



CAMBRIDGE NORTH

ENVIRONMENTAL STATEMENT
VOLUME 1 : MAIN REPORT
JUNE 2022

Quality Assurance

Quality Assurance

Site name:	Cambridge North Phase Two
Client name:	Brookgate Land Ltd on behalf of The Chesterton Partnership
Type of report:	Environmental Statement
Prepared by:	Caroline Rodger BSc (Hons) MSc PIEMA
Signed	
Date	June 2022
Reviewed by:	Peter Radmall MA, B.Phil, CMLI
Signed	
Date	June 2022

A copy of the Environmental Statement and Appendices may be viewed at:

South Cambridgeshire District Council
South Cambridgeshire Hall
Cambourne Business Park
Great Cambourne
Cambourne, Cambridge
CB23 6EA





Paper copies of the Environmental Statement, together with the technical appendices can be purchased from Bidwells at a cost of £350. Alternatively, a CD containing the documents can be provided at a cost of £15 (prices are inclusive of VAT). The Non-Technical Summary is available free of charge.


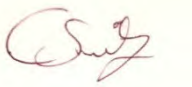

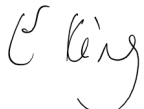


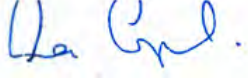
Comments on the Environmental Statement should be directed in writing to South Cambridgeshire District Council at the address above.

Technical Quality Assurance

Technical Quality Assurance

For each of the topic chapters included within this Environmental Statement, the relevant consultants responsible for their production have confirmed the technical robustness of the assessment process.







CHAPTER	ORGANISATION	AUTHOR	AUTHOR'S SIGNATURE
Air Quality		Patrick Nolan	
Climate Change		Katie Fawcett Emma Marsland	
Cultural Heritage		Jenni Mason	
Ecology		Elizabeth White	
Flood Risk and Drainage		Malcolm Cowther	
Human Health		Juliet Clark	
Landscape and Visual		Martina Sechi	
Lighting		Giulio Antonutto	
Noise and Vibration		Norbert Skopinski	
Socio-Economics		Simon Elliot	

CHAPTER	ORGANISATION	AUTHOR	AUTHOR'S SIGNATURE
Soils and Groundwater		Charlotte Smith	
Transport		Eliot King	
Wind		Giulia Matteoni Anna Coppel	 

Statement of Competency

Statement of Competency

This Environmental Statement has been prepared by competent experts. Relevant expertise and qualifications of the expert team are outlined below.

DISCIPLINE	CONSULTANT	AUTHOR, RELEVANT QUALIFICATIONS AND EXPERTISE
EIA Coordinator and ES editor, authors of chapters not otherwise specified below.		Caroline Rodger PIEMA , 2 years' experience in EIA. Peter Radmall, MA, B.Phil, CMLI , 30 years' experience in EIA coordination, particularly in the residential, technology and transport sectors.
Air Quality		Patrick Nolan is a Consultant at Temple Group Limited with considerable experience in the air quality consultancy sector. Patrick has been involved in the production of air quality, odour and dust assessments for a variety of clients from the construction, utility, private and public sectors, including Local Authorities. His assessment work has involved dispersion modelling of road and industrial point sources and passive and active air quality and dust monitoring for a range of sites. Patrick has also been involved in the review of air quality assessments for Local Authorities.
Climate Change		Katie Fawcett MSc Environmental Diagnosis and management, BSc (Hons) Geology. Associate member Institute of Environmental Sciences, Graduate member of IEMA, Full member of institute of Air Quality Management. Katie is an experienced carbon, climate change and air quality consultant with a varied project profile comprising major infrastructure (including DCO) such as National Highways Road schemes and High Speed 2 Phase 2a and 2b, and experience producing EIA and ES chapters for a variety of planning applications. Emma Marsland MSc Environment and Climate Change, BA (Hons) Biology and Communications. Emma is a Senior EIA and Climate Change Consultant with experience leading on carbon reduction and management for large infrastructure projects and preparing climate change assessments for EIA's on a variety of project types and scales. Emma was a member of the working group for the updated IEMA guidance on addressing carbon in EIA.
Cultural Heritage		Jenni Mason, Director, Heritage & Townscape, Turley - Technical Lead Author BSc (Hons) Architectural and Urban Conservation, PG Dip Urban Design, Member of the Institute of Historic Building Conservation (IHBC). Jenni has almost 20 years' experience in conservation of the built environment, with experience gained in both public and private sectors. She has provided cultural heritage technical expertise for and reviewed several EIAs, including bypass schemes, major regeneration projects, urban extensions and new settlements, and for the expansion and development of film studios.
Ecology		Elizabeth White BSc, MSc (Hons) Biodiversity and Conservation. Elizabeth is an ecologist with experience working in the professional sector. She is experienced in a wide range of ecological surveys and has worked on a broad range of projects covering small-scale developments to major infrastructure projects and input in environmental statements. Elizabeth holds Natural England licenses for dormice and great crested newt and is a full member of CIEEM.
Flood Risk and Drainage		Malcolm Crowther (MSc Eng Water Resources Technology, BEng Hons Civil Engineering, CEng MCIWEM Chartered Engineer CIWEM). Malcolm is an Associate charged with managing the company's projects with respect to Flood Risk and Sustainable Drainage services. Since 2002 Malcolm has managed projects in the UK relating to flood risk and environmental impact assessments for diverse sites located within tidal and fluvial floodplains. He advised on flood risk for a programme of land sales undertaken by the Homes and Community Agency (2013 to 2017).









DISCIPLINE	CONSULTANT	AUTHOR, RELEVANT QUALIFICATIONS AND EXPERTISE
Human Health		Juliet Clark BA Geography, MSc Urban Development Juliet is an Associate Member of the Institute of Environmental Management Association and a Chartered Member of the Royal Town Planning Institute. Juliet is a health and socio-economic planner with 12 years' experience across the private & public sectors in the UK. She has expertise in socio-economic strategy development, health impact assessment, designing health into development. social value strategies, planning and economic analysis.
Landscape and Visual		Martina Sechi - Martina is an Associate Landscape Architect, Head of Landscape and Townscape Assessment within the Urban Design Studio at Bidwells. She is a Chartered Member of the Landscape Institute with over 8 years of experience in landscape and townscape assessment. She has worked on a comprehensive range of EIA projects, including tall buildings within Cambridge and other historic towns.
Lighting		Giulio Antonutto is an Associate Director at Arup, with twenty years' experience in the lighting industry. He is a Fellow of the Chartered Institution of Building Services Engineers and a Fellow of the Institution of Lighting Professionals.
Noise and Vibration		Norbert Skopinski – Noise Consultant. Norbert is a principal consultant with nine years of experience in noise and vibration consultancy services. He has worked on several EIA and infrastructure projects, including Crossrail, HS2, Brentwood Enterprise Park, and the River Thames Scheme, where he gained experience in a variety of environmental disciplines. He holds an MSc in Applied Acoustics with distinction from the University of Derby and is a corporate member (MIOA) of the Institute of Acoustics.
Socio-Economics		Simon Elliott BSc (Hons) MSc is a socio-economic planner with over 20 years' experience in the field of socio-economics, which has included acting for many key employment developments in Cambridge including CB1, the Babraham Research Campus, Granta Park and Cambridge Science Park. In addition to providing assessments to accompany planning applications, he is regularly called upon to provide evidence to local plan examinations and act as an expert witness on planning appeals.
Soils and Groundwater		Charlotte Smith has a BSc (Hons) in Environmental Earth Science. Charlotte has been a Chartered Geologist since 2013 and a Specialist in Land Condition (SiLC) since 2021. Charlotte has 14 years' experience in ground investigation and geo-environmental consultancy, and during her career she has worked on a range of public and private sector development schemes. Charlotte has broad experience in the assessment and management of land contamination, having supported planning applications and planning condition discharge, Development Consent Order applications and prospective land acquisitions and divestments.
Transport		Eliot King BA (Hons) Geography MSc Transport Planning. Eliot is an Associate within PJA's Bristol office with over 14 years' experience. Eliot's focus is principally in transport development planning and he has provided transport planning advice on a broad range of developments comprising both EIA and non-EIA schemes.
Wind		Anna Coppel is an Associate at Arup, with 12 years of experience in using Computational Fluid Dynamics in industry. She is a chartered member of the Institution of Mechanical Engineers (CEng IMechE). She holds a PhD in Computational Fluid Dynamics. Giulia Matteoni is a Senior Engineer at Arup, with nine years of experience in the wind engineering industry. She is a chartered member of the Institution of Mechanical Engineers (CEng IMechE). She holds a PhD in wind engineering.

Table of Contents

Table of Contents

1.0	Introduction	1
	Background	1
	Need for the Environmental Statement	1
	Purpose of EIA	2
	Scope of the Environmental Impact Assessment	2
	Environmental Statement Structure	3
	Project Team	4
2.0	Methodology	7
	Introduction	7
	EIA Objectives	7
	General Approach	7
	EIA Method and Assessment Criteria	9
	Relevant Environmental Assessments	20
	Consultation	21
	EIA Elements	27
3.0	Site and Context	33
	Introduction	33
	Site Description and Location	33
	Geology and Hydrogeology	33
	Landscape and Topography	34
	Transport	34
	Flood Risk and Drainage	34
	Air Quality	34
	Archaeology and Cultural Heritage	34
	Ecology and Nature Conservation	35
4.0	Proposed Development and Consideration of Alternatives	39
	Background	39
	Development Overview	39
	Construction Methods, Environmental Mitigation and Monitoring	43
	Consideration of Alternatives	45
	Conclusions	49
5.0	Planning Policy Context	53
	Introduction	53

	Development Plan Policy	53
	Material Considerations	54
	Planning Practice Guidance (PPG)	55
	Emerging Greater Cambridge Local Plan	58
6.0	Air Quality	61
	Introduction	61
	Key Legislation, Policy and Guidance Considerations	61
	Methodology	66
	Limitations and Assumptions	70
	Baseline Conditions	71
	Future Baseline Conditions	75
	Predicted Effects	76
	Assessment of Effects	76
	Mitigation	87
	Residual Effects	89
	Monitoring	90
	Cumulative Effects	90
	Conclusions and Summary of Effects	91
7.0	Climate Change	95
	Introduction	95
	Potential Sources of Impact	95
	Methodology	99
	Baseline Conditions	105
	Future Baseline Conditions	109
	Predicted Effects	117
	Mitigation	123
	Residual Effects	124
	Monitoring	124
	Cumulative Effects	124
	Conclusions and Summary of Impacts	125
8.0	Cultural Heritage	131
	Introduction	131
	Legislation and Policy Context	131
	Potential Sources of Impacts	136
	Methodology	136
	Existing Baseline Conditions	141

	Evolution of the Baseline Conditions without Development	151
	Predicted Impacts	151
	Evaluation of Predicted Impacts	152
	Mitigation	160
	Residual Effects	161
	Cumulative Effects	162
	Monitoring	164
	Summary of Impacts	164
9.0	Ecology	169
	Introduction	169
	Potential Sources of Impact	170
	Planning Policy and Legalisation Context	170
	Methodology	173
	Assessment Criteria and Assignment of Significance	178
	Magnitude of Impact	180
	Significance of Ecological Effects	181
	Baseline Conditions	182
	Potential Impacts - Construction	191
	Potential Impacts – Operation	192
	Assessment of Effects	192
	Monitoring	202
	Cumulative Effects	203
	Conclusions and Summary of Effects	204
10.0	Flood Risk and Drainage	211
	Introduction	211
	Potential Sources of Impact	211
	Policy Context	213
	Local Planning Policy	215
	Methodology	218
	Baseline Conditions	225
	Future Baseline Conditions	231
	Predicted Effects	232
	Assessment of Effects	232
	Operational Effects	236
	Mitigation	238
	Residual Effects	242

	Monitoring	243
	Cumulative Effects	244
	Conclusions and Summary of Effects	245
11.0	Human Health	255
	Introduction	255
	Potential Impacts	255
	Legislation, Policy and Guidance	257
	Methodology	259
	Assessment of Significance	263
	Approach to Cumulative Assessment	266
	Approach to Future Baseline Conditions	266
	Existing Baseline Conditions	267
	Evolution of the Baseline Conditions without the Proposed Development	282
	Predicted Impacts	283
	Evaluation of Predicted Impacts	301
	Mitigation	301
	Residual Effects	301
	Cumulative Effects	301
	Monitoring	301
	Summary of Impacts	302
12.0	Landscape and Visual	305
	Introduction	305
	Potential Sources of Impact	305
	Methodology	305
	Planning Policy Context	309
	Baseline Conditions	314
	Visual Baseline	330
	Future Baseline Conditions	334
	Predicted Effects	335
	Assessment of Landscape/Townscape Effects	335
	Mitigation	343
	Residual Effects	343
	Monitoring	343
	Cumulative Effects	344
	Conclusions and Summary of Effects	345

13.0	Lighting	353
	Introduction	353
	Potential Sources of Impact	353
	Methodology	353
	Baseline Conditions	362
	Future Baseline Conditions	363
	Predicted Effects	363
	Assessment of Effects on Sunlight and daylight	364
	Operational Effects	364
	Construction Sunlight and Daylight	365
	Assessment of Effects Reflected Glare	365
	Operational Effects	365
	Mitigation	368
	Residual Effects	369
	Monitoring	369
	Cumulative Effects	369
	Conclusions and Summary of Effects	370
14.0	Noise and Vibration	375
	Introduction	375
	Key Legislation, Policy and Guidance	375
	Assessment Methodology	385
	Prediction Methodology and Significance Criteria	387
	Baseline Conditions and Identification of Key Receptors	399
	Assessment of Likely Significant Effects	401
	Residual Effects	415
	Cumulative Effects	416
	Conclusions and Summary of Effects	417
15.0	Socio-Economics	427
	Introduction	427
	Potential Sources of Impact	427
	Methodology	427
	Baseline Conditions	433
	Future Baseline Conditions	442
	Predicted Effects	442
	Mitigation	447
	Residual Effects	448

	Monitoring	448
	Cumulative Effects	448
	Conclusions and Summary of Effects	448
16.0	Soils and Groundwater	453
	Introduction	453
	Legislation, Policy and Guidance	453
	Potential Sources of Impact	454
	Methodology	454
	Baseline Conditions	457
	Future Baseline Conditions	462
	Assessment of Predicted Effects	462
	Mitigation	464
	Residual Effects	467
	Monitoring	468
	Cumulative Effects	468
	Conclusions and Summary of Effects	469
17.0	Transport	475
	Introduction	475
	Methodology	475
	Policy	476
	Potential Impacts	476
	Significance Criteria	484
	Magnitude of Impact	484
	Determining the Significance of Effect	485
	Baseline Conditions	486
	Future Baseline Conditions	489
	Predicted Effects	490
	Assessment of Effects	491
	Mitigation	495
	Residual Effects	496
	Monitoring	496
	Cumulative Effects	497
	Conclusions and Summary of Effects	497
18.0	Wind	503
	Introduction	503
	Potential Sources of Impact	503

	Methodology	503
	Baseline Conditions	512
	Predicted Effects	519
	Assessment of Operational Effects	519
	Mitigation	524
	Residual Effects	524
	Monitoring	524
	Cumulative Effects	525
	Conclusions and Summary of Effects	525
19.0	Cumulative Effects	529
	Introduction	529
	Methodology	529
	Inter-project Effects	529
	Intra-Project Effects	530
	Results	530
	Predicted Cumulative Effects – Inter-Project Effects	531
	Predicted Cumulative Effects – Intra Project Effects	537
	Conclusions	538
20.0	Summary of Significant Effects	541
	Introduction	541
	Air Quality	542
	Climate Change	542
	Cultural Heritage	543
	Ecology	544
	Flood Risk and Drainage	545
	Human Health	546
	Landscape and Visual	547
	Lighting	548
	Noise and Vibration	548
	Socio-Economics	550
	Soils and Groundwater	550
	Transport	551
	Wind	551
	Summary of Mitigation Measures and Residual Effects	551
21.0	References	573

List of Appendices

List of Appendices

Chapter 2: Methodology

- Appendix 2.1 Scoping Request
- Appendix 2.2 Scoping Opinion

Chapter 4: Proposed Development and Alternatives

- Appendix 4.1 Plans and Drawings
- Appendix 4.2 Outline Construction Environmental Management Plan (CEMP)

Chapter 4: Air Quality

- Appendix 6.1 Construction Phase Assessment including Dust Risk Assessment
- Appendix 6.2 Detailed Dispersion Modelling Assessment Methodology

Chapter 7: Climate Change

- Appendix 7.1 Relevant Expertise and Qualifications of Competent Experts
- Appendix 7.2 Policy, Guidance and Legislation
- Appendix 7.3 Carbon Assessment Data
- Appendix 7.4 In-Combination Climate Change Impact Assessment Results
- Appendix 7.5 Climate Change Resilience Assessment Results
- Appendix 7.6 Design Guide Input

Chapter 8: Cultural Heritage

- Appendix 8.1 Heritage Asset Plans
- Appendix 8.2 Historic Maps
- Appendix 8.3 Heritage Statement

Chapter 9: Ecology

- Appendix 9.1 Ecology Survey Report
- Appendix 9.2 Ecological Design Strategy
- Appendix 9.3 Biodiversity Net Gain Report

Chapter 10: Flood Risk and Drainage

- Appendix 10.1 Cambridge North Development Flood Risk Assessment and Drainage Strategy
- Appendix 10.2 Water Resource Addendum

Chapter 11: Human Health

- Appendix 11.1 Health Scoping HUDU Matrix
- Appendix 11.2 Health Policy and Guidance
- Appendix 11.3 Study Area Health Profiles

Chapter 12 Landscape and Visual

- Appendix 12.1 Methodology
- Appendix 12.2 Mapping
- Appendix 12.3 Visual Assessment
- Appendix 12.4 Technical Visualisations by VuCity
- Appendix 12.5 Correspondence

Chapter 13: Lighting

- Appendix 13.1 Sunlight and Daylight Assessment
- Appendix 13.2 Obtrusive Lighting Assessment
- Appendix 13.3 Reflective Solar Glare Assessment

Chapter 14: Noise and Vibration

- Appendix 14.1 Noise and Vibration Technical Appendices
- Appendix 14.2 Noise Impact Assessment for Residential Planning

Chapter 16: Soils and Groundwater

- Appendix 16.1 Phase 1 Geo-environmental Desk Study
- Appendix 16.2 Definitions of Probability, Consequence and Risk.
- Appendix 16.3 Criteria for Determining Sensitivity of Receptors, Magnitude of Impact and Significance of Effects

Appendix 16.4: Baseline, Construction Phase and Operation Phase Conceptual Site Models

Chapter 17: Transport

Appendix 17.1 Transport Assessment

Appendix 17.2 Framework Travel Plan

Appendix 17.3 Low Emission Strategy

Chapter 18: Wind

Appendix 18.1 Computational Fluid Dynamics (CFD) Methodology and Analysis

List of Abbreviations

List of Abbreviations

AADT	Annual Average Daily Traffic (flow)
AAP	Area Action Plan
ABS	Annual Business Survey
AEP	Annual Exceedance Probability
ANPR	Automatic Number Plate Recognition
AOD	Above Ordnance Datum
AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
AQO	Air Quality Objective
AQS	Air Quality Standard
ASB	Anti-social behaviour
BEES	Building Energy Efficiency Survey
BEIS	Department for Business, Energy & Industrial Strategy
BGL	Below Ground Level
BGS	British Geological Survey
BRE	Building Research Establishment
BREEAM	Building Research Establishment Environmental Assessment Method
BS	British Standard
BSI	British Standards Institution
BtR	Built to Rent
CCC	Cambridgeshire County Council
CCG	Clinical Commissioning Groups
CCiC	Cambridge City Council
CCR	Climate Change Resilience
CDM	Construction (Design and Management) Regulations 2015
CEMP	Construction Environmental Management Plan
CGB	Cambridgeshire Guided Busway
CHP	Combined Heat and Power
CIBSE	Chartered Institution of Building Services Engineers
CIRIA	Construction Industry Research and Information Association
Conservation Area	An area of notable environmental or historical interest or importance which is protected by law against undesirable changes.
COSHH	Control of Substances Hazardous to Health
CSM	Conceptual Site Model
CTMP	Construction Traffic Management Plan

Environmental Statement Vol 1 Main Report

Cultural Heritage	The heritage of tangible and intangible heritage assets of a group or Society that is inherited from past generations.
DBEIS	Department for Business, Energy and Industrial Strategy
Decibel (dB)	This is the unit sound pressure levels are presented in. They are a logarithmic ratio between the sound pressure and a reference sound pressure (20 μ Pa). A 3dB increase is a doubling of sound energy but is generally a just noticeable increase; a 10dB increase is a 10-fold increase in sound energy and is generally perceived as being twice as loud.dB(A) This indicates that the overall dB noise level has been 'A-weighted'; this is a weighting applied to instrument-measured sound levels to account for the relative loudness perceived by the human ear.
DEFRA	Department for Environment, Food and Rural Affairs
Designated Heritage Asset	A World Heritage Site, Scheduled Monument, Listed Building, Protected Wreck Site, Registered Park and Garden, Registered Battlefield or Conservation Area designated under the relevant legislation.
DMP	Dust Management Plan
DTM	Digital Terrain Model
DWS	Drinking Water Standards
EA	Environment Agency
EC	European Commission
EFT	Emissions Factor Toolkit
EIA	Environmental Impact Assessment
EPC	Energy Performance Certificate
EPUK	Environmental Protection UK
EQS	Environmental Quality Standards
ES	Environment Statement
EU	European Union
FFL	Finished Floor Level
FPD	First Public Drain
FRA	Flood Risk Assessment
GAC	Generic Assessment Criteria
GCP	Greater Cambridge Partnership
GEA	Gross External Area
GHG	Green House Gases
GI	Ground Investigation
GIA	Gross Internal Area
GLA	Greater London Authority
GSCP	Greater Cambridge Shared Planning
GWP	Global-Warming Potential
HCA	Homes and Communities Agency

Environmental Statement Vol 1 Main Report

HDV	Heavy Duty Vehicle
Heritage Asset	A building, monument, site, place, area or landscape identified as having a degree of significance meriting consideration in planning decisions, because of its heritage interest. It includes designated heritage assets and assets identified by the local planning authority (including local listing).
HGV	Heavy Goods Vehicles
HIA	Health Impact Assessment
HMO	Homes in Multiple Occupation
HUDU	Healthy Urban Development Unit
HWS	Health and Wellbeing Strategy
IAIA	International Association for Impact Assessment
IAQM	Institute of Air Quality Management
ICCI	In-Combination Climate Change
ICoP	Interim Code of Practice
IEMA	Institute of Environmental Management and Assessment
ILP	Institution of Lighting Professionals
IMD	Indices of Multiple Deprivation
IWMS	Integrated Water Management Study
JSNA	Joint Strategic Needs Assessment
L_{A10} and L_{A90}	The L_{A10} index is often used in the description of road traffic noise, whilst the L_{A90} , the noise level exceeded for 90% of the measurement period, is the usual descriptor for underlying background noise.
LAEI	London Atmospheric Emissions Inventory
L_{Aeq}	This represents the A-weighted 'ambient noise level' also known as the equivalent continuous sound level. As almost all sounds vary or fluctuate with time it is helpful to have an average of the total acoustic energy experienced over its duration. The $L_{Aeq,16hr}$ for example, describes the equivalent continuous sound level over the 16-hour period between 7am and 11pm.
L_{AFmax}	The maximum RMS A-weighted sound pressure level, using the Fast time weighting.
LAQM	Local Air Quality Management
LCA	Life Cycle Assessment
LDC	Land Drainage Consent
LDV	Light Duty Vehicle
LES	Low Emission Strategy
LFRRMS	Local Flood Risk Management Strategy
LGS	Local Geological Site
LHA	Local Highway Authority
LIDAR	Light Detection and Ranging

Environmental Statement Vol 1 Main Report

Listed Building	A building or structure of special architectural and historic interest which is protected by law against unauthorised works that affect its special interest.
LLFA	Lead Local Flood Authority
L_n	Another method of describing, with a single value, a noise level which varies over a given time period is to consider the length of time for which a particular noise level is exceeded. If a level of X dB(A) is exceeded for say 6 minutes within one hour, then that level can be described as being exceeded for 10% of the total measurement period. This is denoted as the $L_{A10} = X$ dB.
LNR	Local Natural Reserve
LPA	Local Planning Authority
LSOA	Lower Super Output Areas
LZC	Low and Zero Carbon
mAOD	metres Above Ordnance Datum
MSA	Mineral Safeguarding Area
MSCP	Multi-Storey Car Park
MSOA	Middle Super Output Area
MYPE	Mid-Year Population Estimates
NAQO	National Air Quality Strategy Objectives
NC	New Construction
NEC	North East Cambridge
NECAAP	North East Cambridge Area Action Plan
NIA	Net Internal Area
NNR	Nation Natural Reserve
NO ₂	Nitrogen Dioxide
Non-designated Heritage Asset	Non-designated heritage assets are buildings, monuments, sites, places, areas or landscapes identified by plan-making bodies as having a degree of heritage significance meriting consideration in planning decisions, but which do not meet the criteria for designated heritage assets.
NO _x	Oxides of nitrogen
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
NRMM	Non-Road Mobile Machinery
OA	Output Area
ONS	Office for National Statistics
PAH	Polycyclic aromatic Hydrocarbons
PASH	Annual Probable Sunlight Hours
PBDE	Polybrominated diphenyl ethers
PCB	Polychlorinated Biphenyls
PFOS	Perfluorooctane Sulphonate

Environmental Statement Vol 1 Main Report

PHE	Public Health England
PJA	Phil Jones Associates
PM	Particulate Matter
PM10	Particulate matter of size fraction approximating to <10mm diameter
PM2.5	Particulate matter of size fraction approximating to <2.5mm diameter
P-OWMP	Preliminary Operational Waste Management Plan
PPG	Planning Policy Guidance
PPS	Playing Pitch Strategy
PRoW	Public Rights of Way
PRS	Private Rented Sector
PWSH	Winter Probable Sunlight Hours
RBMP	River Basin Management Plan
RC	Reinforced Concrete
Registered Park and Garden	A garden, grounds or other planned open space such as a town square which are of particular historic interest. The impact of any proposed development on its special character must be considered in the planning process.
RMA	Risk Management Authority
RNAG	Reasons for Not Achieving Good
S106	Section 106
SAC	Special Area of Conservation
SCDC	South Cambridgeshire District Council
Scheduled Monument	A site of national archaeological importance that is protected by law.
SCI	Statement of Community Involvement
SDC	Sustainable Design and Construction
SFRA	Strategic Flood Risk Assessment
SHMA	Strategic Housing Market Assessment
SINC	Site of Importance for Nature Conservation
SLL	Society of Light and Lighting
SNPP	Sub National Population Projections
SPA	Special Protection Area
SPD	Supplementary Planning Document
SPG	Supplementary Planning Guidance
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage Systems
SWMP	Surface Water Management Plan
TA	Transport Assessment

TEB	Transport Evidence Base
Temple	Temple Group Limited
TG	Technical Guidance
TPH	Total Petroleum Hydrocarbons
UK-AIR	UK Air Information Resource
UKCP18	UKCP18 Climate Projections
UXO	Unexploded Ordnance
VSC	Vertical Sky Component
WCS	Water Cycle Study
WFD	Water Framework Directive
WHIASU	Wales Health Impact Assessment Support Unit
WHO	World Health Organisation
WRE	Water Resources East

Landscape and Visual

The following definitions are in line with the glossary provided by the Landscape Institute guidance (GLVIA3 and TGN 06/19):

The following definitions are in line with the glossary provided by the Landscape Institute guidance (GLVIA3 and TGN 06/19):

AVR 0/1/2/3	Accurate Visual Representation. A still image, or animated sequence of images, intended to convey reliable visual information about a proposed development.
AVR Level 0	Location and size of proposal. This equates to a photowire and provides an outline of the proposal overlaid onto the photograph base.
AVR Level 1	Location, size and degree of visibility of proposal. This shows the massing of the proposal within a 3D context represented by the photograph - that is, what can and cannot be seen.
AVR Level 2	As level 1 + description of architectural form. This illustrates architectural form such as doors, windows and floors, and gives a sense of the form and shading of the development within its context.
AVR Level 3	As level 2 + use of materials. This is a fully rendered photomontage, usually photo-realistic with texture, shading and reflections as appropriate.
DEVELOPMENT	Any proposal that results in a change to the landscape and/or visual environment.
DESIGNATED TOWNSCAPE/ LANDSCAPE	Areas of townscape/landscape identified as being of importance at international, national or local levels, either defined by statute or identified in development plans of other documents.
EFFECTS	The change resulting from the action (the action being the development proposal).
IMPACTS	The action being taken (the action being the development proposal).
ITERATIVE DESIGN PROCESS	The process by which project design is amended and improved by successive stages of refinement which respond to a growing understanding of environmental issues.
LANDSCAPE	An area, as perceived by people, the character of which is the result of the action and interaction of natural and/or human factors.

Environmental Statement Vol 1 Main Report

LAND-USE	What the land is used for, based on broad categories of functional land cover, such as urban and industrial use and the different types of agriculture and forestry.
LPA	Local Planning Authority
MAGNITUDE (of effects)	A term that combines judgements about the size and scale of the effects, the extent of the area over which it occurs, whether it is reversible or irreversible and whether it is short or long term in duration.
SENSITIVITY	A term applied to specific receptors, combining judgments of the susceptibility of the receptor to the specific type of change or development proposed and the value related to that receptor.
SIGNIFICANCE	A measure of the importance or gravity of the environmental effect, defined by significance criteria specific to the environmental topic.
SUSCEPTIBILITY	The ability of a defined townscape or visual receptor to accommodate the specific Proposed Development without undue negative consequences.
TECHNICAL VISUALISATIONS	Visualisation Types, which are intended to form part of a professional Landscape and Visual Impact assessment (LVIA), Townscape and Visual Impact Assessment (TVIA) or Appraisals that typically accompany planning applications. It is critical that these visualisations are accurate, objective and unbiased. (Type 1 - annotated viewpoint photographs; Type 2 - 3D wireline / model; Type 3 - photomontage / photowire; and Type 4 - photomontage / photowire (survey / scale verifiable).
TOWNSCAPE	The character and composition of the built environment including the buildings and the relationship between them, the different type of urban open space, including green spaces, and the relationship between buildings and open space.
TOWNSCAPE RECEPTORS	Defined aspects of the townscape resource that have the potential to be affected by the proposal.
VERIFIED VIEWS or VERIFIED PHOTOMONTAGE	Visualisations subjected to a quality assurance process to confirm that what is being presented is an accurate reflection of the true situation.
VIEWPOINT	These can be actual or virtual. They are points in space from where the view is obtained.
VISUALISATIONS	Computer simulation, photomontage or other technique to illustrate the predicted appearance of the development.
VISUAL AMENITY	The overall pleasantness of the view people enjoy of their surroundings, which provides an attractive visual setting or backdrop for the enjoyment of activities of the people living, working, recreating, visiting or travelling through an area.
VISUAL RECEPTORS	Individual and/or defined groups of people who have the potential to be affected by the proposal
ZTV	Zone of Theoretical Visibility: A map, usually digitally produced, showing areas of land within which development is theoretically visible.

Introduction



1.0 Introduction

Background

- 1.1 Bidwells LLP have been instructed by Brookgate Land Ltd on behalf of The Chesterton Partnership (hereafter “the Applicant”) to undertake an Environmental Impact Assessment (EIA) under the Town and Country Planning (Environmental Impact Assessment) (England) Regulations 2017 (as amended) (hereafter ‘the EIA Regulations’) to accompany a hybrid planning application for mixed-use development on land off Cowley Road, Cambridge.
- 1.2 Cambridge North railway station was granted planning permission in 2016 and the station was completed and opened for passenger services in May 2017. Two subsequent concurrent applications, comprising a hotel (also known as Two Cambridge Square and building S02 in the masterplan) and office (also known as One Cambridge Square and building S03 in the masterplan) were granted planning permission in 2018. This represented the first phase of the Cambridge North redevelopment.
- 1.3 This application represents the second phase in the wider redevelopment of Cambridge North and will further build on the momentum created by the Station development and the hotel and office permissions.
- 1.4 The description of development for which permission is being sought (hereafter “the Proposed Development”) is:
- *An outline application (all matters reserved apart from access and landscaping) for the construction of three new residential blocks, providing flexible Class E and Class F uses on the ground floor (excluding Class E (g) (iii)), and two commercial buildings for Use Classes E(g) i (offices), ii (research and development) providing flexible Class E and Class F uses on the ground floor (excluding Class E (g) (iii)), construction of basements for parking and building services, car and cycle parking and infrastructure works;*
 - *A full application for the construction of three commercial buildings for Use Classes E(g) i (offices) ii (research and development), providing flexible Class E and Class F uses on the ground floor (excluding Class E (g) (iii)), with associated car and cycle parking, a multi storey car and cycle park, construction of basements for parking and building services, car and cycle parking and associated landscaping and infrastructure works.*
- 1.5 The Environmental Statement (ES) is organised into three main volumes as follows:
- Volume 1: Main Report (this document);
 - Volume 2: Technical Appendices (providing figures and detailed assessments for particular issues); and
 - Volume 3: Non-Technical Summary (NTS) providing an overview of the main findings and recommendations reported in the ES.

Need for the Environmental Statement

- 1.6 Certain types of development are required to be the subject of EIA (“EIA development”). Schedule 1 of the EIA Regulations lists the type and scale of development that automatically require EIA. Schedule 2 of the EIA Regulations sets out the development types that may require EIA (“Schedule 2 development”). To qualify as a Schedule 2 development, it must be either located in a “Sensitive Area” as defined in Regulation 2(1) or exceed the applicable threshold in

Schedule 2. Not all Schedule 2 development will require EIA and they consequently need to be screened on a case-by-case basis using the criteria set out in Schedule 3 of the Regulations.

- 1.7 The proposal in this case does not qualify as a Schedule 1 development and is not located within or close to a Sensitive Area. It is, however, of a type and scale that falls within Schedule 2(10) 'Infrastructure Projects' - specifically 10(b) 'Urban Development Projects'. The Proposed Development exceeds the relevant thresholds on the basis the development includes more than 150 units and is more than 5 hectares. The Proposed Development comprises up to 425 units and the Site area is approximately 9.9 hectares in size.
- 1.8 In accordance with the EIA Regulations, given the size, scale and nature of the Proposed Development, significant environmental effects are considered likely in the absence of measures to reduce these effects. Accordingly, the Applicant has volunteered to conduct an EIA.

Purpose of EIA

- 1.9 The National Planning Practice Guidance (NPPG) sets out that the aim of an EIA is to:
- “Protect the environment by ensuring that a local planning authority when deciding whether to grant planning permission for a project, which is likely to have significant effects on the environment, does so in the full knowledge of the likely significant effects, and takes this into account in the decision-making process...”*
- The aim of Environmental Impact Assessments is also to ensure that the public are given early and effective opportunities to participate in the decision-making procedures.” Paragraph:002 Reference ID: 4-002-20140306*
- 1.10 In enabling the systematic examination of effects from a proposal, EIA facilitates refinement of an emerging development proposal to minimise adverse impacts on the environment and to maximise beneficial consequences. EIA, as reported in the ES, seeks to ensure that the likely significant environmental effects of a development proposal are understood by the decision makers and taken into account in evaluating the proposal. The ES also provides information to interested parties, thereby facilitating participation in decision-making processes.

Scope of the Environmental Impact Assessment

- 1.11 Regulation 15 of the EIA Regulations allows applicants to request a written statement from the relevant planning authority as to the content of the EIA and the information to be provided in the ES. This 'Scoping Opinion' provides clarity on content and methodology.
- 1.12 The scoping process followed for this application is described in detail in Chapter 2. In summary, this concluded that the Proposed Development was likely to give rise to significant environmental effects upon the following environmental aspects and, as such, these should be addressed in the EIA:
- Air Quality;
 - Climate Change;
 - Cultural Heritage;
 - Ecology;
 - Flood Risk and Drainage;
 - Human Health;

- Landscape and Visual;
- Lighting;
- Noise and Vibration;
- Socio-Economics;
- Soils and Groundwater;
- Transport;
- Wind; and
- Cumulative Impacts.

Environmental Statement Structure

1.13 Volume 1 of the ES (this volume) presents the findings of the EIA in a series of chapters. The document is structured as follows:

- Chapter 1- Introduction
- Chapter 2- Methodology
- Chapter 3- Site and Context
- Chapter 4- Proposed Development and Alternatives
- Chapter 5- Planning Policy
- Chapter 6 - Air Quality
- Chapter 7- Climate Change
- Chapter 8 - Cultural Heritage
- Chapter 9 - Ecology
- Chapter 10 - Flood Risk and Drainage
- Chapter 11- Human Health
- Chapter 12 - Landscape and Visual
- Chapter 13- Lighting
- Chapter 14 - Noise and Vibration
- Chapter 15 - Socio-Economics
- Chapter 16 - Soils and Groundwater
- Chapter 17 - Transport
- Chapter 18 - Wind
- Chapter 19 - Cumulative Effects
- Chapter 20 - Summary of Significant Effects

Volume 2

1.14 A number of technical reports have been produced to accompany the planning application. Those reports relied on in the EIA are compiled in the ES (Volume 2) for completeness.

Volume 3

1.15 This volume provides a relatively short, non-technical summary of the outcomes of the EIA as reported in the ES. This is a useful starting point for readers of the ES and is presented separately.

Project Team

1.16 The production of this ES has been co-ordinated by Bidwells and presents the results of the EIA process carried out by a number of specialist consultants on behalf of the Applicants. The roles and responsibilities of each member of the team are set out in **Table 1.1**.

Table 1.1: EIA Consultant Team

ENVIRONMENTAL ASPECT	CONSULTANT
Air Quality	Temple Group
Climate Change	Arup
Cultural Heritage	Turley
Ecology	RPS Group
Flood Risk and Drainage	Phil Jones Associates (PJA)
Human Health	Stantec
Landscape and Visual	Bidwells LLP
Lighting	Arup
Noise and Vibration	Temple Group
Socio-Economics	Bidwells LLP
Soils and Groundwater	PJA
Transport	PJA
Wind	Arup

1.17 The methodology and approach that has been adopted for preparation of this ES is outlined in Chapter 2.

Methodology



2.0 Methodology

Introduction

- 2.1 This chapter describes the background and methodology used for undertaking the EIA, defines the scope of assessment and sets out the approach for reporting this assessment within the ES.

EIA Objectives

- 2.2 The objectives of the EIA are:
- To establish existing/baseline environmental conditions;
 - To identify, describe and assess the significance of the environmental effects of the Proposed Development, during both construction and operation; and
 - To identify mitigation, enhancement and monitoring measures to prevent, reduce or remedy significant adverse effects and to maximise the beneficial effects of the Proposed Development.

General Approach

- 2.3 The EIA process, generally, has comprised a series of stages (see **Figure 2.1**).
- 2.4 This ES has been prepared in accordance with the EIA Regulations. These Regulations translate the requirements of the European Union Directive 2014/52/EU on the Assessment of the Effects of Certain Public and Private Projects on the Environment (“the EIA Directive”), the most recent being the Town and Country Planning (Environmental Impact Assessment) Regulations 2017. Amendments to the EIA Regulations include those which continue to implement EIA on the United Kingdom (UK)’s exit from the European Union (“The Environmental Assessments and Miscellaneous Planning (Amendment) (EU Exit) Regulations 2018”).
- 2.5 The EIA has also been prepared with regard to other guidance, as referenced, including:
- EIA Guide to Delivering Quality Development (Institute for Environmental Management and Assessment (IEMA) 2016);
 - EIA Guide to Shaping Quality Development (IEMA 2015);
 - National Planning Practice Guidance (Ministry of Housing, Communities & Local Government);
 - Ministry of Housing, Communities and Local Government (MHCLG 2018); and
 - Guidelines for Environmental Impact Assessment (IEMA 2004).

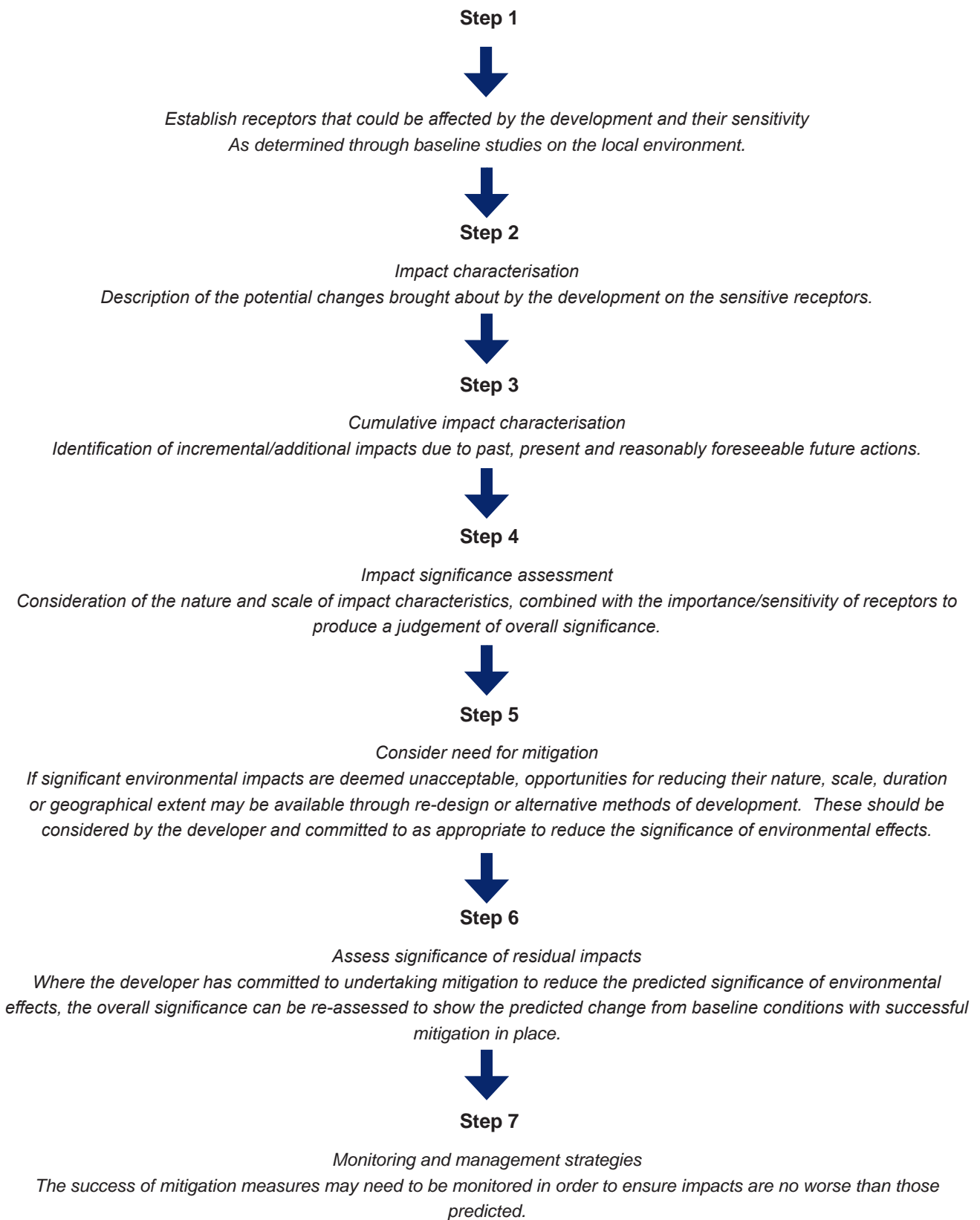


Figure 2.1 Environmental Impact Assessment Process

EIA Method and Assessment Criteria

Approach

- 2.6 This EIA has assessed the Proposed Development based on the application for a hybrid planning application. A series of Parameter Plans, (**Appendix 4.1** of Volume 2 of this ES) have been developed as part of the design process in order to set the framework for the outline elements of the Proposed Development. These are submitted for approval, as part of the Outline Planning Application, and form the basis of the EIA.
- 2.7 A description of the Proposed Development is provided in Chapter 4 of this ES. The Parameter Plans in **Appendix 4.1**, relevant explanatory and illustrative detail within the Design and Access Statement (DAS), the Proposed Development description and associated appendices, and any points of elaboration in the technical chapters, form the basis of the project, which has been subject to EIA.

Definitions of Impacts and Effects

- 2.8 For clarity, attention has been taken in this ES to distinguish between environmental impacts and environmental effects. These are defined as follows:
- Environmental Impacts: the process whereby a change, which may be beneficial or adverse or both, is brought about in the existing environment as a result of the development activities; and
 - Environmental Effects: the consequences for the natural and man-made environment, including humans.

Significance of Effects

- 2.9 The EIA regulations require that an EIA assesses the likely significant effects arising from a proposal on population, human health, biodiversity, land, soil, water, air, climate, material assets, cultural heritage, landscape and interactions between these topics. The definition of significance is prescribed to varying degrees by statute and policy (including EU and national policies, guidelines and standards). In many cases, however, such guidance is general in nature. It is broadly accepted that the significance of an effect reflects the relationship between two factors:
- The value of the affected resource or receptor and its sensitivity to the impact (which can vary depending on the nature of the impact); and
 - The magnitude of an impact (i.e. the actual change taking place to the environment).
- 2.10 Determination of significance is based on consideration of the characteristics of the impact, including the likelihood, character (direct, indirect, secondary or cumulative); duration (frequency, short, medium and long term, permanent or temporary), and importance; the environmental sensitivity of receptors; and any quantified thresholds or indicative criteria set out in Government Regulations and Policy Guidelines. Where quantifiable criteria are not available or appropriate, defined qualitative criteria and expert judgement are applied.
- 2.11 The timescales considered are as follows:
- Short Term (i.e. less than 5 years);
 - Medium Term (i.e. 5-10 years);
 - Long Term (i.e. for the duration of the operational phase of the development);

2.12 The nature of the effect is considered as follows:

- Permanent (i.e. irreversible); and
- Temporary (i.e. during the Construction Phase or visual impacts during the operational phase prior to landscaping maturing).

2.13 The significance of effects has been assessed using one or more of the following criteria, unless otherwise stated:

- International, national and local standards;
- Relationship with planning policy;
- Sensitivity of receiving environment;
- Reversibility and duration of effect;
- Magnitude of effect;
- Likelihood of effect and related uncertainties;
- Inter-relationship between effects; and
- The results of consultations.

Identification of Sensitive Receptors

2.14 The environmental effects of a given development are typically predicted in relation to sensitive receptors, including nearby residential developments and natural resources.

2.15 **Table 2.1** below sets out standardised approach to considering the value and sensitivity of identified receptors and refers exclusively to environmental designations.

Table 2.1: Sensitivity Receptors

VALUE	SENSITIVITY	CHARACTERISTICS
International/National	VERY HIGH	Extremely rare (endangered), potentially extremely vulnerable to change, of international importance or recognition, very limited potential for substitution. For example, World Heritage Site, Ramsar Wetland etc.
National	HIGH	Rare, National Importance or recognition, limited potential for substitution, highly vulnerable to change, protected in national legislation. For example Site of Special Scientific Interest, National Parks, Grade I and Grade II* Listed Buildings and Scheduled Ancient Monuments.
Regional/County/District	MODERATE	Somewhat rare or vulnerable and difficult to substitute. Resources and receptors of Regional, County or District Importance e.g. Regional and Country Wildlife Sites, Grade II Listed Buildings.
District/Local	LOW	Locally Important, difficult to substitute at a local level, rare or unusual at the local level but well represented elsewhere. For example, Local Nature Reserves, Locally Listed Buildings etc.
Local	VERY LOW	Of limited importance or value, not vulnerable to change, can be readily substituted and/or which have been partially destroyed. E.g. undesignated buildings of some limited historical significance.
Negligible	NEGLIGIBLE	Areas where there is minimal evidence of any resource or receptor.

Magnitude of Change

2.16 Impacts can arise from direct actions and from the proximity of new structures (e.g. noise or dust) or indirectly as a consequence of the development. Indirect impacts are a matter of fact and judgement; an example of an indirect impact is a substantial requirement for the offsite sourcing of aggregate materials. Impacts can be beneficial or adverse, temporary or permanent. The degree of impact has been considered in terms of Major, Moderate, Minor or Negligible as set out in **Table 2.2**.

Table 2.2: Magnitude of Change

	MAGNITUDE	CHARACTERISTICS OF CHANGE
	Severe	Fundamental, wide spread and long term enhancement to the environment.
	Major Beneficial	The Proposed Development would remove features that adversely affect the existing environment, prevent further degradation, and enhance and protect the environment in the long-term.
	Moderate Beneficial	The Proposed Development would notably reduce rate of current degradation and/ or enhance existing character.
	Minor Beneficial	The Proposed Development would reduce rate of current degradation.
	None	The Proposed Development would not result in any meaningful change to the receptor/ resource.
	Minor Adverse	The Proposed Development would increase the rate of current degradation or introduce some minor detractors into the environment.
	Moderate Adverse	The Proposed Development would result in the partial loss of a resource or notably degrade a receptor environment.
	Major Adverse	The Proposed Development would result in the complete loss of a resource or compromise the integrity of a receptor such that its long-term survival is highly unlikely.
	Severe	Total loss/ damage/ destruction of or major alteration / changes to key elements / features/ characteristics of the receiving environment.

Evaluation of Significance

2.17 Wherever applicable, topic-specific good practice methodologies, established impact prediction techniques, recognised models or guidelines are used to evaluate the significance of the likely effects. Where statutory criteria have not been available, non-statutory guidance or acknowledged reference points are adopted. The details of all methods and assessment criteria are provided in each ES technical chapter (chapters 6-18).

2.18 The primary objective of the assessment is to identify the likely significant environmental effects. A general approach to the determination of whether the result is deemed to be significant is described below. Whilst significance is not absolute, terms and assumptions are clearly set out so that the process is as transparent as possible.

2.19 Combining the value of each resource and the magnitude of the change (impact) resulting from the Proposed Development, an assessment has been made of the significance of the effect, as indicated in **Table 2.3** below.

Table 2.3: Significance Matrix

		BASELINE SENSITIVITY				
		VERY HIGH	HIGH	MODERATE	LOW	VERY LOW
MAGNITUDE OF CHANGE	MAJOR BENEFICIAL	Major Beneficial	Major-Moderate Beneficial	Moderate Beneficial	Moderate/Minor Beneficial	Minor Beneficial
	MODERATE BENEFICIAL	Major-Moderate Beneficial	Moderate Beneficial	Moderate-Minor Beneficial	Minor Beneficial	Minor/Beneficial
	MINOR BENEFICIAL	Moderate Beneficial	Moderate/Minor Beneficial	Minor Beneficial	Minor/Beneficial	Negligible
	NEUTRAL	Negligible	Negligible	Negligible	Negligible	Negligible
	MINOR ADVERSE	Moderate Adverse	Moderate/Minor Adverse	Minor Adverse	Minor/Negligible Adverse	Negligible
	MODERATE ADVERSE	Major-Moderate Adverse	Moderate Adverse	Moderate/Minor Adverse	Minor Adverse	Minor/Negligible Adverse
	MAJOR ADVERSE	Major Adverse	Major-Moderate Adverse	Moderate Adverse	Moderate/Minor Adverse	Minor Adverse

2.20 The above matrix has been used to assess the significance of environmental effects where they are predicted to occur, although specific assessment guidelines for certain topics may use slightly different criteria. Where this is the case, the method for assessing significance has been outlined within the relevant topic chapter. The following terms are used in the ES, unless otherwise stated, to describe the significance of impacts:

- **Major beneficial or adverse significant effect-** where the development would cause a significant improvement (or deterioration) to the existing environment;
- **Moderate beneficial or adverse significant effect-** where the development would cause a noticeable improvement (or deterioration) to the existing environment;
- **Minor beneficial or adverse effect –** where the development would cause a small or barely perceptible improvement (or deterioration) to the existing environment; and,
- **Negligible-** no discernible improvement or deterioration to the existing environment.

2.21 Where there is a possibility of a “borderline” determination of significance (e.g. Moderate/Minor) the outcome has been identified on the basis of professional judgement and/or the specifics of the assessment for that topic.

Mitigation Measures

2.22 The ES identifies appropriate mitigation measure to avoid, prevent, reduce, or compensate for impacts. Opportunities for enhancement are also taken advantage of, so as to maximise the beneficial effects.

2.23 In general, mitigation can include:

- Measures relied upon which are part of the design, and thus for approval under this planning application. These include modifications to the location or design of the proposals at pre-consent stage. IEMA (2016) refers to these as ‘inherent’ mitigation.
- Measures which need to be secured at a later stage, such as through a condition or planning obligation. These can be called ‘foreseeable’ mitigation. Examples of these are provision of community infrastructure offsite, adherence to noise limits, or management through a plan which has not yet been produced (such as provision of a Transport Plan, with details to be agreed by condition).
- Measures which will be undertaken to meet other existing legislative requirements, or standard practice used to manage commonly occurring environmental effects. An example of these measures is adherence to emissions control measures required under parallel consenting regimes, or standard considerate contractor practices to manage possible sources of nuisance during construction. These can be called ‘tertiary’ mitigation.

2.24 This ES identifies the type of mitigation, considers the certainty of its effectiveness, the mechanism for securing the mitigation, and the timescales over which it would be applied. This provides greater clarity on how the mitigation measures will be secured.

Evaluation of Residual Effects

2.25 Residual effects are the remaining impacts of the development assuming successful implementation of the identified mitigation measures. The significance of impacts is assessed and categorised as per the methodology, specifically:

- Major, moderate, minor or negligible;
- Positive (beneficial), negative (adverse);
- Short, medium or long term;
- Permanent or temporary;
- Reversible or irreversible;
- Direct or indirect; and
- Unavoidable or uncertain.

Monitoring

2.26 The need for monitoring of likely significant effects has been considered, and details of suggested monitoring activities have been recommended where relevant.

2.27 This has considered the type of indicators to be monitored and has ensured that the duration and character of the monitoring are proportionate to the nature, location and size of the Proposed Development and the significance of its effects. Avoidance of duplication of monitoring has been considered, and any existing suitable monitoring arrangements have been identified.

2.28 The effectiveness of mitigation measures and the need for potential remedial action have been considered, based on the nature of the effect and the monitoring suggested.

2.29 The mitigation and monitoring measures are set out in each environmental topic chapter and summarised in the concluding tables to aid decision making and implementation.

Relationship to Parallel Consenting Regimes

- 2.30 EIA is undertaken to inform planning application decisions for particular projects, based on the requirements set out in the EIA Regulations. The test of consent for a planning application is whether the proposals are an acceptable use of land, in terms of relevant planning policy. There are wholly separate consenting regimes for the control of processes and emissions, such as the environmental permitting regulatory system. Consequently, it is not for the EIA process to duplicate the requirements of these other consenting regimes.

EIA Scoping Request

- 2.31 The original version of the Proposed Development was subject a Screening Opinion dated 6 June 2017 (planning reference S/1714/17/E1) which confirmed that an EIA would be required. This was then followed by a formal scoping process which commenced in August 2020 by submitting a formal Scoping Request to SCDC. Subsequently SCDC issued their Scoping Opinion on 8 October 2020 (planning reference: 20/03464/SCOP). As the proposals have changed since the issue of the Scoping Opinion dated October 2020, a further Scoping Request was submitted to SCDC in November 2021 (**Appendix 2.1**). SCDC issued their formal Scoping Opinion (**Appendix 2.2**) on 9 February 2022 (planning reference 21/05178/SCOP). This process identified the following topics to be considered in the EIA:

- Air Quality;
- Climate Change;
- Cultural Heritage;
- Ecology;
- Flood Risk and Drainage;
- Human Health;
- Landscape and Visual;
- Lighting;
- Noise and Vibration;
- Socio-Economics;
- Soils and Groundwater;
- Transport;
- Wind; and
- Cumulative Impacts.

- 2.32 In order to inform their Scoping Opinion, SCDC consulted the following:

- Environment Agency;
- Natural England;
- **Greater Cambridge Shared Planning Service:**
 - Conservation and Design;
 - Landscape;
 - Nature Conservation;
 - Sustainable Drainage;

- Urban Design;
- Planning Policy; and
- Sustainability.
- Greater Cambridge Shared Waste;
- **South Cambridgeshire District Council:**
 - Environmental Health;
 - Sustainable Drainage; and
 - Community Development.
- **Cambridge City Council:**
 - Environmental Health.
- **Cambridgeshire County Council:**
 - Highways;
 - Archaeology;
 - Growth and Economy; and
 - Local Flood Authority.
- Cambridgeshire Wildlife Trust;
- Anglian Water;
- Cambridge Water;
- Cambridge Past, Present and Future;
- Highways England;
- Historic England;
- RSPB;
- Milton Parish Council; and
- National Grid.

Scope of Environmental Topics

2.33 It should be noted that the other environmental topics required to be considered under Regulation 4 (2) were determined not likely to have significant environmental effects and either have not been considered in the EIA, or have been reported at a commentary level (i.e. they have been scoped out or scoped down). A summary of these topics is provided in **Table 2.4**.

Table 2.4: Non-significant Environmental Topics

TOPIC	CONSIDERATION
Tourism and Retail	While there may be some minor beneficial tourism and retail impacts from the Proposed Development, these are not likely to be significant.
Agricultural Land	There is no agricultural land associated with the Site, therefore this has been scoped out of the EIA.

TOPIC	CONSIDERATION
Arboriculture	<p>The Site will be cleared as part of preparation works and the loss of some scrub and trees will be inevitable. However, as part of the Proposed Development, a Landscape Strategy will be prepared and will incorporate sitewide landscaping and tree planting.</p> <p>As such, there is unlikely to be a significant impact on trees which is not addressed through the landscaping and ecological assessment.</p> <p>An Arboricultural Impact Assessment has been prepared in support of the planning application.</p>
Archaeology	<p>An Archaeological Desk Based Assessment has been prepared in support of the planning application which confirmed that the Site is thought to have been fields from the Medieval period until the mid-19th century when the railway and its sidings were built. Archaeological remains from the 19th century are, therefore, not expected to be present on site.</p> <p>Quarrying of the river terrace gravels in the area has confirmed Palaeolithic hand axes and the possibility of such items occurring on site cannot be ruled out. In situ worked flints from the Upper Palaeolithic, Mesolithic and Neolithic periods have been recorded from the alluvial flats on the side of the River Cam and there is a possibility that similar finds may be encountered on site if they have not been disturbed by the railway and sidings.</p> <p>The periods from which archaeological finds are most likely to be made are the Late Iron Age and Roman periods, with the possibility of cremations and settlement remains being encountered on site.</p> <p>Intrusive investigations are therefore required to determine the level of destruction to buried archaeological remains, if they exist on site.</p> <p>It is considered that following the intrusive investigations, if any archaeological remains are present, an appropriate mitigation strategy can be implemented so there are no significant effects on archaeological remains. Archaeology has therefore been scoped out of the EIA.</p>
Safeguarded Infrastructure	<p>The Cambridgeshire and Peterborough Minerals and Waste Local Plan Policies Map identifies the Site as falling within a Consultation Area (CA) associated with the Cambridge North East Aggregates Railhead site (a Transport Infrastructure Area) and the Cambridge Water Recycling Centre (a Water Recycling Area).</p>

TOPIC	CONSIDERATION
Safeguarded Infrastructure	<p>Policy 16 in the Cambridgeshire and Peterborough Minerals and Waste Local Plan states that development within a CA will only be permitted where it demonstrates that the development will:</p> <ul style="list-style-type: none"> • not prejudice the existing or future use of the area (i.e. the MAA, MDA, WMA, TIA or WRA) for which the CA has been designated; and • not result in unacceptable amenity issues or adverse impacts to human health for the occupiers or users of such new development, due to the ongoing or future use of the area for which the CA has been designated. <p>When considering proposals for non-mineral and non-waste management development within a CA, then the agent of change principle will be applied to ensure that the operation of the protected infrastructure (i.e. MAA, MDA, WMA, TIA or WRA) is not in any way prejudiced. Any costs for mitigating impacts on or from the existing minerals and/or waste-related uses will be required to be met by the developer. It is for the developer to demonstrate that any mitigation proposed as part of the new development is practicable, and the continued use of existing sites will not be prejudiced.</p> <p>Regarding the Aggregates Railhead, potential impacts from this facility have been included in the relevant baseline studies (notably air quality, noise and transport). These studies did not identify any impacts sufficient to be likely to affect the amenity of future occupants of the Proposed Development, or to be a source of complaint.</p> <p>Regarding the Water Recycling Centre, an updated Odour Report prepared by Arup, May 2022, confirms that the levels of odour associated with this facility are unlikely to give rise to any complaints from future occupants of the Proposed Development, especially residents.</p>
Waste	<p>The planning application will be supported by a Site Waste Management and Materials Plan. This will ensure waste is dealt with appropriately and recycled where possible during construction. An operational waste management strategy will be prepared for the operational phases and will detail measures for waste provision. Operational waste is also not considered to be significant.</p>
Material Assets - Utilities	<p>Provision of utilities (electricity, gas, fresh/drinking water and foul water) will be addressed through appropriate technical reports as needed but are not considered a likely significant environmental effect. In addition to this, Utility providers have a statutory duty to provide capacity in line with permitted demand.</p>

TOPIC	CONSIDERATION
<p>Material Assets – Safeguarded Infrastructure</p>	<p>The Cambridgeshire and Peterborough Minerals and Waste Local Plan Policies Map identifies the Site as falling within a Consultation Area associated with the Cambridge North East Aggregates Railhead site (a Transport Infrastructure Area) and the Cambridge Water Recycling Centre (a Water Recycling Area).</p> <p>Policy 16 in the Cambridgeshire and Peterborough Minerals and Waste Local Plan states that development within a Consultation Area will only be permitted where it demonstrates that the development will: not prejudice the existing or future use of the area (i.e. the MAA, MDA, WMA, TIA or WRA) for which the Consultation Area has been designated; and not result in unacceptable amenity issues or adverse impacts to human health for the occupiers or users of such new development, due to the ongoing or future use of the area for which the Consultation Areas has been designated.</p> <p>When considering proposals for non-mineral and non-waste management development within a Consultation Area, then the agent of change principle will be applied to ensure that the operation of the protected infrastructure (i.e. MAA, MDA, WMA, TIA or WRA) is not in any way prejudiced. Any costs for mitigating impacts on or from the existing minerals and/or waste-related uses will be required to be met by the developer. It is for the developer to demonstrate that any mitigation proposed as part of the new development is practicable, and the continued use of existing sites will not be prejudiced.</p> <p>With regard to the nearby Tarmac aggregates/asphalt/concrete plant potential impacts from this facility have been included in the relevant baseline studies (notably air quality, noise and transport). These studies did not identify any impacts sufficient to be likely to affect the amenity of future occupants of the Proposed Development, or to be a source of complaint.</p>
<p>Material Assets – Safeguarded Infrastructure</p>	<p>In relation to potential impacts from the Water Recycling Centre, an updated Odour Report (Arup, May 2022) confirms that the levels of odour associated with this facility are unlikely to give rise to any complaints from future occupants of the Proposed Development, especially residents.</p>

TOPIC	CONSIDERATION
Vulnerability to major accidents or disasters	<p>Regulation 4 (4) requires the identification, description and assessment of expected significant effects arising from the vulnerability of the Proposed Development to relevant major accidents or disasters. This requirement is notably for expected significant effects arising from major relevant accidents and disasters.</p> <p>Given the Site and the nature of the Proposed Development, it is considered unlikely there will be significant effects from major relevant accidents or disasters.</p>
Odour	<p>Although the Site is in relatively close proximity to the Cambridge Water Recycling Centre, which is a known source of odour, recent studies indicate that the level of nuisance has decreased. Odour issues are not considered to be significant and have, therefore, been scoped out of the EIA. Odour impacts have, however, been addressed in a separate Odour Statement which has been prepared in support of the planning application.</p>

ES Content Requirements of the EIA Regulations

2.34

The 2017 EIA Regulations establish required processes for EIA screening and EIA scoping, as described in the previous sections. The Regulations also set out a series of requirements for EIA generally (primarily in Regulation 4) and for the contents of the ES (primarily in Regulation 18 and Schedule 4). For clarity, this section describes the approach to key elements of these requirements not addressed elsewhere in this ES.

Table 2.5: ES Content Requirements

SCHEDULE 4 REQUIREMENT	WHERE LOCATED IN THIS ES
1. A description of the development, including in particular a description of the location of the development, the physical characteristics of the whole development, the main characteristics of the operational phase of the development and an estimate, by type and quantity, of expected residues and emissions.	Chapter 4: Proposed Development.
2. A description of the reasonable alternatives studied by the developer and an indication of the main reasons for selecting the chosen option.	Chapter 4: Proposed Development and Alternatives.
3. A description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge.	The baseline scenarios are defined in Chapter 2: Methodology (this chapter), with details provided in each topical chapter (6 to 18).

SCHEDULE 4 REQUIREMENT	WHERE LOCATED IN THIS ES
4. A description of the factors specified in regulation 4(2) likely to be significantly affected by the development.	Descriptions provided in each topical chapter (6 to 18). Scoping details are in Chapter 2 (this chapter).
5. A description of the likely significant effects of the development on the environment resulting from, inter alia: (a) the construction and existence of the development, including, where relevant, demolition works.	Chapter 4: Proposed Development.
(b) the use of natural resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources.	Chapter 4: Proposed Development and topical chapters (6 to 18).
(c) the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste.	Chapter 4: Proposed Development, and topical chapters (6 to 18).
(d) the risks to human health, cultural heritage or the environment (for example due to accidents or disasters).	Risks due to accidents or disasters are considered in Chapter 2 (this chapter).
(e) the cumulation of effects with other existing and/ or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources.	Cumulative Impacts are considered in each topical chapter (6 to 18) and synthesised in Chapter 20.
(f) the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change.	The implications of Climate Change have been considered in each of the topic chapters (6-18).
(g) the technologies and the substances used.	Chapter 4: Proposed Development.
6. A description of the forecasting methods or evidence used to identify and assess the significant effects on the environment .	A framework approach to methods is provided in Chapter 2 (this chapter) with refinements in the topical chapters (6-18) as necessary.
7. A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements.	Each topical chapter specifies mitigation measures and monitoring. This is summarised in Chapter 20: Summary of Significant Effects.
A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned.	Addressed in Chapter 2, this chapter.
A non-technical summary of the information provided.	Provided as a stand-alone document, Volume 3.
A reference list detailing the sources used for the descriptions and assessments included in the environmental statement.	References are provided at the end of each chapter.

Relevant Environmental Assessments

2.35 Regulation 18(3)(c) requires that any relevant UK environmental assessments reasonably available are taken into account, so as to avoid duplication of assessment. Through the consultation process and cumulative impact consideration, the Environmental Impact Assessment undertaken for the Cambridge North Station (dated 2015) has been identified as being relevant to this scheme, due to the proximity and scale of development.

Consultation

- 2.36 Consultation has formed an integral part of the EIA process. Prior to the submission of the planning application, consultation has been undertaken with the public and with consultees regarding potential environmental effects associated with the Proposed Development.
- 2.37 The Applicant has participated in consultation with SCDC through the pre-application process to help the Council define their vision for the North East Cambridge Area Action Plan (NEC AAP).
- 2.38 Two public consultations were organised to give members of the public an opportunity to familiarise themselves with the design proposal, to raise comments or feedback and to discuss with members of the design team. The first public consultation was held on the 8th and 9th of December 2021.
- 2.39 The second public consultation was held on the 28th and 29th of March 2022. The emphasis of this event was to demonstrate:
- The changes and improvements to the masterplan compared to the previous proposed scheme; and
 - How the design team have responded to the concerns raised in the first public consultation, such as:
 - Size, height, and position of some of the buildings in the commercial quarter;
 - Improving pedestrian and cycling experience;
 - Go even further with enhancing biodiversity on site; and
 - Introduction of more shops, restaurants, cafes and community facilities around Cambridge North Railway Station.

EIA Scoping

- 2.40 In addition to the public consultation engagement with the Local Planning Authority (LPA), the EIA Regulations contain a formal process for determining the content of an EIA called “scoping”. Using the EIA Scoping process, the LPA was asked to provide baseline information and to provide their view as to the likely significant environmental effects resulting from the Proposed Development, resulting in an agreed scope of works for the EIA. The LPA sent the EIA Scoping Request to relevant organisations (referred to as “consultees”) who they considered should provide necessary responses. Where responses were received, they were then interpreted by the LPA to determine the required contents of the EIA.
- 2.41 While there is an overlap between EIA scoping, pre-application consultation and the public consultation, EIA scoping provides a formal check on the proposed scope of the EIA and content of the ES. Under Regulation 18(4), an ES must be based on the most recent scoping opinion issued (so far as the Proposed Development remains materially the same as the Proposed Development which was subject to that opinion or direction).
- 2.42 **Table 2.6** provides a summary of the key matters highlighted during the consultation with consultees, and the project team response, specifically confirming how the issues have been dealt with in the ES.

Table 2.6: Summary of Key Consultee Issues and Responses

CONSULTEE	SUMMARY OF ISSUES RAISED	RESPONSE TO ISSUES RAISED AND WHERE REPORTED IN THE ES
Cadent Gas	No objection to the proposal.	N/A
Historic England	<p>Because of the nature of the proposed use and the surrounding townscape character, this development could have potential to be visible across a large area and could, as a result, affect the significance of heritage assets at some distance from this site itself. Our primary concern in relation to this proposal is the impact of the development upon the significance of the designated heritage asset within the area surrounding the development. In particular we are aware that there are up to 10 Grade I and II* buildings within a 1.5 km radius of the development area, as well as the Chesterton Abbey Scheduled Monument and conservation areas (Baits Bite Lock, South Cambridgeshire, Fen Ditton, Horningsea, South Cambridgeshire, Riverside and Stourbridge Common, Cambridge, Ferry Lane, Cambridge and Chesterton, Cambridge). We would therefore expect the assessment to clearly demonstrate that the extent of the proposed study area is of the appropriate size to ensure that all heritage assets likely to be affected by this development have been included and can be properly assessed. It is important that the assessment is designed to ensure that all impacts are fully understood.</p> <p>The setting of heritage assets is not just restricted to visual impacts, other factors should also be considered, in particular noise, light, and traffic assessments.</p> <p>The Heritage Impact Assessment Study Area should also include assets that could be affected by development, such as Horningsea Conservation Area, Baits Bite Lock and assets in Cambridge City Centre.</p>	Chapter 8: Cultural Heritage
Shared Waste and Environment – EHP	<p>Cumulative Effects</p> <p>The Cumulative Effects Chapter will need to look closely at the predicted traffic impacts on nearby roads, as this proposal will be likely to influence vehicle movements and consequently impact on noise levels and air quality predicted/experienced at both existing and future developments in the area.</p>	Chapter 19: Cumulative Effects

CONSULTEE	SUMMARY OF ISSUES RAISED	RESPONSE TO ISSUES RAISED AND WHERE REPORTED IN THE ES
<p>Shared Waste and Environment – EHP</p>	<p>Air Quality</p> <p>Whilst the Site is not in an Air Quality Management Area with existing poor air quality, the Proposed Development may result in construction and operational emissions to air, including transport that may have an adverse impact on local air quality. Impacts such as those generated by transportation sources (construction and operational phases) have the potential to affect sensitive locations both within the City of Cambridge as well as areas within SCDC.</p> <p>It should also be noted that SCDC’s District Design Guide SPD under Air Quality requires consideration of the implementation of a Low Emissions Strategy (Transport Related) to mitigate any transport related impact.</p> <p>Consideration of the Air Quality impacts from nearby industrial/commercial processes holding an Environmental Permit issued by the Local Authority or Environment Agency will also need to be included.</p> <p>Any air quality assessment should be in accordance with industry standards best practice guidance and due regard should be given to SCDC’s Supplementary Planning Document - “Greater Cambridge Sustainable Design and Construction Supplementary Planning Document, Adopted January 2020”.</p> <p>Human Health</p> <p>Due to the scale of the development, a combined Health and Environmental Impact Assessment (HEIA) will be required to meet SCDC’s requirements.</p> <p>Lighting</p> <p>It is accepted the assessment of artificial lighting that will be required for the development cannot be completed at this time due to lack of final details. It is welcomed that an assessment will, however, be undertaken when detailed design information becomes available.</p> <p>It is accepted that temporary lighting used during the construction phase will be scoped out of the assessment due to the transient nature of construction lighting requirements. Construction lighting levels will be determined by health and safety requirements</p> <p>Noise and Vibration</p> <p>Impacts from the Cambridge North Station on the Proposed Development will need careful consideration. Rail noise will also be an important consideration at this location.</p>	<p>Chapter 6: Air Quality and Appendix 17.3 Low Emission Strategy</p> <p>Chapter 11: Human Health Chapter 13: Lighting Chapter 14: Noise and Vibration Chapter 16: Soils and Groundwater</p>

CONSULTEE	SUMMARY OF ISSUES RAISED	RESPONSE TO ISSUES RAISED AND WHERE REPORTED IN THE ES
<p>Shared Waste and Environment – EHP</p>	<p>The noise impacts of the Cambridge Guided Busway on sensitive premises on the new development (e.g. laboratory buildings) will need careful assessment.</p> <p>It is recommended that all noise sources are considered e.g. general anonymous environmental noise sources - road traffic, compared to commercial, industrial trade and businesses (that are not anonymous noise sources). It will need to be demonstrated that adverse impacts have been sufficiently minimised.</p> <p>Odour Due to the distance and orientation to the Cambridge Water Recycling Centre, from initial information available, odour impacts are predicted to be low for this development phase and the suggested provision of an odour note justifying the application with regard to odour would be welcomed.</p> <p>Contaminated Land Due to the potentially contaminative previous uses on the Site that could lead to ground contamination, a detailed assessment will be required.</p> <p>Contaminated land should be considered and assessed in accordance with government / industry best practice and technical guidance and the ‘Greater Cambridge Sustainable Design and Construction Supplementary Planning Document, Adopted January 2020’.</p>	<p>Chapter 6: Air Quality and Appendix 17.3 Low Emission Strategy</p> <p>Chapter 11: Human Health Chapter 13: Lighting Chapter 14: Noise and Vibration Chapter 16: Soils and Groundwater</p>
<p>Sustainability</p>	<p>The Climate Change Assessment should include reference to the following:</p> <ul style="list-style-type: none"> • 2021-2026 Climate Change Strategy; • SCDC Zero Carbon Strategy and Action Plan, which outlines how SCDC are supporting the district to halve emissions by 2030 and reduce them to zero by 2050, along with the outputs from the Cambridgeshire and Peterborough Independent Commission on Climate; • UK’s Carbon Budgets; and • Cambridge Local Plan (2018) and the Proposed Submission version of the North East Cambridge Area Action Plan. <p>The Scoping Report provides historic weather data from the Met Office Weather Station at the NIAB site.</p>	<p>Chapter 7: Climate Change</p>

CONSULTEE	SUMMARY OF ISSUES RAISED	RESPONSE TO ISSUES RAISED AND WHERE REPORTED IN THE ES
Sustainability	<p>Given the built-up nature of the Cambridge North Site, it may be more appropriate for weather data from the Met Office Weather Station at Cambridge Botanic Garden to be used, which would be more reflective of the conditions that the Site is likely to experience. At the very least, a comparison between the data from the two stations should be undertaken.</p> <p>The assessment must include carbon emissions associated with unregulated energy as part of the operational emissions, a critical element of achieving net zero carbon.</p> <p>The area is now classified as being in severe water stress, and updated evidence that the Planning Service now has on water resources as part of the Integrated Water Management Strategy for the Greater Cambridge Local Plan highlights the need for the highest levels of water efficiency in all new developments to help ensure long term sustainable water supplies. Given the scale of the Proposed Development, it is recommended that water resources is scoped into the assessment.</p>	Chapter 7: Climate Change
SCDC - Drainage	<p>Water quality requirements for the Proposed Development would need to be in accordance with CIRIA SuDS Manual and adequate water quality treatment would need to be provided through the use of SuDS for all areas of new hardstanding relative to their type and use. Appropriate pre-treatment would need to be applied to any incoming flows. Interception storage would be required for the impermeable surfaces. This would need to be provided close to where the rain falls at plot level in features such as green/brown roofs, raingardens, permeable paving, and other vegetated features.</p> <p>Consideration should be made to Policies CC/8 and CC/9 of the Local Plan to ensure the surface water drainage strategy will be compliant.</p>	Chapter 10: Flood Risk and Drainage
Cambridgeshire County Council - Local Highways	A full Transport Assessment (TA) will be required to accompany any forthcoming planning application so that the transport implications of the development can be understood.	Chapter 17: Transport and Appendix 17.1 Transport Assessment
National Highways	The subsequent application will need a Transport Assessment in response to discussions with Highways England. The Transport Assessment should be undertaken in accordance with DfT Circular 02/2013 "The Strategic Road Network and the Delivery of Sustainable Development". Reference should also be made to "The Strategic Road Network and the Delivery of Sustainable Development". Reference should also be made to "The Strategic Road Network: Planning for the future (A guide to working with Highways England on planning matters)" and National Planning Practice Guidance.	Chapter 17: Transport

CONSULTEE	SUMMARY OF ISSUES RAISED	RESPONSE TO ISSUES RAISED AND WHERE REPORTED IN THE ES
National Highways	Whilst the Site is in a relatively sustainable location, within close proximity to Cambridge North Station and good walking/ cycling facilities, the A14 junction is heavily saturated and therefore National Highways ask to continue to work with the Applicant to agree traffic limitation methods such as a trip budget / Framework Travel Plan.	Chapter 17: Transport
SCDC- Archaeology	<p>The 2020 Scoping Opinion (Appendix 2.2) for the adjacent and partially overlapping Cowley Road development suggested that the potential impact on the proposal on archaeology could be scoped out, based on archaeology survival in this area being unlikely due to truncation occasioned by the construction of the railway and sidings. Although extrapolated from information obtained during previous fieldwork from only part of the Site, for which no further archaeological works were recommended, is it also known that the northern area was previously quarried, and on balance, it is considered that the potential for archaeological survival across the development area is low, based on the known evidence.</p> <p>It is therefore advised that further detailed and updated assessment of the potential impact of the proposal on undesignated heritage assets of archaeological interest is not a necessary component for inclusion within the Cultural Heritage Chapter of the ES.</p>	N/A
SCDC- Contaminated Land	A Phase 1 Geoenvironmental Desk Study and ground investigation are required.	Chapter 16: Soils and Groundwater and Appendix 16.1
SCDC - Air Quality	In addition to an Air Quality Assessment, a Low Emission Strategy (LES) should be submitted as part of the planning application in line with the requirements of the Greater Cambridge Sustainable Design and Construction SPD 2020. The LES should include sustainable transport measures to reduce transport related emissions.	Chapter 6 Air Quality and Low Emission Strategy at Appendix 17.3
Cambridge County Council as Lead Local Flood Authority (LLFA)	<p>As LLFA a full Flood Risk Assessment and/or Surface Water Drainage Strategy is to be submitted in support any planning application which must include:</p> <ul style="list-style-type: none"> • How the proposed surface water drainage scheme has been determined following the drainage hierarchy; • Pre-development run-off rates; • Post development run-off rates with associated storm water calculations; • Discharge location(s); and 	Chapter 10: Flood Risk and Drainage

CONSULTEE	SUMMARY OF ISSUES RAISED	RESPONSE TO ISSUES RAISED AND WHERE REPORTED IN THE ES
Cambridge County Council as LLFA	<ul style="list-style-type: none"> Drainage calculations to support the design of the system f) Drawings of the proposed surface water drainage scheme including sub-catchment breakdowns where applicable g) Maintenance and management plan of the surface water drainage system (for the lifetime of the development) including details of future adoption. <p>It should be noted that the use of SuDS for surface water treatment and management must be incorporated within the scheme. If SuDS are not fully utilised, sound justification for the exclusion of features must be provided.</p> <p>The Applicant should, as part of the surface water strategy, demonstrate that the requirements of any local surface water drainage planning policies have been met and the recommendations of the relevant Strategic Flood Risk Assessment and Surface Water Management Plan have been considered.</p>	Chapter 10: Flood Risk and Drainage
SCDC - Urban Design	<p>The cited Guidelines for the Environmental Assessment of Road Traffic, 1993 does not consider the impact on cyclists. Considering the high number of cyclists in Cambridge, please formally recognise cycling as a significant mode of transport and include Cyclist Severance, Cyclist Delay and Cyclist Amenity to the list of relevant impacts to be assessed. Assessment of daylight and sunlight should be included in the EIA.</p>	Chapter 17: Transport Chapter 13: Lighting
SCDC - Biodiversity	<p>The term 'wild habitat' requires further definition to understand the proposed habitat types, long-term management and status. 10+ % BNG ambition for the Site is supported. The proposed use of extensive biodiverse roof is supported, however, their suitability for many invertebrate groups associated with OMH requires consideration and may dictate the ultimate habitat condition scores within the BNG metric.</p> <p>Cumulative ecological effects of wider proposed AAP should be considered, particularly with regard to habitat connectivity.</p>	Chapter 8: Ecology

EIA Elements

Baselines

- 2.43 The baseline environmental conditions need to be established to enable an accurate assessment of potential changes to such conditions that may occur, and to assess the resultant environmental impacts of the Proposed Development.
- 2.44 The EIA determines the likely significant environmental effects resulting from the Proposed Development for the following scenarios:

Baseline (Current Site Conditions);

- 2.45 The baseline assessment year for the EIA is the environmental conditions of the Site and surrounding area prevailing at the time baseline research and surveys were undertaken, which for most topics was between 2020 and 2022.
- A broad range of information has been gathered to define and describe the existing environmental characteristics and receptors for each environmental topic baseline. Specific relevant baseline details are provided in each topic chapter.

Baseline with the addition of the Proposed Development:

- Baseline with the Proposed Development under construction, and
- Baseline with the Proposed Development in operation.

Baseline evolution without the Proposed Development:

- The EIA Regulations require an assessment of “*an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge*” (Schedule 4, 3). The project baseline without the Proposed Development is considered to be the continuation of the current Site’s uses, together with any foreseeable change in the surrounding area. Topic-specific baseline evolution assessments are provided in the individual topic chapters.

Spatial Scope

- 2.46 The geographical extent of the EIA is referred to as the ‘spatial scope’ and varies according to the topic under consideration. Some environmental effects extend beyond the Site boundary, such as air quality and noise. The appropriate spatial scope of specific assessments is set out in the relevant ES chapters and differs based on the requirements of each assessment. This takes into account:
- The physical area of the Proposed Development and any ancillary works;
 - The nature of the baseline environment; and
 - The manner in which effects are likely to spread.

- 2.47 Key environmental receptors within and around the Site are presented in Chapter 3 of this ES. Where specific or more distant receptors have been considered these are described in relevant technical chapters.

Temporal Scope

- 2.48 The EIA considers the effects from site preparation and construction through to operation. The temporal scope used for the assessment assumes the construction works for the Proposed Development could commence in 2023.
- 2.49 It is anticipated that the Proposed Development will be fully completed and operational by 2027. The principal assessment year for EIA, or year of completion, is therefore 2027. This is a firm deadline and thus considered to be worst case. Whilst construction and occupation of the Proposed Development will be phased, the assessment has not taken account of individual phases or interim scenarios.

Cumulative effects

- 2.50 Cumulative effects can be broadly defined as the effects which results from the incremental effects of an action when added to other past, present and reasonably foreseeable future

actions. These actions should be considered regardless of what agency or person undertakes such actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time. Such actions are typically related to other developments that already have consent and are either under construction or could be constructed or completed prior to or during implementation of the Proposed Development.

- 2.51 Chapter 19 of the ES details the consideration of cumulative impacts that has been undertaken and draws together the findings from each topic chapter to analyse the interactions between effects and to provide a summary of the cumulative effects of the Proposed Development.

Assumptions and Limitations

- 2.52 The following are the overarching assumptions, limitations and uncertainties in the ES. Assumptions on a topic specific level are covered in each chapter.

- The assumptions undertaken within each of the topic chapters are based on the plans enclosed in **Appendix 4.1**.
- All of the principal existing land uses adjoining the Site remain substantially unaltered.
- Information provided by third parties is complete and up to date.
- The design, construction and operational development will satisfy environmental standards consistent with contemporary legislation, practice and knowledge at the time of the submission of the application as a minimum, but will strive to achieve best practice.
- Baseline conditions have been established from a variety of sources, including historical data. However, due to the dynamic nature of certain aspects of the environment, conditions may change during the construction and operation of the Proposed Development.
- The planning permission, if granted, will contain conditions and legal obligations that will be sufficient to secure the necessary mitigation measures identified during the assessment process.

- 2.53 The individual technical chapters provide additional detail where there are specific assumptions and limitations of relevance to a particular topic.

- 2.54 It is not considered that these limitations have had a material impact on the outcome or conclusions of the assessments undertaken, which remain an accurate, comprehensive and robust record of the likely significant effects arising from the Proposed Development.

Avoidance of Bias

- 2.55 This ES reports the findings of an independent assessment of environmental effects, which presents the environment effects objectively and separate from any planning argument for the Proposed Development.

- 2.56 Where qualitative assessment has been undertaken, it has used standardised methodology and employed professional judgement. The assessment has taken a conservative 'worst case view' in assessing impacts where appropriate. Where uncertainties or assumptions have been made in the assessment process, these have been clearly stated.

Approach to Technical Chapters

- 2.57 Each topic chapter (Chapter 6-18 inclusive) has approached the assessment by following a consistent structure, which is generally as follows:

- **Introduction** - A brief summary of the topic to be assessed.
- **Potential Impacts** - Building on the scoping stage; this section outlines potential impacts on a particular topic.
- **Methodology** - Outlines the methods used to undertake the assessment for a particular environmental topic.
- **Baseline Conditions** - Outlines the baselines for the topic area under assessment. The environmental effects are measured by the degree of deviation from the baseline.
- **Predicted Impacts** - Identifies the nature, extent and magnitude of impacts resulting from the development during construction and once operational.
- **Significance Evaluation of Predicted Effects** - The significance of the predicted effects is assessed according to the methodology.
- **Mitigation and Enhancement** - Details the scope for mitigation of any adverse effects, enhancement of beneficial effects, and the effectiveness of these measures.
- **Residual Effects** - Evaluates the significance of any unavoidable or residual effects that remain after the mitigation and enhancement measures have been fully implemented.
- **Monitoring** - Considers the need for monitoring any effects and mitigation to confirm that effects and mitigation are operating as expected in the EIA.
- **Cumulative Effects** - A summary of any cumulative effects is provided for clarity.
- **Conclusion and Summary of Effects** - A conclusion and a summary of effects in tabular format is provided in each chapter.

Site and Context



3.0 Site and Context

Introduction

- 3.1 This chapter of the ES sets the context for the assessment of the likely significant environmental effects arising from the Proposed Development. It describes the nature of the Site and the surrounding area and the specific environmental planning context, insofar as it relates to the Site and its immediate surroundings.

Site Description and Location

- 3.2 The Site lies within the jurisdiction of South Cambridgeshire District Council (SCDC) and extends to approximately 9.9 hectares (ha).
- 3.3 The Site forms part of the former Chesterton Sidings site, adjacent to Cambridge North Station. It is located on the north-east edge of Cambridge, approximately 3km from the city centre, and lies to the north and west of the River Cam, east of the Cambridge Business Park and south of the A14 and the Cambridge Water Recycling Centre.
- 3.4 The Site is bound to the north by the remainder of the former Chesterton Sidings site, to the east by the railway line, to the south by the consented One Cambridge Square office building (currently under construction also known as Building S03) and the consented Two Cambridge Square hotel building (now in operation and also known as Building S04) and to the west and north-west by the Cambridge Guided Busway (CGB) and Cambridge Business Park.
- 3.5 The Site is previously development land that comprises the existing surface level railway station car park of 428 spaces, further areas of hardstanding and areas of scrub. The Site has been partially cleared as part of the Site preparation works for Cambridge North Station to the south.

Geology and Hydrogeology

Geology

- 3.6 Geological mapping indicates that the majority of the Site is underlain by River Terrace Deposits described as 'sand and gravel, locally with lenses of silt, clay or peat'. Superficial Deposits are indicated to be absent from the northern and eastern parts of the Site.
- 3.7 Bedrock of the Gault Formation underlies the entirety of the Site and is generally described by the BGS as 'pale to dark grey or blue-grey clay mudstone, glauconitic in part, with a sandy base'.

Hydrogeology

- 3.8 The River Terrace Deposits are classified by the Environment Agency as a Secondary A Aquifer and the Gault Formation is classified as Unproductive Strata.
- 3.9 The Site is not located in a groundwater source protection zone.

Mineral Resources

- 3.10 The Cambridgeshire and Peterborough Minerals and Waste Local Plan 2016 (adopted July 2021) indicates that River Terrace Deposits underlying the Site are designated as a sand and gravel MSA.

Landscape and Topography

- 3.11 The Site is located on the extreme eastern edge of the Bedfordshire and Cambridgeshire Claylands National Character Area (NCA), and also demonstrates the influence of the adjacent Fens NCA and East Anglian Chalk NCA. The Site's topography is relatively flat, with fluctuations in elevation between 6m and 7m Above Ordnance Datum (AOD).

Transport

- 3.12 Vehicular access to the Site is gained via Milton Avenue, which links Cambridge North Station with Cowley Road. Cowley Road provides access to the wider highway network, including the A10 and its junction with the A14 to the north.
- 3.13 The Site benefits from a number of sustainable transport links including the Cambridge North Station, Guided Busway, and the cycleway which is adjacent to the Guided Busway. The Site is also within walking distance of Chesterton, Abbey, King's Hedges and Milton.

Flood Risk and Drainage

- 3.14 The nearest surface water feature to the Site is the 'First Public Drain' drain that adjoins the north-western boundary of the Site.
- 3.15 The River Cam flows in a north easterly direction to the south and east of the Site, passing within around 450m of the southern site boundary at its closest point. The River Cam is classified as a Main River and is part of the Anglian River Basin District.
- 3.16 The Site is located wholly within Flood Zone 1, demonstrating that there is a <0.1% Annual Exceedance Probability (AEP) of fluvial flooding at the Site. The 0.1% (1 in 1,000 year) fluvial floodplain is defined by the extent of Flood Zone 2, which does not extend from the River Cam to any areas west of the railway lines, including the Site. The risk of fluvial flooding at the Site is therefore very low.

Air Quality

- 3.17 The Site is not located within an Air Quality Management Area (AQMA). The closest AQMA to the Site is the Cambridge AQMA approximately 1.4km to the south-west, covering the city centre. The Cambridge AQMA was declared in 2005 due to exceedances of the Nitrogen Dioxide (NO₂) annual mean objective.

Archaeology and Cultural Heritage

- 3.18 There are no designated heritage assets within the Site, nor within 400m of its boundaries. The eastern edges of Fen Ditton Conservation Area and the north-eastern edge of the Riverside and Stourbridge Common Conservation Area are just within 500m of the Site boundary.
- 3.19 The Archaeological Desk Based Assessment prepared as part of the planning application has confirmed that the Site, is thought to have been fields from the Medieval period until the mid-19th century when the railway and its sidings were built. Archaeological remains from the 19th century are, therefore, not expected to be present on-site.
- 3.20 Quarrying of the river terrace gravels in the area has confirmed Palaeolithic hand axes and the possibility of such items occurring on-site cannot be ruled out. In situ worked flints from the

Upper Palaeolithic, Mesolithic and Neolithic periods have been recorded from the alluvial flats on the side of the river Cam and there is a possibility that similar finds may be encountered on-site if they have not been disturbed by the railway and sidings.

- 3.21 The periods from which finds are most likely to be made are the Late Iron Age and Roman periods, with the possibility of cremations and settlement remains being encountered on-site.

Ecology and Nature Conservation

- 3.22 There are 13 statutorily designated sites for nature conservation within 2km of the Site. the closest of these is Bramblefields Local Nature Reserve (LNR) approximately 450m south-west of the Site. Eleven non-statutory sites are located within 2km of the Site, the closest being Ditton Meadows City Wildlife Site, located 540m from the Site.
- 3.23 Open Mosaic Habitat on Previously Developed Land is present across the Site which is considered to be of national value and is UK BAP Priority habitat and listed on section 41 of the Natural Environment and Rural Communities (NERC) Act 2006.
- 3.24 The habitats on-site comprise semi-improved neutral grassland, scattered scrub, ponds and woodland edge which are considered to be of medium ecological value. All of the habitats are common within the wider landscape and are not considered to have an ecological value beyond the local level.

Proposed Development & Assessment of Alternatives



4.0 Proposed Development and Consideration of Alternatives

Background

- 4.1 This chapter describes the Proposed Development which forms the basis of the EIA. It describes the various elements of the proposals, as well as the means by which the proposals would be implemented.

Planning Drawings

- 4.2 The application is a hybrid planning application. The planning drawings relied on as the basis of the EIA are appended to the ES in **Appendix 4.1**.

Development Overview

- 4.3 The Proposed Development comprises:

“An outline application (all matters reserved apart from access and landscaping) for the construction of three new residential blocks, providing flexible Class E and Class F uses on the ground floor (excluding Class E (g) (iii)), and two commercial buildings for Use Classes E(g) i (offices), ii (research and development) providing flexible Class E and Class F uses on the ground floor (excluding Class E (g) (iii)), construction of basements for parking and building services, car and cycle parking and infrastructure works;

A full application for the construction of three commercial buildings for Use Classes E(g) i (offices) ii (research and development), providing flexible Class E and Class F uses on the ground floor (excluding Class E (g) (iii)), with associated car and cycle parking, a multi storey car and cycle park, construction of basements for parking and building services, car and cycle parking and associated landscaping and infrastructure works.”

Outline Element

Residential Quarter

- 4.4 The residential quarter is located on the western part of the application site and is bound by Milton Avenue to the east, the Cambridgeshire Guided Busway to the west and Cambridge Business Park to the north.
- 4.5 The residential quarter is proposed to comprise three perimeter blocks (see Land Use Parameter Plan 239-ACME-PLA-S01-0107) and will comprise a mix of types, sizes and tenures:
- Block S11 – S12: 78 homes all of which will be Build to Rent units;
 - Block S13 – S16: 155 homes all of which will be open market units; and
 - Block S17 – S21: 192 homes all of which will be Build to Rent units.
- 4.6 Block S11 – S12 is located to the south of Block S17 – S21 and also proposes to accommodate retail uses at ground floor level facing Milton Avenue.
- 4.7 Block S13 – S16 is located on the western edge of the residential quarter and is proposed to accommodate ground floor amenity uses at the northern and southern end of the block.
- 4.8 Block S17 – S21 is located in the north of the residential quarter and is also proposed to accommodate a number of amenities located at ground floor level of the eastern face of the

block facing Milton Avenue. At this outline stage, the exact uses proposed are not finalised, but it is envisaged that they could include retail, community and/or commercial services.

- 4.9 The precise number of dwellings and housing mix will be confirmed through reserved matters applications; however, an indicative housing mix is provided in **Table 4.1** below.

Table 4.1: Indicative Housing Mix

	MARKET	BUILD TO RENT	TOTAL
1 Bed	62	127	189
2 Bed	79	134	213
3 Bed	14	9	23
TOTAL	155	270	425

Commercial Use

- 4.10 The commercial component of the outline element comprises two commercial buildings (referred to as Two Milton Avenue (S8) and One Chesterton Square (S9)) on what is referred to as the ‘triangle site’. The triangle site is centrally located within the application site and is bound by Milton Avenue to the west, Cowley Road to the north and the existing station car park to the east. (see Land Use Parameter Plan 239-ACME-PLA-S01-0107).
- 4.11 One Chesterton Square (S9) is proposed at the north of the triangle site and is of a larger footprint which enables the flexibility to split the floorplate in up to four tenancies. The Land Use Parameter Plan proposes a maximum development zone of 24,100 sqm (GIA). One Chesterton Square will have a typical floor plate of 3,670 sqm. Chesterton Square is proposed to include a basement level, linked to Two Milton Avenue (S8), to accommodate car parking, cycle parking, shower facilities and associated changing rooms and drying rooms and storage.
- 4.12 One Chesterton Square will also accommodate amenity provision at ground floor level, as follows:
- A large retail unit in the north-eastern corner, at the end of Station Row and to provide an active frontage on this corner; and
 - A smaller retail unit along the western elevation, with frontage on to Milton Avenue.
- 4.13 Two Milton Avenue (S8) is proposed at the south of the triangle site. The Land Use Parameter Plan proposes a maximum development zone of 13,100 sqm (GIA) and the typical floor plate would be approximately 1,850 sqm.
- 4.14 Two Milton Avenue is also proposed to accommodate amenity provision at ground floor level with units facing both Station Row to the east, Milton Avenue to the west and Chesterton Square to the north.
- 4.15 Two Milton Avenue is proposed to include a basement level, linked to One Chesterton Square (S9), to accommodate car parking, cycle parking, shower facilities and associated changing rooms and drying rooms, plant and storage.
- 4.16 The roofs of both S9 and S8 will consist of a plant area surrounded by a plant screen at 3.8m – 4.5m in height.

Building Heights

- 4.17 Building heights will range between 4 and 8 storeys (see building height parameter plan 239-ACME-PLA-S01-0106 in **Appendix 4.1**). Lower heights are proposed to be located on the eastern edge of the Site along the railway edge and on the western edge of the Site with the tallest buildings to be located along Milton Avenue (see the building heights parameter plan in **Appendix 4.1**).

Transport and Access

- 4.18 Vehicular access to the Site is proposed from the eastern extent of Cowley Road, via the road which has already been constructed and serves Cambridge North Station, the Novotel Hotel, and office building at One Cambridge Square currently under construction (known as Milton Avenue) (see Transport and Access Parameter Plan 239-ACME-PLA-S01-0108 in **Appendix 4.1**).
- 4.19 The carriageway of Milton Avenue would remain unchanged in connection with the development proposals. However, the footway/cycleway spaces on the western side are proposed to be switched from the current situation so that the cycleway is located closest to the carriageway to tie into the masterplan proposals. Additionally, space within the verges would be provided to accommodate disabled parking and loading bays.
- 4.20 Pedestrian and cyclist access to the Site is proposed from the following locations:
- Cowley Road – to the north of the Site;
 - Cambridgeshire Guided Busway – to the north-west of the Site; and
 - Moss Bank – to the south-west of the Site.

Landscape and Public Realm

- 4.21 The Proposed Development includes a number of landscape and public realm areas. These include and are shown on the Landscape and Open Spaces Parameter Plan 239-ACME-PLA-S01-0109 in **Appendix 4.1**).
- Chesterton Gardens – A central park within the residential quarter which comprises extensive tree planting, lawn mounds, sinuous paths, planting, play areas, pergolas for gatherings and seating areas;
 - Chesterton square – A public square within the commercial quarter which comprises trees, water feature jets and ‘sky mirror’, raised beds, planting, seating, and a ‘follow me’ paving band that enlivens the space;
 - Station Row/Swale Street - Linear swale with ecologically diverse plantings, seating-steps and causeway crossings;
 - Piazza - Pocket park at termination of Station Row, with wide crossing path to One Milton Avenue and Residential Quarter;
 - Milton Way - Pocket park and passageway for cyclists, office worker spill-out space and residents. Raised planters sit over basements, with integrated seating;
 - Courtyards - West-facing residents’ courtyards, overlooking tree belt. Seating and tree planting; and
 - Wild park – Areas of retained Open Mosaic habitat and new Open Mosaic seeding, balancing pond and areas of natural play.

Full Element

4.22 The hybrid application includes a full application for the following:

- One Milton Avenue (S4);
- Mobility Hub (S5); and
- One and Three Station Row (S6 and S7).

One Milton Avenue (S4)

4.23 One Milton Avenue is located at the south-western end of the application site, to the north of the consented One Cambridge Square office building (S3) which is currently under construction.

4.24 One Milton Avenue is a proposed office building (GEA of 18,575 sqm) and has been designed to achieve a BREEAM Excellent rating. Located at the building's centre is a central core, consisting of all regular and accessible WCs, as well as showers, lifts, cleaning stores, and central services.

4.25 The building includes for retail space at ground floor level (84 sqm GIA), accessed via Milton Avenue.

4.26 The building's eastern elevation features the entrance to the building, facing onto Milton Avenue. The building is seven storeys in height plus plant. The building steps back to the north and west from level 05 upwards, offering significant amenity space to the building users.

Mobility Hub (S5)

4.27 The Mobility Hub is located at the south-eastern end of the application site, to the north of the existing 'Novotel' hotel building and to the west of the railway line.

4.28 The mobility hub would accommodate 725 car parking spaces across 5 levels (including ground floor). 622 of these spaces would be provided for rail users, re-providing the existing 428 surface car parking spaces, and accommodating a further 194 spaces for future growth. The remaining 103 spaces of the parking capacity would be provided at basement level of the mobility hub for the use of the commercial development.

4.29 The existing 428 rail-related car parking spaces will be maintained throughout the construction period of the proposed development through providing temporary surface level parking on the 'Triangle Site' to the east of Milton Avenue. Once complete, the mobility hub will accommodate the existing quantum of rail-related car parking, plus an additional 194 car parking spaces for rail use as requested by the rail industry. The development of the Site will prevent the provision of further rail-related car parking in the future, and therefore it will be capped at 622 spaces.

4.30 Access to the Mobility Hub will be via the new 'Cowley Road east' which will run along the eastern boundary of the Site.

One and Three Station Row (S6 and S7)

4.31 One and Three Station Row are laboratory buildings and have been designed to achieve a BREEAM Excellent rating. One Station Row has a GEA of 11,407 sqm and Three Station Row has a GEA of 12,061 sqm.

4.32 Both One and Three Station Row are five storeys in height. An amenity terrace is proposed at level 3 on both elevations.

- 4.33 Flexible retail provision (and other complementary ground floor uses) are proposed at ground floor level, accessed off 'Station Row' to the north (1,168 sqm GIA). The retail uses ensure an activated frontage to Station Row. The side passages contain pocket parks, and visitor cycle parking.

Construction Methods, Environmental Mitigation and Monitoring

Phasing

- 4.34 An indicative phasing plan has been prepared which identifies the potential phasing of the Proposed Development. This is included as part of the Design and Access Statement submitted as part of the planning application.
- 4.35 It is anticipated that infrastructure works related to the Proposed Development could commence in 2023, with an anticipated completion date of the entire development site by 2027.
- 4.36 A detailed phasing plan will be confirmed at a later stage. However, at this stage, it is anticipated that the development will comprise the following five phases:
- Phase 1: Mobility Hub (S05) (expected 2023-2025), One Station Row (S06) (expected 2023-2025), Three Station Row (S07) (2024-2026);
 - Phase 2 – Residential Quarter (2023-2026);
 - Phase 3 – One Chesterton Square (S04) (2024-2026);
 - Phase 4 – One Milton Avenue (S04) (2025-2027); and
 - Phase 5 – Two Milton Avenue (S08) (2026-2028).
- 4.37 Further discussions will take place with the LPA regarding phasing, which can be secured via a suitably worded condition.
- 4.38 A Construction Environmental Management Plan (CEMP) has been prepared to support the application and inform the EIA: this is attached as **Appendix 4.2**. The CEMP is an iterative document which will be updated as the construction proposals mature and will incorporate any necessary planning conditions.

Overview

- 4.39 Site working hours will be as per the planning requirements as follows:
- Monday – Friday: 0800 – 1800; and
 - Saturday: 0800 – 1300.
- 4.40 Any works outside these normal hours will be subject to the requirement to obtain consent from the Local Authority.

Transport

- 4.41 Project deliveries will follow the prescribed access / egress delivery route exiting the A14 at junction 33, heading south on Milton Road before turning left onto Cowley Road leading to Cambridge North Station. These deliveries will enter the Site compound area north of Milton Avenue for off-loading and distribution.
- 4.42 Due to the proximity of cyclist and pedestrian zones, site controls will be reviewed with Cambridgeshire County Council and SCDC with the following procedures to be applied:

- The pedestrian zone leading along Cowley Road to Cambridge North Station will be switched to the opposite side of the carriageway to avoid any unnecessary interface with construction activities. The pedestrian zone will lead to the Station car park, where a new pedestrian crossing will be introduced so as to maintain access to the Station.
- The existing cycle path along Cowley Road is intended to be closed during the construction works, whilst the existing cycle path along the guided busway would be maintained.
- Public notices / signage to be erected as required along Cowley Road.

Waste

- 4.43 Waste material generated during the course of the project will be segregated where possible within the central compound area – and at the recycling centre (off site) to attain 95% diversion from landfill.
- 4.44 The Site Waste Management Plan (SWMP) will outline the methods and procedures that will be employed to ensure that an effective and efficient waste management service is implemented, as well as identifying the categories of waste expected to arise.
- 4.45 Waste shall be stored appropriately depending on its type and classification, i.e. Controlled waste, Hazardous waste and General wastes. In any event, waste storage shall be kept to a minimum and in suitable containers or locations for disposal.

Dust/ Noise/ Vibration

- 4.46 Existing noise and vibration levels will be recorded during the pre-construction period to assess background levels and agree limits with SCDC. They will then be monitored on site, if necessary, throughout the work to ensure that they are not exceeded.
- 4.47 Noise and pollution will be kept to acceptable levels by good working practice, which include:
- well silenced and maintained plant and machinery;
 - not leaving engines running when not in use;
 - bunded fuel storage;
 - minimising use of percussive plant;
 - use of hoardings and screens;
 - not allowing vehicles to track mud onto adjacent roads;
 - damping down dusty materials;
 - wet cutting to avoid dust;
 - limiting duration of noisy operations as well as prior communication;
 - timing noisy works to least sensitive times of the day; and
 - Vehicles leaving site will be carefully checked and wheels cleaned of debris prior to exiting onto Cowley Road. Due to the fact that all deliveries are via the hard-standing compound area, wheel debris will be at a minimum. However, there will be periods (i.e. substructure excavations etc.) where extra vigilance will be enforced regarding wheel cleansing. Additional road sweeper/cleaning assistance will be provided during these periods when necessary.

Consideration of Alternatives

- 4.48 Schedule 4 of the EIA Regulations requires that an ES should provide a description of the reasonable alternatives studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen scheme, including a comparison of the environmental effects. This is provided below.

Site Alternatives

- 4.49 The application site forms part of the Major Development Site allocation within the SCDC Local Plan (2018) under Policy SS/4. Policy SS/4 confirms that the area is allocation for “*high quality mixed-use development, primarily for employment within Use Classes B1, B2 and B8 as well as a range of supporting uses, commercial, retail, leisure and residential uses (subject to acceptable environmental conditions)*”. Given this, no alternative site location options were considered by the Applicant.

Design Alternatives

Buildings S8 and S9

- 4.50 The original design for the triangle site in April 2021 consisted of two separate buildings on the northern edge of the Site with a street cutting north-south between the buildings. Due to the requirement for a minimum 18m distance between buildings, the two buildings typology was deemed inefficient in terms of its floor plate size. To fully utilise the northern plot, it is considered that a single building is a more viable approach, providing a different office building typology and scale that is not offered by the other proposed commercial buildings.
- 4.51 The single, larger footprint that is now building S9 also means there is the flexibility to split the floorplate into up to four tenancies. Building S9 then underwent various design iterations to ascertain the optimum footprint and articulation. The final design shows a building with four clear ‘petals’ on each corner with a deep recess between them. The final design which comprises one building instead of two, is not considered to result in additional environmental effects.
- 4.52 Building S8 is a considerably smaller and slimmer building and its form has always been a triangular shape due to its location at the tip of the plot. The evolution of buildings S8 and S9 from April 2021 to May 2022 can be seen in **Figure 4.1**.



Figure 4.1: Design Evolution of Buildings S08 and S09

Mobility Hub

- 4.53 The mobility hub was originally designed to hold all parking requirements for both Network Rail commuters as well as the office buildings. As such, the capacity of the building was significantly greater and required 8 storeys.
- 4.54 Early studies explored PV panel shelters for the roof level as well, but this was rejected due to potentially increasing visual impacts for sensitive receptors at locations east of the Site.
- 4.55 Initially, basement options were not considered, but due to the height concerns, further opportunities were explored to lower the building into the ground, including consideration of full and half basement designs.
- 4.56 In its final iteration, the total number of storeys has been reduced to 6, with most of the parking allocated to the offices to be housed within a basement beneath each of the office buildings.
- 4.57 Floor heights have also evolved, from 2.8m in early iterations, to 3.3m for ground and first floor and 3m on all floors. This was adopted to facilitate future adaptive reuse of the building, allowing ground and first floors to hold double stack bicycle racks for potential future conversion of the lower levels of the structure as a cycle hub. Reducing the height of the mobility hub has reduced its potential impact, particularly in views from the east. The design evolution of the mobility hub can be seen in **Figure 4.2**.

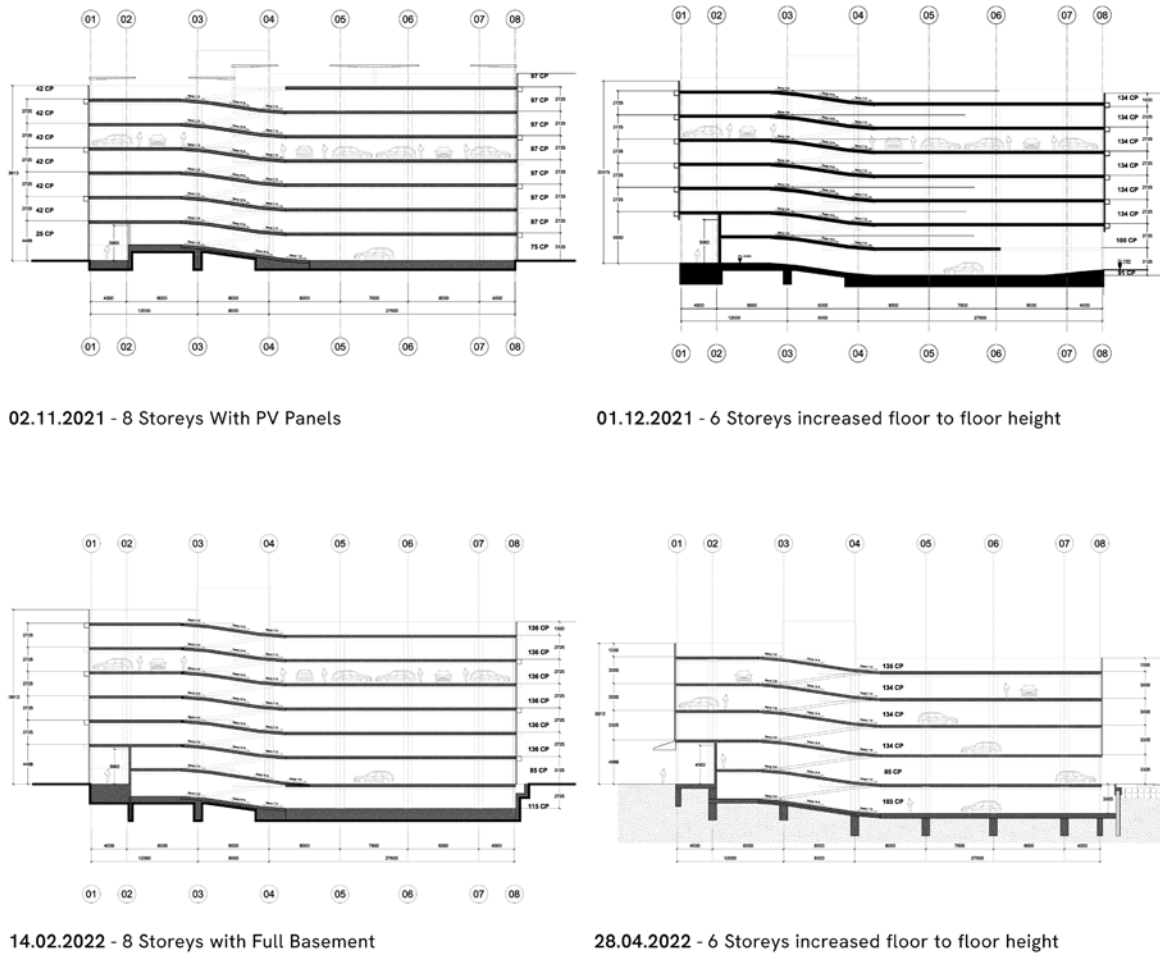


Figure 4.2: Design Evolution of the Mobility Hub

Residential Quarter

- 4.58 The residential site has gone through a process of continuous development and refinement. The main revisions and changes are highlighted below and in **Figure 4.3** and **Figure 4.4**.
- 4.59 Revision B – January 2021: Revision B was an initial feasibility study to analyse what can be achieved on the plot. The massing and the connectivity of the Site were explored with the aim of creating a publicly accessible yet private residential garden, shaping a clear central courtyard and removing the vehicular access from the courtyard.
- 4.60 Revision C – January 2021: The southern edge connection was modified to improve the arrival experience from the south of the plot. Overall heights and form were also adjusted.
- 4.61 Revision D – January 2021: The massing was taken to the next stage of development with the internal accommodation schedule beginning to take shape.
- 4.62 Revision F: February 2021: A further recalibration of the overall massing height took place. Access to the residential garden was modified to follow the sequence of public spaces and pedestrian connections in the masterplan.



Figure 4.3: Design Evolution of Residential Quarter in Early 2021

- 4.63 Revision G – May 2021: Internal layouts were further developed for the unit typologies and the amenity spaces.
- 4.64 Revision J – November 2021: A decision was taken to remove the residential quarter from the planning application to allow the more advanced commercial application to go ahead first.
- 4.65 Revision N – February 2022: The residential quarter was reintroduced as part of the outline application. The overall plot was re-adjusted to a reduced size and internal layouts further developed.
- 4.66 Revision S- June 2022: Internal layouts are further developed. The amenities spaces and commercial offer are refined and the design of the residential central public space, Chesterton Gardens, further progressed.

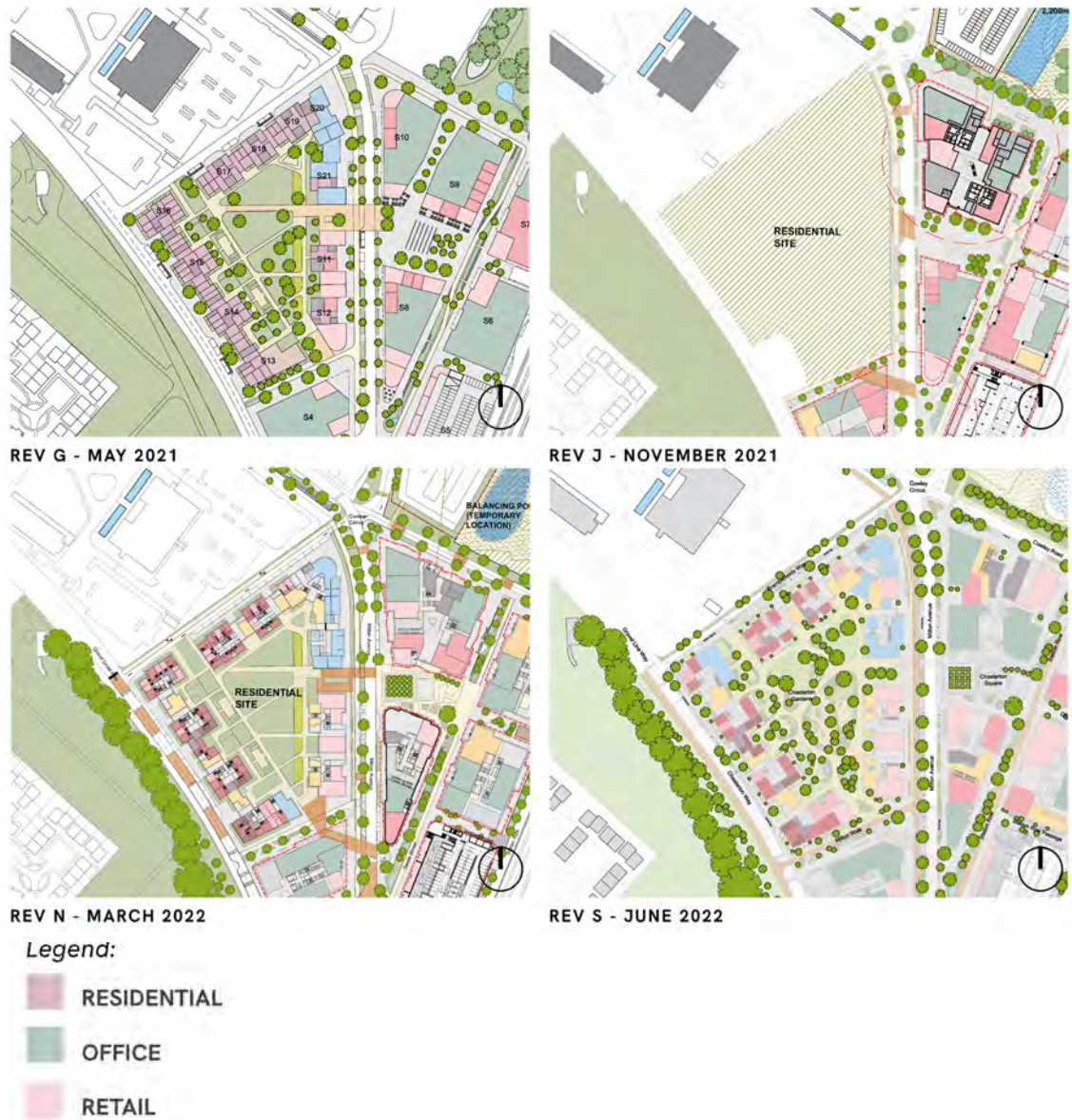


Figure 4.4: Design Evolution of Residential Quarter from May 2021 to June 2022

4.67 The design iteration, which now includes the residential quarter, is not considered to have resulted in any materially different environmental effects (in terms of changes to the schedule of assessment topics), although it will have given rise to different socio-economic effects and to have introduced receptors who are sensitive to sources of impact such as noise and dust.

Conclusions

4.68 It has been demonstrated in this chapter that the proposals have been developed and evolved in response to the Technical Assessments undertaken by the Consultant Team and included within this ES, and also through detailed and extensive engagement with Council Officers, statutory consultees and the public in order to deliver the Proposed Development. The Applicant and its design team consider the Proposed Development to be the most appropriate response to the operational requirements, having regard to those environmental assessments and engagement with stakeholders to provide the best quality solution.

4.69 The next chapter of this ES sets out the planning policy context.

Planning Policy Context



5.0 Planning Policy Context

Introduction

- 5.1 The planning policy context for the Proposed Development is set out in detail in the Planning Statement, submitted separately as part of the documents accompanying this planning application. The Planning Statement describes how the Proposed Development complies with policy and sets out the Applicant's case for development. This ES is not concerned with matters of policy compliance, and instead provides information about the planning policy context relevant to this EIA. To this end, this chapter provides an overview of planning policies which have been considered in the EIA; individual technical chapters provide more detail on relevant policies as they relate to specific topics.

Development Plan Policy

- 5.2 In accordance with Section 38(6) of the Planning and Compulsory Purchase Act 2004, consideration is given below to the relevant policies of the adopted Development Plan for the Site, which comprises:

- Adopted SCDC Local Plan (2018) and Proposals Map (2018); and
- Cambridgeshire and Peterborough Minerals and Waste Local Plan (2021).

- 5.3 Relevant material considerations in this case comprise the following:

- National Planning Policy Framework (2021);
- National Planning Practice Guidance;
- National and regional economic and industrial policies; and
- Supplementary policies and evidence prepared locally.

Adopted SCDC Local Plan 2018

- 5.4 The SCDC Local Plan was formally adopted on 27 September 2018. The Plan sets out the vision, policies and proposals for future development and land use around the fringe of Cambridge to 2031.

- 5.5 In relation to the Development, the most pertinent policies of the South Cambridgeshire Local Plan include:

- **Policy S/3: Presumption in Favour of Sustainable Development:**

“When considering development proposals the Council will take a positive approach that reflects the presumption in favour of sustainable development contained in the National Planning Policy Framework”.

- **Policy SS/4: Cambridge northern fringe east and Cambridge North railway station:**

A detailed review of this policy is provided in the planning statement submitted as part of the planning application.

- **Policy E/9: Promotion of Clusters:**

“Development proposals in suitable locations will be permitted which support the development of employment clusters...”

“Employment land allocations especially suited for cluster development are Northstowe, North-west Cambridge, and the new employment provision on the edge of Cambridge

(Policies E/1 and SS/4). These areas will be expected to include provision of a range of suitable units, including for start-ups, SMEs, and incubator units”.

- **Policy TI/2: Planning for Sustainable Travel:**

“Development must be located and designed to reduce the need to travel, particularly by car, and promote sustainable travel appropriate to its location

Planning permission will only be granted for development likely to give rise to increased travel demands, where the Site has (or will attain) sufficient integration and accessibility by walking, cycling or public and community transport...

Developers will be required to demonstrate they will make adequate provision to mitigate the likely impacts (including cumulative impacts) of their proposal including environmental impacts (such as noise and pollution) and impact on amenity and health...

Developers of ‘larger developments’ or where a proposal is likely to have ‘significant transport implications’ will be required to demonstrate they have maximised opportunities for sustainable travel and will make adequate provision to mitigate the likely impacts through provision of a Transport Assessment and Travel Plan...

Travel Plans must have measurable outputs, be related to the aims and objectives in the Local Transport Plan and provide monitoring and enforcement arrangements...”

Cambridgeshire and Peterborough Minerals and Waste Local Plan (2021)

- 5.6 The Cambridgeshire and Peterborough Minerals and Waste Local Plan was adopted by Cambridgeshire County Council and Peterborough City Council on 28 July 2021. The Minerals and Waste Local Plan sets out policies to guide mineral and waste management development until 2036.
- 5.7 The Cambridgeshire and Peterborough Minerals and Waste Local Plan Policies Map identifies the Site as falling within a Consultation Area associated with the Cambridge North East Aggregates Railhead site (a Transport Infrastructure Area) and the Cambridge Water Recycling Centre.
- 5.8 Those policies contained within the Plan that are considered to be of relevance to the current proposals, are set out below:
- Policy 14: Waste management needs arising from residential and commercial development; and
 - Policy 16: Consultation areas.

Material Considerations

National Planning Policy Framework (2021)

- 5.9 The National Planning Policy Framework (“NPPF” or “Framework”) was published in 2012 and subsequently revised in July 2018, with a further revision in February 2019 and July 2021. The Framework represents up-to-date government planning policy and is a material consideration that must be taken into account where it is relevant to a planning application or appeal. This includes the presumption in favour of development found at paragraph 11 of the Framework.
- 5.10 Key sections of the Framework include:
- Chapter 2: Achieving sustainable development;
 - Chapter 4: Decision-making;

- Chapter 5: Delivering a sufficient supply of homes;
- Chapter 6: Building a strong, competitive economy;
- Chapter 8: Promoting healthy and safe communities;
- Chapter 9: Promoting sustainable transport;
- Chapter 11: Making effective use of land;
- Chapter 12: Achieving well-designed places;
- Chapter 14: Meeting the challenge of climate change, flooding and coastal change;
- Chapter 16: Conserving and enhancing the natural environment; and
- Chapter 17: Conserving and enhancing the historic environment.

Planning Practice Guidance (PPG)

- 5.11 The PPG confirms the objectives in the NPPF that good design is an integral part of sustainable development. The NPPF seeks for new development to integrate with its surroundings as well-designed places are successful and valued by exhibiting qualities that benefits users, in addition to the wider area.

National and Regional Economic and Industrial Policies

- 5.12 In relation to the Development, the most national and regional economic and industrial policies include:
- Life Sciences Industrial Strategy (2017);
 - Life Sciences Sector Deal (2017);
 - Life Sciences Vision (2021);
 - Cambridgeshire and Peterborough Independent Economic Review (CPIER) (2018);
 - Cambridgeshire and Peterborough Local Industrial Strategy (2019); and
 - Life Science Strategy for the Cambridgeshire and Peterborough Combined Authority (2021).

Supplementary Planning Documents (SPDs)

- 5.13 The following supplementary planning documents support the South Cambridgeshire Local Plan (2018):
- Cambridgeshire Flood and Water SPD – Adopted 2018;
 - Sustainable Design and Construction SPD- Adopted 2020; and
 - Biodiversity SPD – Adopted 2022.
- 5.14 The following SPDs were adopted by SCDC to provide guidance to support previously adopted Development Plan Documents that have now been superseded by the South Cambridgeshire Local Plan 2018. These documents are still material considerations when making planning decisions, with the weight in decision making to be determined on a case by case basis having regard to consistency with national planning guidance and the adopted South Cambridgeshire Local Plan 2018:
- Trees and Development Sites SPD- Adopted 2009;
 - Open Space in New Developments SPD- Adopted 2009;

- Landscape in New Developments SPD- Adopted 2010;
- District Design Guide SPD- Adopted 2010; and
- Affordable Housing SPD – Adopted 2010.

Emerging North East Cambridge Area Action Plan (NEC AAP)

- 5.15 South Cambridgeshire District Council and Cambridge City Council are jointly preparing an Area Action Plan (AAP) for North East Cambridge. Once adopted, the Area Action Plan will form part of the statutory development plan for both Councils. It will set out a series of site-specific policies and the mix and quantum of development for the Area Action Plan.
- 5.16 North East Cambridge is a 182-hectare brownfield site which is within a 15-minute cycle ride from Cambridge City Centre. The application site falls within the boundary of the emerging NEC AAP.
- 5.17 The Applicant has been actively engaging with officers from the Councils and representatives from surrounding landowners as part of the Landowner Liaison Forums for the emerging NEC AAP and has undertaken engagement with the local community. This is to ensure that development of the application site would not compromise opportunities for the redevelopment of the wider area.
- 5.18 In relation to the Development, the most pertinent draft policies of the Proposed Submission NEC AAP (Regulation 19) document (2021) include:
- **Draft Policy 1: A comprehensive approach at North East Cambridge:**

“Proposals that accord with the Area Action Plan’s Spatial Framework and relevant policies, and that deliver upon the vision and strategic objectives for the place, will be approved without delay, subject to a full assessment of the particular impacts of the proposals and securing appropriate mitigation measures where necessary...

*To avoid piecemeal development that could prejudice the delivery of the strategic objectives and Spatial Framework, proposals should be designed to secure coordinated and comprehensive development in **accordance with Policy 23: Comprehensive and Coordinated Development...**”*
 - **Draft Policy 9: Density, heights, scale and massing:**

“Development proposals should be of an appropriate height, scale and massing in order to create distinctive high-quality buildings which make a positive contribution to the existing and emerging context when considered from immediate, mid-range and long-range views. Taller buildings, and those in prominent locations, should respond appropriately and sensitively to the local setting, add to the attractiveness and interest of the skyline and landscape, and be responsive to the historic wider setting of the City and related heritage assets...

Development proposals should adhere to the maximum building heights identified on Figure 22...

Where applicable, the net residential development densities shown on Figure 24 should be used to inform schemes coming forward...

- All proposals will be assessed against Appendix F of the Cambridge Local Plan (or successor) as well as the following criteria:

 - a) Location, setting and context...*
 - b) Exemplary design...*

- c) *Amenity and microclimate...*
- d) *Public realm...*
- e) *Airport Safeguarding Assessment...*

- **Draft Policy 10d: Station Approach:**

“A new Local Centre should be provided in accordance with the Spatial Framework...”

- **Draft Policy 12a: Business:**

“Proposals which create new employment floorspace and promote increased jobs and job densities in the Area Action Plan area will be supported where they are consistent with the other policies of the Area Action Plan and adopted Local Development Plan...

Specifically, by land parcel...

d. Chesterton Sidings: New business space will be created in this area alongside homes and other employment, retail and community floorspace to create a mixed-use area, based around Cambridge North Station and the Station Approach Local Centre. This area will be a key gateway to both the Site and wider area.”

The Area Action Plan makes provision for up to 188,500m² net additional business (Class E(g)) floorspace in accordance with the distribution set out in the table below. These will need to be considered alongside the other policies of the Area Action Plan, Spatial Framework and other supporting diagrams as well as the adopted local development plans.

DEVELOPMENT PARCEL	ADDITIONAL COMMERCIAL FLOORSPACE (CLASS E (G))
Anglian Water / Cambridge City Council site	Up to 23,500m ²
Cambridge Business Park	Up to 50,000m ²
Cambridge Science Park	Up to 60,000m ²
Chesterton Sidings	Up to 23,500m ²
Cowley Road Industrial Estate	Re-provision of existing amount of commercial floorspace within Cowley Road and from Nuffield Road Industrial Estates
Nuffield Road Industrial Estate	None. Existing amount of commercial floorspace should be re-provided to Cowley Road Industrial Estate
St Johns Innovation Park	Up to 30,000m ²
Trinity Hall Farm Industrial Estate	Up to 1,500m ²
Total	Up to 188,500m²

Proposals which exceed these figures will need to be justified in terms of the Greater Cambridge Employment Land and Economic Development Evidence Study (2020) (through an Employment Impact Assessment) and any impact on the AAP trip budget, Area Action Plan wide infrastructure and whether the character, role and function of an area could be compromised.”

- **Draft Policy 13a: Housing Provision:**

“Proposals that secure an appropriate mix of housing on site and contribute to the creation of inclusive, mixed and balanced communities will be supported...”

- **Draft Policy 13c: Build to Rent:**

“Build to Rent should be provided in a balanced way across North East Cambridge without it being the dominant typology of homes in any location...”

- **Draft Policy 22: Managing motorised vehicles:**
“Development proposals will be supported where it can be demonstrated that it can be delivered within the vehicle trip budget. Development will not be permitted if proposals exceed the vehicle trip budget...”
- **Draft Policy 23: Comprehensive and Coordinated Development:**
“Planning applications for major development within the North East Cambridge Area Action Plan area will be supported where:
 - a. The proposal demonstrates the development will make an appropriate and proportionate contribution to site wide infrastructure such as road and rail crossings, public transport, active travel, community facilities, open space and Green Infrastructure provision, to be secured through the use of planning contributions in accordance with Policy 27;*
 - b. The proposal is supported by a comprehensive masterplan - accompanied as necessary by parameter plans in relation to layout, scale, appearance, access and landscaping - that accords with the overarching Area Action Plan Spatial Framework and other relevant Development Plan policies...”*

Emerging Greater Cambridge Local Plan

- 5.19 Cambridge City Council and South Cambridgeshire District Council are working together to create a new joint Local Plan for the two areas – referred to as Greater Cambridge.
- 5.20 In November and December 2021, the Councils undertook the ‘First Proposals’ consultation, also known as Regulation 18 Preferred Options consultation. This sought views on the emerging development strategy, the direction of travel for policies and issues the Council should be considering as policies are prepared.
- 5.21 In the ‘First Proposals’ consultation document, a new Policy (Policy S/NEC: North East Cambridge) is proposed to cover the whole of the AAP area and to set out the placemaking vision for and the scale and scope of development at North East Cambridge.
- 5.22 The Emerging Greater Cambridge Local Plan, when adopted, will replace the South Cambridgeshire Local Plan and Cambridge Local Plan. However, given the early stage of preparation it carries little weight in the decision-making process.
- 5.23 Whilst the Emerging Greater Cambridge Local Plan is still at an early stage and therefore cannot be afforded any weight in the determination of planning applications, the evidence base underpinning the Plan is a material consideration. One of the key evidence base documents of relevance to this application is the Cambridge Employment Land and Economic Development Evidence Study (2020). This confirms that there is very little vacancy of a suitable type across industrial or office markets within the North East Cambridge submarket. This contrasts against strong corporate office market demand and R&D demand in the area, with the Cambridge North Station’s accessibility as a particular local driver for demand.

Air Quality

6

6.0 Air Quality

Introduction

- 6.1 This chapter of the ES assesses the likely significant effects of the Proposed Development in terms of air quality and is supported by **Appendix 6.1** and **Appendix 6.2**. It should be noted that odour has been scoped out as an EIA topic, but is the subject of a separate technical report submitted alongside the ES. It should also be noted that a Low Emission Strategy has been prepared separately and is included as an appendix to the Transport chapter.
- 6.2 The chapter describes: the assessment methodology; the baseline conditions currently existing at the Proposed Development and in the surrounding area; the likely significant environmental effects; the mitigation measures required to prevent, reduce or offset any significant adverse effects; the likely residual effects after these measures have been employed; and the cumulative effects associated with the Proposed Development in combination with other developments.
- 6.3 The primary pollutants of interest for this assessment are nitrogen dioxide (NO₂) and particulate matter (PM₁₀ and PM_{2.5}), as well as dust from the construction phase. Likely significant effects are identified in relation to health-based standards.
- 6.4 This chapter includes a baseline assessment of local air quality, a construction phase assessment and an operational phase assessment. Detailed assessment for construction traffic has been scoped out as the construction vehicles are not anticipated to exceed the screening criteria. Mitigation measures and/or further work have been recommended where appropriate.
- 6.5 The technical appendices that support the chapter are:
- **Appendix 6.1** Construction Phase Assessment including dust risk assessment; and
 - **Appendix 6.2:** Detailed Dispersion Modelling Assessment Method which includes the details of receptors and roads included, model verification study, traffic data etc.

Potential Sources of Impact

- 6.6 The Proposed Development may result in the following effects on local air quality:

Construction Phase

- Effects associated with dust and PM₁₀, with the potential to cause a loss of amenity and health impacts at nearby sensitive receptors; and
- Impacts on local air quality as a result of traffic related emissions generated by construction traffic

Operational Phase

- Impacts on local air quality as a result of changes in traffic related emissions associated with the Proposed Development

Key Legislation, Policy and Guidance Considerations

- 6.7 The air quality assessment was undertaken within the context of relevant planning policies, guidance documents and legislative instruments. These are summarised below.

Legislation and Regulations

Air Quality Strategy

- 6.8 The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (AQS) sets the framework for government policy on air quality in the UK. The AQS sets out air quality standards and objectives to be achieved (shown in **Table 6.1**) and introduces a policy framework for tackling fine particles. In setting air quality objectives, due account was taken of health and socio-economic cost-benefit factors, together with consideration of the practicalities of achieving such targets. Air quality objective (AQO) levels are set out in legislation in the Air Quality (England) Regulations 2000, as amended.
- 6.9 Although achievement of air quality objectives is not a statutory requirement, they reflect statutory limits outlined in The Air Quality Standards Regulations 2010 as amended, which require the Secretary of State to achieve EU limit values set out in EU Ambient Air Quality Directives.

Table 6.1: Air Quality Objectives relevant to the Assessment

POLLUTANT	AIR QUALITY OBJECTIVE LEVELS	MEASURED AS
Nitrogen dioxide (NO₂)	200 µg/m ³ , not to be exceeded more than 18 times per year	1-hour mean
	40 µg/m ³	Annual mean
Nitrogen oxides (NO_x)*	30 µg/m ³	Annual mean
Particles (PM₁₀)	50 µg/m ³ , not to be exceeded more than 35 times per year	24-hour mean
	40 µg/m ³	Annual mean
Particles (PM_{2.5})	25 µg/m ³	Annual mean

* For the protection of vegetation and ecosystems only.

The Environment Act 1995

- 6.10 The Environment Act 1995, specifically Sections 82-84, requires all local authorities to carry out periodic reviews of air quality within their administrative areas. This review and assessment process now follows a phased approach, whereby local authorities only undertake a level of assessment that is commensurate with the risk of an air quality objective being exceeded and therefore not being met. The aim of this review process is to assess whether the air quality objectives are likely to be achieved. Areas where objective levels are likely to be exceeded are to be declared air quality management areas (AQMAs) by the local authorities.

Planning Policy

National Planning Policy Framework and Planning Practice Guidance

- 6.11 The National Planning Policy Framework (NPPF) was published during July 2021. The NPPF establishes a framework under the Town and Country Planning Act which should be used by local authorities to make local plans and determine planning applications.
- 6.12 Paragraph 174 states:
- “Planning policies and decisions should contribute to and enhance the natural and local environment by:*
- “e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution*

or land instability. Development should, wherever possible, help to improve local environmental conditions....”

6.13 Paragraph 186 states:

“Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan”.

6.14 The 2019 Air Quality Planning Practice Guidance (AQPPG) supports the NPPF, by including recommendations on the scope of an air quality assessment.

South Cambridgeshire District Local Plan 2018

6.15 The South Cambridgeshire Local Plan sets out the planning policies and land allocations to guide the future development of the district up to 2031. It includes policies on a wide range of topics such as housing, employment, services and facilities, and the natural environment. Policy SC/12 relates to Air Quality and states:

- 1) Where development proposals would be subject to unacceptable air quality standards or would have an unacceptable impact on air quality standards they will be refused.
- 2) Where emissions from the proposed development are prescribed by EU limit values or national objectives, the Applicant will need to assess the impact on local air quality by undertaking an appropriate air quality assessment and detailed modelling exercise having regard to guidance current at the time of the application to show that the national objectives will still be achieved.
- 3) Development will not be permitted where it would adversely affect air quality in an Air Quality Management Area (AQMA); or lead to the declaration of a new AQMA through causing a significant deterioration in local air quality by increasing pollutant levels either directly or indirectly; or if it would expose future occupiers to unacceptable pollutant levels.
- 4) Larger development proposals that require a Transport Assessment and a Travel Plan as set out in Policy TI/2 will be required to produce a site based Low Emission Strategy. This will be a condition of any planning permission given for any proposed development which may result in the deterioration of local air quality and will be required to ensure the implementation of suitable mitigation measures.
- 5) Development will be permitted where:
 - a) It can be demonstrated that it does not lead to significant adverse effects on health, the environment or amenity from emissions to air; or

- b) Where a development is a sensitive end use, that there will not be any significant adverse effects on health, the environment or amenity arising from existing poor air quality.
- 6) Specifically, applicants must demonstrate that:
- c) There is no adverse effect on air quality in an Air Quality Management Area (AQMA) from the development;
 - d) Pollution levels within the AQMA will not have a significant adverse effect on the proposed use / users;
 - e) The development will not lead to the declaration of a new AQMA;
 - f) The development will not interfere with the implementation of and should be consistent with the current Air Quality Action Plan;
 - g) The development will not lead to an increase in emissions, degradation of air quality or increase in exposure to pollutants at or above the health based air quality objective;
 - h) Any impacts on the proposed use from existing poor air quality, are appropriately mitigated;
 - i) The development promotes sustainable transport measures and use of low emission vehicles in order to reduce the air quality impacts of vehicles.
- 7) Applicants shall, where appropriate, prepare and submit with their application, a relevant assessment, taking into account guidance current at the time of the application.

South Cambridgeshire District Council Air Quality Strategy 2021 - 2025

- 6.16 South Cambridgeshire District Council produced its Air Quality Strategy in 2021 which sets out the new approach to shift focus towards identifying potential new hotspots of poor air quality across the district, and implement any necessary measures to ensure compliance with the air quality objectives.
- 6.17 The strategy outlines three focussed actions, to ensure that:
- 1) Air quality is monitored and understood district wide and appropriate measures are introduced to meet air quality objectives;
 - 2) Policies are in place to minimise impacts from future developments; and
 - 3) Public engagement is aimed at increasing local knowledge and supporting better choices in reducing daily impact on air quality.

Technical Standards and Guidance

Guidance on the Assessment of Dust from Demolition and Construction (Institute of Air Quality Management, 2016) ('the IAQM 2014 guidance')

- 6.18 The guidance, which was published in 2014 and underwent minor updates in 2016, provides a framework for assessing the risk which fugitive dust and PM could have on air quality and suggests appropriate dust and air emissions mitigation measures for sites according to the level of risk.

Land-Use Planning & Development Control: Planning for Air Quality ('the EPUK-IAQM guidance')

6.19 Published by Environmental Protection UK (EPUK) and the IAQM, this guidance includes a method for screening the requirement for an air quality assessment and determining the significance of any air quality impacts associated with a development proposal. It also identifies mitigation measures which can be implemented to reduce air quality effects attributable to the scheme.

Local Air Quality Management Technical Guidance ('TG16')

6.20 TG16 includes guidance for local authorities to assess and, where required, deliver improvements in air quality within their jurisdiction. TG16 also recommends where the AQOs should be applied, as outlined in **Table 6.2**.

Table 6.2: Examples of where the air quality objectives should apply, as per TG16

AVERAGING PERIOD OBJECTIVES	OBJECTIVES SHOULD APPLY AT	OBJECTIVES SHOULD GENERALLY NOT APPLY AT
Annual mean	All locations where members of the public might be regularly exposed. Building façades of residential properties, schools, hospitals, care homes etc.	Building façades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
24-hour mean and 8-hour mean	All locations where the annual mean objective would apply, together with hotels. Gardens of residential properties (not at peripheries or front gardens unless exposure is likely there).	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
1-hour mean	All locations where the annual mean and: 24 and 8-hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets). Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more. Any outdoor locations where members of the public might reasonably expect to spend one hour or longer.	Kerbside sites where the public would not be expected to have regular access.
15-minute mean	All locations where members of the public might reasonably be exposed for a period of 15 minutes or longer.	

Greater Cambridge Sustainable Design and Construction Supplementary Planning Document (2020)

- 6.21 The 'Greater Cambridge Sustainable Design and Construction Supplementary Planning Document' sets out the standards required to meet the objectives and policies of the Cambridge and South Cambridgeshire Local Plans as sustainable as possible. It also outlines what air quality information is required to support a planning application and the criteria for carrying out a 'detailed' air quality assessment, including dispersion modelling. Mitigation measures which should be considered are also defined.

North East Cambridge Area Action Plan Environmental Health Topic Paper (2020)

- 6.22 The North East Cambridge Area Action Plan sets out strategic objectives for the development of the area, with focus on creating a healthy, safe, characterful district where people can live and work. The aim is to design the area in a way that improves wellbeing and the quality of life for anyone wishing to use the space.
- 6.23 The accompanying Environmental Health Topic Paper covers specific environmental protection issues to be considered, and these include air quality.

Methodology

- 6.24 The approach taken for assessing the potential air quality impacts of the Proposed Development is as follows:
- Baseline characterisation of local air quality;
 - Qualitative impact assessment of dust and emission generated during the construction related activities;
 - Advanced dispersion modelling assessment of air quality impacts attributable to increases in vehicle movements from the Proposed Development once operational;
 - Recommendation of mitigation measures, where appropriate, to ensure any adverse effects on air quality are minimised; and
 - Identification of residual effects resulting from the Proposed Development.
- 6.25 The main pollutants for consideration in this assessment are:
- Fugitive PM₁₀, PM_{2.5} and dust emissions from construction related activities; and
 - NO₂, PM₁₀ and PM_{2.5} emissions from existing baseline traffic and additional traffic attributable to the Proposed Development.

- 6.26 The Proposed Development does not include centralised heat and energy plant. However, traffic generated by the Development has the potential to affect local air quality. In addition, the Proposed Development will be impacted upon by the existing local air quality, including road traffic emissions.

Baseline Assessment

- 6.27 Existing or baseline air quality refers to the concentrations of relevant substances that are already present in ambient air, including road traffic and industrial sources.
- 6.28 A study has been undertaken using data obtained from continuous and diffusion tube monitoring stations maintained by CCC and South Cambridgeshire District Council (SCDC); estimated

background from the United Kingdom Air Information Resource (UK-AIR) website maintained by the Department for Environment, Food and Rural Affairs (Defra).

Consultation

- 6.29 A Scoping Report (**Appendix 2.1**) was submitted to SCDC with a formal request for an EIA Scoping Opinion in accordance with Regulation 15 of the EIA Regulations. As part of this process, key statutory and non-statutory consultees have been consulted to review the proposed methodology and criteria for assessment. The Council subsequently issued its Scoping Opinion (**Appendix 2.2**), commenting on the proposed scope and methodology of the topics for assessment within the EIA. The assessment has been completed in accordance with the scoping opinion.

Construction Phase Dust Assessment

- 6.30 Potential air emissions from demolition and construction activities, particularly in the form of dust, have the potential to cause a loss of amenity (due to dust soiling). The finer fraction of dust, in the form of PM₁₀ and particulates of finer fractions, have the potential to affect human health. Given the variability of construction sites and the range of activities undertaken, making an accurate assessment of the dust and air pollutants generated is rarely feasible or practicable. Instead, a qualitative assessment has been undertaken to examine potential areas of concern and identify the best practicable means for eliminating, minimising and mitigating potential emissions.
- 6.31 Key sources of air pollution from construction sites include:
- dust created by demolition of existing on-site buildings;
 - earthworks connected with the removal of the existing road network, levelling activities to facilitate construction of the industrial estate and underground services, and associated haulage, tipping, stockpiling and landscaping;
 - general construction activities, which may include, concrete mixing, cutting, grinding etc; and
 - dust from haulage vehicles on site and on local roads, causing 'trackout'.
- 6.32 Potential air quality impacts during the construction phase were considered in line with the IAQM guidance document¹³, at human receptor locations up to 350 m from the Site boundary or within 50 m of the route used by construction vehicles on a public highway, up to 500 m from the Site entrance. The study areas for the construction phase assessment are shown in **Appendix 6.1**.
- 6.33 This assessment identifies potential works that may generate dust and incorporates a list of appropriate mitigation measures to control them. These measures will be incorporated into a Construction Environmental Management Plan (CEMP), a draft of which is attached as **Appendix 4.2**.
- 6.34 The IAQM 2014 guidance have been respectively used to undertake the risk assessment. The method recommended by this guidance is outlined in **Appendix 6.1**.

Assessment of Vehicle Movements (Operational phases)

- 6.35 Road traffic is a primary source of emissions to air. The combustion of fuel in vehicles leads to several harmful by-products which can affect air quality in the vicinity of roads. Areas with high

traffic volumes or near to major roads often experience elevated pollutant levels, particularly in the form of NO₂, PM₁₀ and PM_{2.5}.

- 6.36 The EPUK-IAQM guidance outlines screening criteria which can be used to determine when an air quality assessment is required. The Proposed Development is expected to lead to an exceedance of the screening criteria due to the anticipated increase in light- and heavy-duty vehicle movements. The criteria are exceeded both when the development is undergoing construction and once operational. Therefore, detailed dispersion modelling has been undertaken to determine the potential effects of the development on local air quality, considering road traffic and the plant, for both the construction and operational phases.
- 6.37 The ADMS-Roads software was used to assess emissions from road traffic attributable to the Proposed Development when it commences Operation and during the year construction activities commence. Full details of the assessment methodology and model input data are provided in **Appendix 6.2**.
- 6.38 Predictions of NO₂, PM₁₀ and PM_{2.5} were made for the following scenarios:
- Scenario 1 (S1): Existing baseline (2019);
 - Scenario 2 (S2): Future baseline (2027), without the Proposed Development in place, but inclusive of all schemes allocated in the CCC Local Plan and consented developments for which traffic data were considered by the transport consultants; and
 - Scenario 3 (S3): Future baseline including any cumulative/ allocated schemes (2027), with the Proposed Development in place.
- 6.39 The method adopted for this assessment takes into account current best practice guidance for assessment of air quality including the EPUK-IAQM guidance.

Study Area – Vehicle Emissions and Energy Provision

- 6.40 The detailed dispersion modelling assessment included roads in the vicinity of the Proposed Development site, where the traffic impacts attributable to the scheme are likely to be greatest. These roads include Milton Road, A14, A1134, A1303 and A1309.
- 6.41 Once operational, the Proposed Development is expected to generate an additional 1,653 LDVs (AADT) and 192 HDVs (AADT) along Cowley Road which is the Site access.
- 6.42 It has been confirmed that no CHP or generators are proposed for the buildings, hence building emissions are assumed to be minimal and have been scoped out of the assessment. All energy provision for heating and hot water will be provided by electricity.

Significance Criteria

- 6.43 The methodology for defining significance of air quality impacts differs from the terminology described in **Chapter 2** of the ES, as air quality is assessed against specific air quality standards and targets.

Construction Phase

- 6.44 The risk of dust impacts from construction activities were defined using the method outlined in **Appendix 6.1**. The significance of the potential for dust to affect sensitive receptors has been assessed (in the absence of mitigation) using professional judgement but is generally considered proportionate to the risk impact categories.

6.45 The significance of effects following the implementation of mitigation has then been reassessed.

Operational Phase

6.46 The significance of effects attributable to impacts from vehicle movements (whether construction or operational) has been determined separately to account for impacts generated in connection with each of the following:

- The impacts of the Proposed Development on air quality at existing sensitive receptors using the assessment criteria in the EPUK-IAQM guidance; and
- The impacts of ambient air quality on the future receptors introduced within the Proposed Development.

Impact magnitude – Proposed Receptors

6.47 To determine the potential for future users of the Proposed Development to be introduced into an area of poor ambient air quality, concentrations at the on-site receptors were compared to the applicable air quality objectives (AQOs) (summarised in **Table 6.3**).

Table 6.3: Ambient AQOs relevant to this assessment

POLLUTANT	AQOS	MEASURED AS	DATES TO BE ACHIEVED AND MAINTAINED THEREAFTER
NO ₂	200 µg/m ³ , not to be exceeded more than 18 times per year	1-hour mean	31 December 2005
	40 µg/m ³	Annual mean	31 December 2005
PM ₁₀	50 µg/m ³ , not to be exceeded more than 35 times per year	24-hour mean	31 December 2004
	40 µg/m ³	Annual mean	31 December 2004
PM _{2.5}	20 µg/m ³	Annual mean	2020

Impact magnitude – Existing Receptors

6.48 The potential impacts of the Proposed Development were assessed by comparing estimated pollutant concentrations with the AQOs (**Table 6.3**), with and without the Proposed Development in place. In addition to the AQOs, the EPUK-IAQM guidance descriptors for magnitude of impact were used to assess the annual mean changes in NO₂, PM₁₀ and PM_{2.5} concentrations, primarily because they consider effects in terms of the magnitude of change from predicted concentrations and also relative to the AQOs.

6.49 **Table 6.4** shows the EPUK-IAQM guidance impact descriptors that take account of the percentage change in concentration relative to the air quality assessment level (AQAL), such as the annual mean objectives, and the annual mean concentration at the receptor during the assessment year.

Table 6.4: Air quality impact descriptors for changes to annual mean NO₂, PM₁₀ and PM_{2.5} concentrations

LONG-TERM AVERAGE CONCENTRATION AT RECEPTOR IN ASSESSMENT YEAR	% CHANGE IN CONCENTRATION RELATIVE TO AIR QUALITY ASSESSMENT LEVEL (AQAL)			
	1	2 – 5	6 – 10	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76 – 94% of AQAL	Negligible	Slight	Moderate	Moderate
95 – 102% of AQAL	Slight	Moderate	Moderate	Substantial
103 – 109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

Note: The AQAL is the relevant AQO. For annual mean NO₂ and PM₁₀, the AQAL is 40 µg/m³. For PM_{2.5}, the AQAL is 20 µg/m³.

6.50 Changes in the hourly mean NO₂ and daily mean PM₁₀ concentrations should not be assessed using the EPUK-IAQM guidance criteria specified above. Consequently, the following impacts would be considered to exert significant effects at a specific receptor location:

- Where the Proposed Development causes a receptor to exceed an annual mean NO₂ concentration of 60µg/m³, where it did not without the Proposed Development in place; and/or,
- Where the Proposed Development causes a receptor to exceed the daily mean PM₁₀ AQO more than the 35 times per year permissible.

6.51 The assessment has only reported pollutant impact magnitudes at receptor locations where the annual, 24-hour and hourly AQOs are recommended to be applied in TG16. Consequently, all reported receptors should be considered as being a 'high' sensitivity.

6.52 The overall significance of effects on local air quality, including background pollutant concentrations, has been established through consideration of the following factors:

- the existing and future air quality in the absence of the development;
- duration (temporary or long term);
- reversibility (reversible or permanent);
- the extent of current and future population exposure to the impacts; and
- the influence and validity of any assumptions adopted when undertaking the prediction of impacts.

Limitations and Assumptions

6.53 The likely air quality effects of the Proposed Development were determined using best-practice modelling techniques. However, dispersion models provide an estimate of concentrations arising from input emissions and historical meteorological data. The estimates produced, while appropriately representing the complex factors involved in atmospheric dispersion, have inherent uncertainty.

6.54 In the absence of traffic data covering a sufficient spatial extent, it has not been possible to assess the effects of the Proposed Development in all areas where the screening criteria are exceeded. Highway speed limits have been used for the assessment of traffic emissions.

- 6.55 Since the Site layout was still evolving at the time of assessment, modelling has been based on vertices representing the Site boundaries. Since these are closer to potential sources of emissions in the surrounding area, they are considered to represent a worst-case scenario.
- 6.56 It was confirmed that no significant on-site sources of combustion would be introduced, and as such these have not been assessed.
- 6.57 The assessment has assumed that all receptors at ground floor level are elevated to 1.5m above ground level, to represent the average breathing height for a human.

Baseline Conditions

- 6.58 The Proposed Development is in North Cambridge, on a parcel of land situated between the Cambridge Guided Busway to the southwest and the Breckland line railway line to the east. There is one AQMA near the development site, with the Cambridge AQMA approximately 1.4km to the southwest covering the city centre. The Cambridge AQMA was declared in 2005 due to exceedances of the NO₂ annual mean objective. Roughly 750m north of the development is the A14, which is the busiest road in the area and will therefore likely be the biggest influence on background air quality conditions.
- 6.59 Each year, CCC and SCDC produce Air Quality Annual Status Reports (ASR) summarising the results of monitoring undertaken in the vicinity of the development site, progress made on improving air quality in the area, and consequently on whether their AQMAs should be maintained. The most recent ASR’s available at the time of this assessment (the 2021 reports, reviewing 2020) show that CCC and SCDC have undertaken monitoring at 19 diffusion tube locations within 2.5km of the Proposed Development site during 2020, the latest year for which monitoring data are available. **Table 6.5** below outlines the annual mean NO₂ monitored at these diffusion tube sites over the last five years. The monitoring locations in the vicinity of the Site are also presented in Figure B-1 in **Appendix 6.2**.

Table 6.5: Annual mean NO₂ concentrations monitored by CCC and SCDC diffusion tubes within 2.5km of the Proposed Development site

SITE ID	SITE NAME	SITE TYPE	DISTANCE FROM PROPOSED DEVT. SITE (KM)	ANNUAL MEAN NO ₂ CONCENTRATION (MG/M ³)				
				2016	2017	2018	2019	2020
DT-28N	73 Cambridge Road, Milton	Roadside	1.3	-	-	22.8	23.0	18.8
12	Newmarket Road 2	Roadside	1.4	29	28	25	23	20.4
8	Milton Road	Roadside	1.4	20	19	18	18	14.0
37	Oaktree Avenue	Urban Background	1.6	18	16	15	15	11.0
60	Barnwell Road	Kerbside	1.7	-	-	23	22	16.4

SITE ID	SITE NAME	SITE TYPE	DISTANCE FROM PROPOSED DEVT. SITE (KM)	ANNUAL MEAN NO ₂ CONCENTRATION (MG/M ³)				
				2016	2017	2018	2019	2020
30	Arbury Road	Kerbside	1.7	19	18	17	18	14.9
20	Elizabeth Way	Roadside	1.9	31	26	27	26	19.3
35	Abbey Road	Roadside	2.1	21	19	17	17	13.5
61	Newmarket Road 3	Roadside	2.1	-	-	33	34	21.8
56	Coldhams Lane 2	Roadside	2.1	27	23	23	20	17.3
38	Chesterton Road	Roadside	2.1	26	23	21	23	15.9
7	Newmarket Road 1	Roadside	2.2	35	32	33	31	26.0
DT9	3 Garner Close, Milton	Urban Background	2.2	17.8	17.5	14.4	15.5	13.3
DT22	Flack End, Orchard Park	Roadside	2.2	22.4	21.2	17.5	15.9	13.3
10	Gilbert Road	Roadside	2.3	22	21	20	24	15.7
33	Victoria Avenue	Roadside	2.4	37	35	35	31	21.4
17	Coldhams Lane	Roadside	2.4	24	22	21	22	15.1
DT27	Engledow Drive, Orch. Park	Urban Background	2.4	22.1	21.2	17.9	16.8	13.5
DT28	22 Topper Street, Orch. Park	Roadside	2.4	21.0	21.3	16.6	16.7	14.1
Objective				40				

Note: Site IDs starting with DT are locations in SCDC. Site IDs without DT at the beginning are in CCC, as labelled in their respective ASRs.

6.60

The results indicate that the annual mean NO₂ AQO has not been exceeded at any of the diffusion tube monitoring sites within 2.5km of the Proposed Development site, including sites situated close to the A14, the busiest A road in the vicinity. At each of the monitoring sites presented for which five years of data are available, it is apparent that annual mean NO₂ concentrations have reduced at both roadside and urban background locations.

6.61 CCC and SCDC also undertake continuous monitoring to determine compliance with the NO₂, PM₁₀ and PM_{2.5} AQOs eight automatic monitors located within their jurisdiction. Six of these monitors record annual mean PM₁₀ concentrations and two record annual mean PM_{2.5} concentrations. The results from these automatic monitors are summarised in **Tables 6.6, 6.7** and **6.8**, below. The monitoring locations in the vicinity of the Site are also presented in Figure **B-2** in **Appendix 6.2**.

Table 6.6: Annual mean NO₂ concentrations monitored by CCC and SCDC automatic monitors

SITE ID	SITE NAME	SITE TYPE	DISTANCE FROM PROPOSED DEVT. SITE (KM)	ANNUAL MEAN NO ₂ CONCENTRATION (MG/M ³)				
				2016	2017	2018	2019	2020
CM2	Montague Road	Roadside	1.8	27	24	25	22	16
CM3	Newmarket Road	Roadside	2.1	24	26	25	22	18
ORCH	Orchard Park Primary School (A14)	Urban Background	3.0	18	18	14	15	11
CM4	Parker Street	Roadside	3.1	41	37	32	33	24
CM5	Regent Street	Roadside	3.3	32	29	26	27	22
CM1	Gonville Place	Roadside	3.5	36	31	30	28	20
IMP	Impington (A14)	Roadside	3.8	23	23	19	16	13
GIRT	Girton	Roadside	4.7	23	23	18	17	12

Note: Site IDs starting with CM are locations in CCC. Site IDs without CM at the beginning are in SCDC, as labelled in their respective ASRs.

Table 6.7: Annual mean PM₁₀ concentrations monitored by CCC and SCDC automatic monitors

SITE ID	SITE NAME	SITE TYPE	DISTANCE FROM PROPOSED DEVT. SITE (KM)	ANNUAL MEAN NO ₂ CONCENTRATION (MG/M ³)				
				2016	2017	2018	2019	2020
CM2	Montague Road	Roadside	1.8	22	20	21	22	19
ORCH	Orchard Park Primary School (A14)	Urban Background	3.0	16	14	14	14	12

SITE ID	SITE NAME	SITE TYPE	DISTANCE FROM PROPOSED DEVT. SITE (KM)	ANNUAL MEAN NO ₂ CONCENTRATION (MG/M ³)				
				2016	2017	2018	2019	2020
CM4	Parker Street	Roadside	3.1	22	21	23	21	17
CM1	Gonville Place	Roadside	3.5	20	18	19	19	15
IMP	Impington (A14)	Roadside	3.8	17	16	17	16	15
GIRT	Girton	Roadside	4.7	17	17	17	17	14

Note: Site IDs starting with CM are locations in CCC. Site IDs without CM at the beginning are in SCDC, as labelled in their respective ASRs

Table 6.8: Annual mean PM_{2.5} concentrations monitored by CCC automatic monitors

SITE ID	SITE NAME	SITE TYPE	DISTANCE FROM PROPOSED DEVT. SITE (KM)	ANNUAL MEAN NO ₂ CONCENTRATION (MG/M ³)				
				2016	2017	2018	2019	2020
CM3	Newmarket Road	Roadside	2.1	11	11	10	10	8
CM1	Gonville Place	Roadside	3.5	15	15	15	14	11

6.62 For the years 2016 to 2020, no exceedances of the annual mean PM₁₀ and PM_{2.5} AQOs were recorded at any of the monitoring locations. Also, the annual mean NO₂ AQO was only marginally exceeded during 2016 at monitor CM4, the roadside monitor on Parker Street. Since then, monitored concentrations at this site have reduced substantially. It should be noted that the number of hours exceeding the hourly mean NO₂ AQO was 0 at all monitors in 2019.

6.63 In our assessment, 2019 will be used as the baseline year as this is considered to be the most recent, ‘normal’ year of monitoring data on record, due to the impact of the Coronavirus pandemic on travel behaviours during 2020 and 2021. Appendix F of CCCs ASR outlines the impact of the pandemic on air quality in Cambridge, by comparing the 2020 and 2019 average data sets. **Table 6.9**, below, presents the measured reductions in average concentrations at different site types. The biggest improvements have been observed where the largest number of vehicles were no longer travelling. Due to the first lockdown restrictions being imposed at the end of March 2020, the differences between 2021 data and 2019 may be even greater, but this data is not yet available.

Table 6.9: List of measured falls in nitrogen dioxide levels

TYPE OF SITE	FALL IN MEASURED NO ₂ (MG/M ³)
Background	-3.5
Urban Background	-4
Radial Roads	-6

TYPE OF SITE	FALL IN MEASURED NO ₂ (MG/M ³)
Inner Ring Roads	-7.5
Inner City Streets	-10
Around the Bus Station	-9
Around the Railway Station	-10

6.64 Background concentrations of NO₂, PM₁₀ and PM_{2.5} were obtained from maps downloaded from the UK-AIR website maintained by Defra. The maps present annual mean pollutant concentrations on a 1km² basis for the years 2018 (the base mapping year) to 2030. The concentrations for the 1km x 1km grid square centred on OS coordinates 547500, 260500, corresponding to the location of the Proposed Development, for 2019, 2022 (the year in which construction activities are expected to commence) and 2027 (the year the Proposed Development is expected to be operational) are shown in **Table 6.10**.

Table 6.10: Background pollutant concentrations at the Proposed Development from UK-AIR

POLLUTANT	2019 (MG/M ³)	2022 (MG/M ³)	2023 (MG/M ³)	2027 (MG/M ³)	OBJECTIVE
NO ₂	11.67	10.38	10.10	9.04	40.0
PM ₁₀	14.88	14.21	14.03	13.67	40.0
PM _{2.5}	9.88	9.36	9.22	8.93	25.0

6.65 Data collected by CCC and SCDC indicate that annual mean NO₂ concentrations can be high in the vicinity of A roads local to the Proposed Development site, including the A14, but were not exceeded at any location in the most recently available 'normal' year of 2019. The highest recorded concentration was 34µg/m³ at diffusion tube DT61 in 2019, which is 15% below the relevant AQO. At the Urban Background monitor closest to the Proposed Development site, DT37, Oaktree Avenue, recorded concentrations were 15µg/m³ in 2019. This is similar, although slightly higher than the background concentrations predicted by UK-AIR of 11.67µg/m³ for the same year of 2019. This could be explained by the fact that this monitor is 1.6km away from the grid square for which data was taken from UK-AIR. As such, it is not expected that ambient NO₂ levels at the Proposed Development site will be in breach of the AQO.

6.66 The highest recorded PM₁₀ annual mean was 21µg/m³, and the highest recorded PM_{2.5} annual mean was 14µg/m³. These concentrations are approximately 48% and 44% below the relevant AQOs, respectively. These two locations are also both roadside monitors within the Cambridge AQMA, 3.1km and 3.5km away from the Proposed Development site respectively. As such, it is not expected that PM₁₀ or PM_{2.5} levels will be in breach of the relevant AQOs and new users of the Site will not be at risk of being exposed to unacceptable air pollutant levels.

6.67 As mentioned previously, 2019 data will be used as the baseline due to the impacts of the Coronavirus pandemic on travel behaviours. This is to ensure a robust and conservative assessment.

Future Baseline Conditions

6.68 Based on the monitored and estimated background data presented above, it is considered that the Proposed Development site is located in an area where the NO₂, PM₁₀ and PM_{2.5} AQOs are unlikely to be exceeded in 2027 (operational year).

Predicted Effects

Construction Phase

- 6.69 During the construction phase, construction activities have the potential to generate fugitive dust emissions which may give rise to annoyance due to the soiling of surfaces. Emissions of this nature can also pose a risk of human health effects due to the increase in exposure to PM₁₀ concentrations.
- 6.70 Emissions from goods vehicles and vehicles used by site personnel to travel to and from Site may also affect local air quality.

Operational Phase

- 6.71 Emissions from vehicles associated with the Proposed Development during the operational phase may affect local air quality.

Assessment of Effects

Construction Phase

Embedded Mitigation: Fugitive Dust

- 6.72 Construction of the Proposed Development will be managed using a Construction Environmental Management Plan (CEMP) (**Appendix 4.2**). The CEMP includes standard good-practice measures to mitigate dust emissions from the Proposed Development to prevent or reduce fugitive dust emissions and/or being deposited on nearby receptors. A regular visual inspection programme is outlined in the CEMP and should be undertaken.
- 6.73 In accordance with the IAQM 2014 guidance, the construction phase assessment has not assumed mitigation secured in the CEMP will be implemented.

Anticipated Effects: Construction Dust

Construction Dust Screening Assessment

- 6.74 As assessment of construction dust effects is normally required if there are:
- Human receptors within 350 m of the Site boundary, or within 50 m of the route used by construction vehicles on a public highway, up to 500 m from the Site entrance; or
 - Ecological receptors within 50 m of the Site boundary; or within 50 m of the route used by construction vehicles on a public highway, up to 500 m from the Site entrance.
- 6.75 If these criteria are not met, it can be assumed that the level of risk from dust amenity will be negligible and any effects will be not significant.
- 6.76 As there are human receptors within 350 m of the Site boundary of the Proposed Development, a dust risk assessment has been undertaken.
- 6.77 According to the MAGIC Maps website, the Bramblefields Local Nature Reserve is located within 50m of the Proposed Development site. The construction dust assessment therefore also included this Site within the risk assessment.
- 6.78 The information to assess the dust emission magnitude has been provided by the Applicant.

Construction Dust Assessment – Dust Emissions Magnitude

6.79 Potential dust emission magnitudes from each of the construction related activities have been assessed using the IAQM 2014 guidance criteria (described in **Appendix 6.1**) and are detailed below. It should be noted that in accordance with the IAQM 2014 guidance, the assessment has been undertaken assuming no mitigation measures have been secured.

Demolition

6.80 Since the proposed development site is mostly vacant land, only small demolition activities are anticipated. No buildings are to be demolished. Some potentially dusty materials such as block paving may be removed. There is to be no crushing on site and demolition activities will take place below 10 m above ground level. The emissions magnitude is therefore considered small.

Earthworks

6.81 Some earthworks including the processes of soil-stripping, ground-levelling, excavation and landscaping are proposed at the Site. The total site area is >10,000m². The total earthworks material to be moved on Site has been estimated to be <20,000 tonnes. Stockpiles stored on Site will be temporary and all spoils are to be removed at the earliest possible opportunity. The potential dust emission magnitude from earthworks is medium.

Construction

6.82 The proposed development will include construction of approximately 450 residential units, 43,000 sqm office floorspace, 3,000 sqm of A1/A3 floorspace, three further office buildings, a multi-storey car park serving both the railway station and the commercial development, as well as public open space. The potential dust emission magnitude for this activity is likely to be large.

Trackout

6.83 According to the IAQM 2014 guidance, trackout is defined as “The transport of dust and dirt from the construction/ demolition site when HDVs leave the Site (having travelled over muddy ground) onto the public road network, where it may be deposited and then re-suspended by vehicles using the network.” It is estimated that the maximum number of HDV outward movements per day would be >50 with an unpaved road length of <50m. Hence, the potential dust emissions magnitude for trackout is large.

Construction Dust Assessment – Receptor Sensitivity

6.84 **Table 6.11** outlines the sensitivity of the surrounding area was determined, with reference to the IAQM 2014 guidance method summarised in **Appendix 6.1**.

Table 6.11: Sensitivity of the surrounding area

TYPE OF WORK	DEMOLITION*	EARTHWORKS	CONSTRUCTION*	TRACKOUT
Dust soiling	Medium: 1-10 medium sensitivity receptors within 20m of the existing building. There is Novotel hotel and some commercial developments adjacent to the proposed development	Medium: 1-10 medium sensitivity receptors within 20m of site boundary. There is Novotel hotel and some commercial developments adjacent to the proposed development	Medium: 1-10 medium sensitivity receptors within 20m of site boundary. There is Novotel hotel and some commercial developments adjacent to the proposed development	Medium: More than 100 medium sensitivity receptors within 20m of roads along which track out could arise (up to 500m of site since it is a major development)

TYPE OF WORK	DEMOLITION*	EARTHWORKS	CONSTRUCTION*	TRACKOUT
Human health impacts	Low: 1-10 high sensitivity receptors within 20m of the existing building and annual mean PM10 concentrations are likely to be below 24µg/m3 the vicinity of the Application Site.	Low: 1-10 high sensitivity receptors within 20m of the Site boundary and annual mean PM10 concentrations are likely to be below 24µg/m3 the vicinity of the Application Site.	Low: 1-10 high sensitivity receptors within 20m of the Site boundary and annual mean PM10 concentrations are likely to be below 24µg/m3 the vicinity of the Application Site.	Low: Less than 100 high sensitivity receptors within 50m of the roads used by construction traffic PM10 concentrations are likely to be below 24µg/m3 the vicinity of the Application Site.
Ecological	Negligible: According to the MAGIC Maps website, there are no SACs, SPAs, Ramsar sites, SSSIs, National Nature Reserves or Ancient Woodlands within 50m of the Proposed Development site or routes along which trackout could arise. However, there is Bramblefields local natural reserve within 50m of the proposed development, but there are no species sensitive to the impacts of dust deposition within the vicinity of the Proposed Development site. Hence, the impacts on ecological receptors have not been further assessed.			

Construction Dust Assessment - Risk of Dust Impacts

6.85 The construction dust risks shown in **Table 6.12** have been assigned based on the dust emission magnitude associated with each on-site activity and the sensitivity of the surrounding area, using the IAQM 2014 guidance method described in **Appendix 6.1**.

Table 6.12: Summary of the dust risk from site construction activities

POTENTIAL IMPACT	DUST RISK SUMMARY			
	DEMOLITION	EARTHWORKS	CONSTRUCTION	TRACKOUT
Dust Soiling	Low Risk	Medium Risk	Medium Risk	Medium Risk
Human Health	Negligible Risk Low Risk Low Risk Low Risk			
Ecological	Negligible Risk	Negligible Risk	Negligible Risk	Negligible Risk

6.86 The overall dust risk from the Site is predicted to be a maximum of ‘medium’ for dust soiling effects. Common disamenity dust effects may include the soiling of neighbouring windows, cars and street furniture.

6.87 Based on the ‘low’ dust impact risks on human health outlined above, it is considered that fugitive dust could have a maximum of ‘low’ (‘not significant’) direct, local, short-to medium-term effects, in the absence of mitigation, on human health.

6.88 Appropriate measures will mitigate most of the residual negative air quality impacts resulting from the construction phase of the Proposed Development and will avoid significant dust effects.

Construction Phase Traffic Emissions – Screening

6.89 The EPUK-IAQM guidance contains criteria which can be used to determine when an air quality assessment (typically taken to mean a detailed air quality assessment) is required. Where one

or more of the criteria are not breached, the effects can be considered as ‘not significant’ and an air quality assessment scoped out. The criteria relevant to the scheme are those relating to the changes in light duty vehicle (LDV) and heavy duty vehicle (HDV) movements, expressed in **Table 6.13** below.

6.90 It is understood that the Proposed Development will not generate more than 500 additional LDV and 100 additional HDV vehicle movements along any of the roads at and around the Site during the construction phase. While the routes along which construction heavy goods vehicles (assumed to comprise all or nearly all HDVs) will travel to and from Site are unknown, it is understood that they are typically expected to be derived to and from the A14, therefore bypassing the Cambridge AQMA. Staff are expected to travel to and from the Site along the A1134 Elizabeth Way and A1303 Newmarket Road but in volumes not exceeding the criterion. Therefore, a detailed dispersion modelling assessment has been scoped out to assess the effects of road traffic attributable to the Proposed Development on air quality at existing human receptor locations during construction.

Screening the need for an Operational Air Quality Assessment – Dispersion Modelling

6.91 For the Proposed Development, there is more than 1,000m² of floorspace and there will be more than ten parking spaces. Therefore, further screening has been undertaken.

6.92 The Proposed Development was screened against the criteria outlined in in the EPUK-IAQM guidance which can be used to determine when an air quality assessment is required and identifies whether any would be exceeded in relation to the Proposed Development.

Table 6.13: Comparison of the proposed development to screening criteria replicated from the EPUK-IAQM guidance

CRITERION FROM EPUK-IAQM GUIDANCE	IS CRITERION EXCEEDED (Y/N), INCLUDING EXPLANATION
A change in road alignment of five metres or more, within an AQMA.	No: The Site is not expected to result in realignments to the existing road network.
Introduce a new junction or remove an existing junction near to relevant receptors which cause traffic to significantly accelerate or decelerate, such as traffic lights or roundabouts.	No: The Proposed Development would not introduce a roundabout or signalised junction.
Have an underground car park with extraction system.	No: No underground car parking is proposed.
Light-duty-vehicle (LDV) annual average daily traffic (AADT) flows changing by 100 AADT or more, within or adjacent to an AQMA, or 500 AADT or more elsewhere.	Yes: The development is expected to produce more than 500 AADT outside of AQMAs and more than 100 AADT in the Cambridge City AQMA and as such the criteria are expected to be exceeded.
Heavy-duty-vehicle (HDV) flows or bus flows (at a bus station) changing by 25 AADT or more, within or adjacent to an AQMA, or 100 AADT elsewhere.	Yes: The development is expected to generate more than 100 additional HDV AADT movements on the local road network, and as such the criteria are expected to be exceeded.
Inclusion of one or more substantial combustion processes, where there is a risk of impacts at relevant receptors.	No: No centralised energy/heating provision is expected within the Proposed Development. All heating to be provided by electricity.

6.93 As shown in **Table 6.13**, the second stage screening criteria are to be exceeded at the Proposed Development. This highlights that detailed modelling of the development’s impact on the local area is necessary, following the EPUK-IAQM guidance.

Impacts of Ambient Air Quality at the Existing Receptors

6.94 Air quality effects were assessed for emissions from road traffic associated with the Proposed Development once it is operational.

6.95 These were assessed for the following 3 scenarios:

- Scenario 1- Baseline for the year 2019. The 2019 has been considered as a baseline year instead of 2020 as emissions were impacted in 2020 due to the changes in travel behaviours caused by the Covid pandemic.
- Scenario 2 – Operational year 2027 without Proposed Development in place, but inclusive of all schemes allocated in the CCC Local Plan and consented development for which traffic data were considered by the transport consultants.
- Scenario 3- Operational year 2027 with Proposed Development in place and inclusive of all consented developments considered by the transport consultants.

6.96 **Table 6.14, 6.15 and 6.16** presents the predicted annual mean NO₂, PM₁₀ and PM_{2.5} concentrations at each of the existing receptor (ER) locations to which the annual and hourly mean AQOs should be applied in S1, S2 and S3. The predicted concentrations in these tables are rounded to one decimal place. The change in concentration (the With development concentration minus the Without development concentration) is calculated based on modelled data to two decimal places, rounded to one decimal place, and therefore may slightly differ to a change in concentrations derived from the rounded predicted With and Without concentrations presented in the tables.

Table 6.14: Estimated annual mean NO₂ concentrations at existing receptors (µg/m³) in S1, S2 and S3 and impact magnitude assigned using the EPUK-IAQM guidance

RECEPTOR ID	S1 BASE CASE (2019)	S2 WITHOUT DEVELOPMENT (2027)	S3 WITH DEVELOPMENT (2027)	PERCENTAGE CHANGE IN CONCENTRATION RELATIVE TO AQUAL	% OF AQUAL	EPUK-IAQM IMPACT DESCRIPTOR
ER1	20.9	15.1	15.2	0.2	38	Negligible
ER2	21.0	15.1	15.2	0.2	38	Negligible
ER3	21.9	15.6	15.7	0.2	39	Negligible
ER4	21.0	15.1	15.2	0.2	38	Negligible
ER5	21.9	15.6	15.7	0.2	39	Negligible
ER6	21.6	15.4	15.5	0.2	39	Negligible
ER7	17.7	12.3	12.3	0.0	31	Negligible
ER8	19.4	13.1	13.2	0.2	33	Negligible
ER9	18.8	12.8	12.9	0.2	32	Negligible
ER10	18.1	12.4	12.5	0.2	31	Negligible
ER11	18.2	12.5	12.6	0.2	31	Negligible
ER12	18.1	12.4	12.5	0.2	31	Negligible
ER13	18.9	12.9	13.0	0.2	32	Negligible
ER14	19.3	13.0	13.1	0.2	33	Negligible

RECEPTOR ID	S1 BASE CASE (2019)	S2 WITHOUT DEVELOPMENT (2027)	S3 WITH DEVELOPMENT (2027)	PERCENTAGE CHANGE IN CONCENTRATION RELATIVE TO AQAL	% OF AQAL	EPUK-IAQM IMPACT DESCRIPTOR
ER15	19.0	12.9	13.0	0.2	33	Negligible
ER16	17.6	12.2	12.3	0.3	31	Negligible
ER17	19.1	13.0	13.1	0.2	33	Negligible
ER18	19.0	12.9	13.0	0.2	33	Negligible
ER19	18.1	12.4	12.5	0.2	31	Negligible
ER20	18.4	12.6	12.7	0.2	32	Negligible
ER21	18.6	12.7	12.8	0.3	32	Negligible
ER22	18.3	12.5	12.6	0.2	32	Negligible
ER23	18.0	12.4	12.5	0.2	31	Negligible
ER24	20.9	13.8	14.0	0.5	35	Negligible
ER25	19.3	13.0	13.1	0.2	33	Negligible
ER26	18.8	12.8	12.9	0.2	32	Negligible
ER27	25.5	17.1	17.2	0.2	43	Negligible
ER28	23.1	15.9	16.0	0.2	40	Negligible
ER29	25.6	17.3	17.4	0.2	43	Negligible
ER30	25.6	17.3	17.4	0.2	43	Negligible
ER31	23.5	16.1	16.2	0.2	41	Negligible
ER32	23.8	16.3	16.4	0.2	41	Negligible
ER33	22.8	15.8	15.8	0.0	40	Negligible
ER34	25.3	17.1	17.2	0.2	43	Negligible
ER35	22.0	15.3	15.4	0.2	38	Negligible
ER36	23.2	16.3	16.4	0.2	41	Negligible
ER37	25.8	18.0	18.1	0.3	45	Negligible
ER38	32.6	22.5	22.7	0.5	57	Negligible
ER39	32.1	22.3	22.4	0.2	56	Negligible
ER40	32.6	22.5	22.7	0.5	57	Negligible
ER41	28.5	19.5	19.6	0.3	49	Negligible
ER42	29.1	19.8	20.0	0.5	50	Negligible
ER43	23.9	16.3	16.4	0.2	41	Negligible
ER44	23.8	16.2	16.3	0.3	41	Negligible
ER45	27.6	18.7	18.8	0.3	47	Negligible
ER46	26.1	17.8	17.9	0.2	45	Negligible
ER47	25.0	16.9	17.0	0.3	42	Negligible
ER48	25.2	17.3	17.4	0.2	43	Negligible
ER49	22.4	15.6	15.7	0.2	39	Negligible
ER50	20.6	14.6	14.6	0.0	37	Negligible
ER51	21.5	15.0	15.1	0.2	38	Negligible
ER52	21.6	15.3	15.3	0.0	38	Negligible
ER53	24.1	16.7	16.7	0.0	42	Negligible
ER54	21.9	15.5	15.5	0.0	39	Negligible
ER55	22.2	15.6	15.6	0.0	39	Negligible
ER56	21.8	15.4	15.4	0.0	39	Negligible

RECEPTOR ID	S1 BASE CASE (2019)	S2 WITHOUT DEVELOPMENT (2027)	S3 WITH DEVELOPMENT (2027)	PERCENTAGE CHANGE IN CONCENTRATION RELATIVE TO AQUAL	% OF AQUAL	EPUK-IAQM IMPACT DESCRIPTOR
ER57	21.8	15.4	15.4	0.0	39	Negligible
ER58	22.1	15.6	15.6	0.0	39	Negligible
ER59	17.9	12.2	12.2	0.0	31	Negligible
ER60	19.5	12.5	12.5	0.0	31	Negligible
ER61	20.0	12.3	12.3	0.0	31	Negligible
ER62	22.2	13.4	13.4	0.0	34	Negligible

Table 6.15: Estimated annual mean PM₁₀ concentrations at existing receptors (µg/m³) in S1, S2 and S3 and impact magnitude assigned using the EPUK-IAQM guidance

RECEPTOR ID	S1 BASE CASE (2019)	S2 WITHOUT DEVELOPMENT (2027)	S3 WITH DEVELOPMENT (2027)	PERCENTAGE CHANGE IN CONCENTRATION RELATIVE TO AQUAL	% OF AQUAL	EPUK-IAQM IMPACT DESCRIPTOR
ER1	16.9	15.7	15.8	0.3	49	Negligible
ER2	16.9	15.7	15.8	0.3	49	Negligible
ER3	17.1	15.9	16.0	0.2	50	Negligible
ER4	16.9	15.7	15.8	0.3	49	Negligible
ER5	17.1	15.9	16.0	0.2	50	Negligible
ER6	17.1	15.9	15.9	0.0	50	Negligible
ER7	16.7	15.5	15.6	0.2	49	Negligible
ER8	17.1	15.9	15.9	0.0	50	Negligible
ER9	17.0	15.7	15.8	0.3	49	Negligible
ER10	16.8	15.6	15.6	0.0	49	Negligible
ER11	16.8	15.6	15.7	0.2	49	Negligible
ER12	16.8	15.6	15.6	0.0	49	Negligible
ER13	17.0	15.8	15.8	0.0	49	Negligible
ER14	17.1	15.8	15.9	0.2	50	Negligible
ER15	17.0	15.8	15.8	0.0	49	Negligible
ER16	16.7	15.5	15.5	0.0	49	Negligible
ER17	17.0	15.8	15.9	0.2	50	Negligible
ER18	17.0	15.8	15.8	0.0	49	Negligible
ER19	16.8	15.6	15.6	0.0	49	Negligible
ER20	16.9	15.6	15.7	0.2	49	Negligible
ER21	16.9	15.7	15.7	0.0	49	Negligible
ER22	16.8	15.6	15.7	0.2	49	Negligible
ER23	16.8	15.5	15.6	0.2	49	Negligible
ER24	17.4	16.1	16.2	0.2	51	Negligible
ER25	17.0	15.8	15.9	0.2	50	Negligible
ER26	16.9	15.7	15.7	0.0	49	Negligible
ER27	17.9	16.7	16.8	0.3	52	Negligible
ER28	17.4	16.2	16.2	0.0	51	Negligible
ER29	17.9	16.8	16.8	0.0	52	Negligible

RECEPTOR ID	S1 BASE CASE (2019)	S2 WITHOUT DEVELOPMENT (2027)	S3 WITH DEVELOPMENT (2027)	PERCENTAGE CHANGE IN CONCENTRATION RELATIVE TO AQUAL	% OF AQUAL	EPUK-IAQM IMPACT DESCRIPTOR
ER30	18.0	16.8	16.8	0.0	53	Negligible
ER31	17.5	16.3	16.3	0.0	51	Negligible
ER32	17.6	16.4	16.4	0.0	51	Negligible
ER33	17.4	16.2	16.2	0.0	51	Negligible
ER34	17.9	16.7	16.7	0.0	52	Negligible
ER35	17.2	16.0	16.0	0.0	50	Negligible
ER36	17.4	16.2	16.2	0.0	51	Negligible
ER37	17.6	16.3	16.3	0.0	51	Negligible
ER38	18.1	16.8	16.8	0.0	53	Negligible
ER39	18.0	16.7	16.7	0.0	52	Negligible
ER40	18.1	16.8	16.9	0.2	53	Negligible
ER41	18.1	16.8	16.9	0.2	53	Negligible
ER42	18.2	17.0	17.0	0.0	53	Negligible
ER43	17.2	16.0	16.1	0.3	50	Negligible
ER44	17.2	16.0	16.0	0.0	50	Negligible
ER45	17.6	16.3	16.4	0.2	51	Negligible
ER46	17.3	16.1	16.1	0.0	50	Negligible
ER47	17.4	16.2	16.3	0.3	51	Negligible
ER48	17.2	16.0	16.0	0.0	50	Negligible
ER49	16.9	15.6	15.6	0.0	49	Negligible
ER50	16.7	15.4	15.4	0.0	48	Negligible
ER51	16.9	15.6	15.7	0.2	49	Negligible
ER52	17.2	16.0	16.0	0.0	50	Negligible
ER53	17.7	16.5	16.5	0.0	52	Negligible
ER54	17.2	16.0	16.0	0.0	50	Negligible
ER55	17.3	16.1	16.1	0.0	50	Negligible
ER56	17.2	16.0	16.0	0.0	50	Negligible
ER57	17.2	16.0	16.0	0.0	50	Negligible
ER58	17.3	16.1	16.1	0.0	50	Negligible
ER59	16.9	15.7	15.7	0.0	49	Negligible
ER60	18.6	17.4	17.4	0.0	54	Negligible
ER61	19.0	17.7	17.7	0.0	55	Negligible
ER62	19.3	18.0	18.0	0.0	56	Negligible

Table 6.16: Estimated annual mean PM_{2.5} concentrations at existing receptors (µg/m³) in S1 and S4 and impact magnitude assigned using the EPUK-IAQM guidance

RECEPTOR ID	S1 BASE CASE (2019)	S2 WITHOUT DEVELOPMENT (2027)	S3 WITH DEVELOPMENT (2027)	PERCENTAGE CHANGE IN CONCENTRATION RELATIVE TO AQUAL	% OF AQUAL	EPUK-IAQM IMPACT DESCRIPTOR
ER1	11.1	10.1	10.1	0.0	41	Negligible
ER2	11.1	10.1	10.1	0.0	41	Negligible
ER3	11.2	10.2	10.3	0.3	41	Negligible

RECEPTOR ID	S1 BASE CASE (2019)	S2 WITHOUT DEVELOPMENT (2027)	S3 WITH DEVELOPMENT (2027)	PERCENTAGE CHANGE IN CONCENTRATION RELATIVE TO AQAL	% OF AQAL	EPUK-IAQM IMPACT DESCRIPTOR
ER4	11.1	10.1	10.1	0.0	41	Negligible
ER5	11.2	10.2	10.2	0.0	41	Negligible
ER6	11.2	10.2	10.2	0.0	41	Negligible
ER7	11.1	10.1	10.2	0.2	41	Negligible
ER8	11.3	10.3	10.3	0.0	41	Negligible
ER9	11.2	10.3	10.3	0.0	41	Negligible
ER10	11.2	10.2	10.2	0.0	41	Negligible
ER11	11.2	10.2	10.2	0.0	41	Negligible
ER12	11.2	10.2	10.2	0.0	41	Negligible
ER13	11.3	10.3	10.3	0.0	41	Negligible
ER14	11.3	10.3	10.3	0.0	41	Negligible
ER15	11.3	10.3	10.3	0.0	41	Negligible
ER16	11.1	10.1	10.1	0.0	41	Negligible
ER17	11.3	10.3	10.3	0.0	41	Negligible
ER18	11.3	10.3	10.3	0.0	41	Negligible
ER19	11.2	10.2	10.2	0.0	41	Negligible
ER20	11.2	10.2	10.2	0.0	41	Negligible
ER21	11.2	10.2	10.3	0.3	41	Negligible
ER22	11.1	10.1	10.1	0.0	40	Negligible
ER23	11.0	10.1	10.1	0.0	40	Negligible
ER24	11.4	10.4	10.4	0.0	42	Negligible
ER25	11.2	10.2	10.2	0.0	41	Negligible
ER26	11.1	10.2	10.2	0.0	41	Negligible
ER27	11.7	10.7	10.7	0.0	43	Negligible
ER28	11.4	10.4	10.4	0.0	42	Negligible
ER29	11.7	10.7	10.7	0.0	43	Negligible
ER30	11.7	10.7	10.7	0.0	43	Negligible
ER31	11.4	10.5	10.5	0.0	42	Negligible
ER32	11.5	10.5	10.5	0.0	42	Negligible
ER33	11.4	10.4	10.4	0.0	42	Negligible
ER34	11.7	10.7	10.7	0.0	43	Negligible
ER35	11.3	10.3	10.3	0.0	41	Negligible
ER36	11.5	10.5	10.5	0.0	42	Negligible
ER37	11.6	10.6	10.6	0.0	42	Negligible
ER38	11.9	10.9	10.9	0.0	44	Negligible
ER39	11.9	10.8	10.9	0.2	43	Negligible
ER40	12.0	10.9	10.9	0.0	44	Negligible
ER41	11.9	10.9	10.9	0.0	44	Negligible
ER42	12.0	11.0	11.0	0.0	44	Negligible
ER43	11.3	10.3	10.3	0.0	41	Negligible

RECEPTOR ID	S1 BASE CASE (2019)	S2 WITHOUT DEVELOPMENT (2027)	S3 WITH DEVELOPMENT (2027)	PERCENTAGE CHANGE IN CONCENTRATION RELATIVE TO AQAL	% OF AQAL	EPUK-IAQM IMPACT DESCRIPTOR
ER44	11.3	10.3	10.3	0.0	41	Negligible
ER45	11.5	10.5	10.5	0.0	42	Negligible
ER46	11.4	10.4	10.4	0.0	42	Negligible
ER47	11.4	10.4	10.4	0.0	42	Negligible
ER48	11.3	10.3	10.3	0.0	41	Negligible
ER49	11.1	10.1	10.1	0.0	40	Negligible
ER50	11.0	10.0	10.0	0.0	40	Negligible
ER51	11.1	10.1	10.1	0.0	40	Negligible
ER52	11.2	10.2	10.2	0.0	41	Negligible
ER53	11.5	10.5	10.5	0.0	42	Negligible
ER54	11.2	10.2	10.2	0.0	41	Negligible
ER55	11.2	10.3	10.3	0.0	41	Negligible
ER56	11.2	10.2	10.2	0.0	41	Negligible
ER57	11.2	10.2	10.2	0.0	41	Negligible
ER58	11.2	10.3	10.3	0.0	41	Negligible
ER59	11.0	10.1	10.1	0.0	40	Negligible
ER60	11.9	10.8	10.9	0.2	43	Negligible
ER61	11.8	10.7	10.7	0.0	43	Negligible
ER62	11.9	10.9	10.9	0.0	44	Negligible

Impacts of Ambient Air Quality at the Proposed Receptors

- 6.97 An assessment was undertaken using the ADMS-Roads Extra dispersion model to assess the effect of traffic and background pollutant sources on new receptors introduced by the Proposed Development.
- 6.98 The results of the modelling and the impact of the completed and operational Proposed Development on NO₂, PM₁₀ and PM_{2.5} concentrations at each modelled proposed receptor (based on EPUK-IAQM guidance) are presented in **Table 6.17**, below.
- 6.99 Annual mean NO₂, PM₁₀ and PM_{2.5} concentrations are predicted to meet the AQOs at all proposed receptors for both the 2027 With development scenario and the 2027 Without development scenario.

Table 6.17: Estimated Annual Mean Concentrations of NO₂, PM₁₀ and PM_{2.5} at Proposed Receptors (µg/m³) for the 2019 Baseline and 2025 With Development Scenarios

RECEPTOR	2019 BASELINE			2027 WITH DEVELOPMENT		
	NO ₂	PM ₁₀	PM _{2.5}	NO ₂	PM ₁₀	PM _{2.5}
PR2	12.1	14.9	9.9	9.2	13.8	9.0
PR3	12.1	15.0	9.9	9.3	15.2	9.0
PR4	15.0	16.4	10.6	10.9	15.2	9.6

RECEPTOR	2019 BASELINE			2027 WITH DEVELOPMENT		
	NO ₂	PM ₁₀	PM _{2.5}	NO ₂	PM ₁₀	PM _{2.5}
PR5	14.9	16.4	10.6	10.8	13.7	9.6
PR6	12.1	15.0	9.9	9.2	13.7	9.0
PR7	12.3	15.0	10	9.4	13.8	9.0

6.100 The location of these receptors and roads is shown in **Appendix 6.2**.

Embedded Mitigation

6.101 A transport assessment (TA) (**Appendix 17.1**) has been undertaken for the Proposed Development.

6.102 The TA has addressed the trip budget for the Site as part of the transport mitigation which can include but not limited to:

- Electric charging points within the car parks to encourage the take up of electric vehicles;
- Covered and secure cycle parking, to encourage travel by bicycle.

Predicted Effects

Impacts of the Proposed Development

6.103 Air quality effects have been assessed for emissions from road traffic associated with the Proposed Development once complete and operational.

6.104 The results of the modelling and the impact of the Proposed Development on NO₂, PM₁₀ and PM_{2.5} concentrations at each receptor (based on EPUK-IAQM guidance) are presented in **Table 6.16**.

6.105 Annual mean NO₂, PM₁₀ and PM_{2.5} concentrations are predicted to meet the AQOs at all modelled receptors in S1, S2 and S3.

6.106 For those receptors where it is appropriate to apply the annual mean NO₂ AQO, it also shows the percentage change in pollutant concentrations (with the Proposed Development in place) relative to the AQAL (i.e., the annual mean NO₂ AQO) between S2 and S3, the S3 pollutant concentration as a percentage of the AQAL, and the assigned EPUK-IAQM guidance impact descriptor.

6.107 The largest change in annual mean NO₂ concentrations is 0.18 µg/m³ increase relative to the AQO at each of the receptors where the annual mean AQO applies. As per the EPUK-IAQM guidance assessment method, the impact of the Proposed Development on air quality is assessed as negligible at the modelled receptors.

6.108 None of the existing receptors modelled would be exposed to annual mean NO₂ concentrations exceeding 60µg/m³ in all the three scenarios. Therefore, in accordance with TG16, none of the receptors are likely to have any exceedance of the NO₂ hourly objective.

6.109 There is no percentage change in annual mean PM₁₀ and PM_{2.5} concentrations caused by the operation of the development and there are no exceedances of the annual mean PM₁₀ or PM_{2.5} AQOs. As a result, the Proposed Development is predicted to have a negligible effect on existing receptor locations.

6.110 The largest concentration was well below the $\sim 31 \mu\text{g}/\text{m}^3$ annual mean PM_{10} concentration which can be expected prior to the $50 \mu\text{g}/\text{m}^3$ 24-hour mean AQO threshold being exceeded on more than the 35 occasions permissible per annum.

6.111 Taken together, the Proposed Development is considered likely to have a negligible, direct, short-to-medium term minor adverse effect on local air quality.

Mitigation

Mitigation Measures for Construction Dust

6.112 As described above, the Proposed Development will constitute a maximum of medium risk for earthworks and construction dust, with potentially significant effects in the absence of mitigation. The use of appropriate mitigation measures throughout the construction period will ensure that impacts to sensitive receptors are minimised.

6.113 The following is a set of best-practice measures from the IAQM 2014 guidance that would be incorporated into the specification for the works. These measures will be presented as part of a Dust Management Plan (DMP) or the relevant section of the CEMP (**Appendix 4.2**).

6.114 The measures would be implemented for as long as potentially dusty activities take place at the Proposed Development site. Some of the measures may only be necessary during phases of work or when specific activities with a high potential to produce dust are undertaken, and the list would be refined progressively. The measures in italics are classified as desirable in the IAQM 2014 guidance, the others being highly recommended.

- Display the name and contact details of person(s) accountable for air quality and dust issues on the Site boundary. This may be the environment manager/ engineer or the Site manager.
- Display the head or regional office contact information.
- Develop and implement a DMP, which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the Site.
- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
- Make the complaints log available to the local authority when asked.
- Record any exceptional incidents that cause dust and/or air emissions, either on- or off- site, and the action taken to resolve the situation in the log book.
- Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and windowsills within 100 m of Site boundary, with cleaning to be provided if necessary.
- Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.
- Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
- Erect solid screens or barriers around dusty activities or the Site boundary that are at least as high as any stockpiles on site, unless not necessary, due to the presence of an existing barrier.
- Fully enclose site or specific operations where there is a high potential for dust production and the Site is active for an extensive period.
- Avoid site runoff of water or mud.
- Keep site fencing, barriers and scaffolding clean using wet methods.
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.
- Cover, seed or fence stockpiles to prevent wind whipping.
- Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone, where applicable.
- Ensure all vehicles switch off engines when stationary - no idling vehicles.
- Avoid the use of diesel- or petrol- powered generators and use mains electricity or battery powered equipment where practicable.
- Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on un-surfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).
- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
- Ensure an adequate water supply on the Site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
- Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.
- Avoid bonfires and burning of waste materials.
- Avoid scabbling (roughening of concrete surfaces) if possible.
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
- It should be noted that measures would predominantly be expected where site activities are expected to occur within 20 m of the Site boundary; where activities take place further within the Site, the potential for them to affect nearby receptors is considered negligible.

Mitigation Measures for Construction Traffic

- 6.115 As a matter of good practice, measures designed to reduce the number of vehicle trips attributable to both commutes and heavy-duty vehicles would be implemented and would form part of the Construction Management Travel Plan. This is recommended to include the following:
- Implementing measures facilitating modal shift, discouraging the use of driving and encouraging walking, cycling, public transport and/or car sharing. Appropriate measures include: the provision of up-to-date public transport information (i.e. timetables, bus maps and routes, etc.) to construction site workers during toolbox talks, inductions or similar and keeping information updated on a site noticeboard in a prominent location; and,
 - Compiling and implementing a construction logistics plan for as long as construction related activities take place at Site. This could include measures to both limit the number of deliveries to and from the Site and would encourage construction traffic to avoid travelling through the Cambridge AQMA.

Mitigation Measures for Operation

- 6.116 The Proposed Development has been assessed as having negligible effects on air quality at existing receptor locations. Whilst these effects are not significant in EIA terms, as a matter of good practice mitigation measures would be implemented to further reduce any traffic effects on local air quality for as long as such impacts may be expected.
- 6.117 Appropriate measures are set out in the Framework Travel Plan (**Appendix 17.2**) and are intended to facilitate modal shift by discouraging the use of driving and by encouraging walking, cycling, public transport and/or car sharing.
- 6.118 They include demand-responsive public transport provision, and where possible and viable, it is recommended that any fleet vehicles under the ownership of future users of the units on Site are selected based on having lower NO_x and PM emissions than average, or not emitting pollutants.
- 6.119 Regarding the electric charge points which are inherent to the scheme, it is recommended that the charge speed is considered relative to the intended length of stay of any vehicles entering and leaving site; for example, 'rapid' charge points may be appropriate in some instances. Any electric vehicle charge points installed should be maintained in good working order and provided to a proportion of parking spaces provided for commuters, visitors and fleet vehicles using the Site.

Residual Effects

Construction Phase

- 6.120 The CEMP and incorporation of mitigation measures will ensure the avoidance of significant effects in respect of construction dust. Effects would be likely to be negligible, with possible short- to medium-term minor adverse effects during adverse weather conditions.
- 6.121 The potential impacts from construction related traffic associated with the Proposed Development have been found to be not significant, and has been screened out of this assessment. However, the implementation of mitigation measures to reduce the impact of construction related vehicle movements will reduce any potential residual impacts further.

Operational Phase

- 6.122 Residual effects following implementation of mitigation measures proposed for the operational phase are expected to be negligible to minor. Effects are expected to be short to medium term as vehicle emissions and background pollutant concentrations are expected to reduce with time, such that compliance with AQOs will be increasingly likely to be achieved.
- 6.123 No significant residual effects are anticipated as a result of the Proposed Development during construction or operation.

Monitoring

- 6.124 Monitoring will be carried out as part of the CEMP, and may include the following measures:
- Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority if asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of site boundary, with cleaning to be provided if necessary.
- 6.125 Carry out regular site inspections to monitor compliance with any dust management plan, record inspection results, and make an inspection log available to the local authority when asked.
- 6.126 Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
- 6.127 The DMP should include *inter alia*, measures for controlling dust and general pollution from site construction operations, and include details of any monitoring scheme, if appropriate.

Cumulative Effects

- 6.128 Cumulative effects are the combined effects of several development schemes (in conjunction with the Proposed Development) which may, on an individual basis be insignificant but, cumulatively, have a significant effect.
- 6.129 The cumulative schemes that have been included and considered in this assessment are:
- 21/02450/REM – Reserved matters application, 421 new homes with associated infrastructure, internal roads and open space.
 - 20/03524/FUL – Upgrade to existing access roads and Cowley Road (as part of wider proposal for the erection of a 5-storey building and a 6-storey building for commercial/business purposes, erection of a transport hub, gymnasium, surface parking, landscaping and associated infrastructure including demolition of the existing building (St Johns House) and associated structures).
 - 21/0460/SCOP – Request for a formal scoping opinion for an order granting development consent for the Cambridge Wastewater treatment plant relocation Horningsea Road, Fen Ditton, Cambridgeshire.
 - 17/1616/CTY – EIA Scoping opinion – Waterbeach New Town, Waterbeach Barracks and Airfield Site, Waterbeach, Cambridgeshire.

- 6.130 The traffic data on which the operational phase assessment has been undertaken is inclusive of all allocated sites anticipated in the Local Plan.
- 6.131 The mitigation measures recommended in this chapter are expected to at least partially mitigate any cumulative effects which operational traffic and construction activities from the Proposed Development could have with the cumulative schemes. No requirement for further mitigation has been identified.

Conclusions and Summary of Effects

- 6.132 Based on the monitoring data and Defra background mapped concentrations, pollutant concentrations at receptors which may be affected by the Proposed Development in the vicinity of the Site are unlikely to exceed the relevant AQOs at present.
- 6.133 This chapter of the ES reviewed existing air quality assessed the effects of fugitive dust from construction related activities (such as demolition) on human health, amenity and ecological receptors qualitatively in accordance with best practice guidance. It also used detailed dispersion modelling to quantify the change in pollutant concentrations brought about by road traffic attributable to the operation of the Site.
- 6.134 Before mitigation, the dust risk assessment has identified that construction activities pose a maximum of a medium dust risk. Negligible adverse effects were identified due to increases in pollutant concentrations attributable to the Proposed Development.
- 6.135 With the implementation of the mitigation measures, such as a Dust Management Plan and Travel Plans, vehicle movements connected with the Proposed Development are expected to have negligible adverse effects on existing receptors.
- 6.136 **Table 6.18** summarises the topic effects resulting from the Proposed Development.

Table 6.18: Summary of Impacts: Air Quality

DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION				IMPACT AFTER MITIGATION (RESIDUAL)			
				ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE	ADVERSE/BENEFICIAL	CEMP*	Rev	ST	Rev	ST	ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE
Construction															
Impact of Construction Dust on human health, amenity and ecological receptors	Loc	High	Low	Adv	Irrev	ST	Adv	CEMP*	Neg	Rev	ST	Neg	Rev	ST	Neg
Operation (includes cumulative development traffic in future year scenarios)															
Human health (impacts of scheme on local air quality)	Loc	High	Med	Adv	Irrev	ST	Adv	Provision of EV charging points and cycle parking. Pedestrian connections across the Site. Travel plan, recommendations for vehicle fleets using site.	Ben	Rev	ST	Ben	Rev	ST	Neg

Key:

Loc: Local
 Irrev: Irreversible
 Neg: Negligible
 Med: Medium
 Adv: Adverse
 ST: Short Term
 Ben: Beneficial

Note: * The IAQM 2014 guidance requires an assessment of fugitive dust effects in the absence of mitigation, hence no measures were assumed to be in place. ** A sensitivity analysis indicating when the effects of the Development would have a negligible effect in the absence of mitigation measures was not specifically tested, however due to the anticipated decline in background concentrations and vehicle emissions over time, significant effects are not expected to be long term.

Climate Change



7.0 Climate Change

Introduction

- 7.1 This chapter presents an assessment of the likely significant effects related to climate change, specifically the release of carbon¹ emissions, a Climate Change Resilience (CCR) assessment and an In-Combination Climate Change (ICCI) assessment.
- 7.2 This chapter has been prepared by Ove Arup and Partners. In accordance with Regulation 18(5) of the Town and Country Planning Environmental Impact Assessment (EIA) Regulations 2017, as amended, a statement outlining the relevant expertise and qualifications of competent experts appointed to prepare this chapter is provided in **Appendix 7.1**.
- 7.3 This chapter is supported by the following appendices:
- Appendix 7.1: Relevant Expertise and Qualifications of Competent Experts;
 - Appendix 7.2: Policy, Guidance and Legislation;
 - Appendix 7.3: Carbon Assessment Data;
 - Appendix 7.4: In-Combination Climate Change Impact Assessment Results;
 - Appendix 7.5: Climate Change Resilience Assessment Results; and
 - Appendix 7.6: Design Guide Input.

Potential Sources of Impact

Carbon Assessment

- 7.4 The scope for the carbon assessment has been set out and agreed as part of the EIA scoping process. The scope of the carbon assessment has been updated to respond to suggestions made within the Scoping Opinion, as well as further project insight. The assessment adopts a whole-life carbon approach where both construction and operation carbon emissions are assessed, as described below.
- 7.5 The following carbon emission sources are scoped into the assessment:

Construction

- Carbon emissions arising from the manufacture and production of construction materials.
- Construction material transport to the Site.
- Energy and fuel use associated with construction plant.

Operation

- Energy and fuel use during operation, including room lighting, cooling and heating.
- Operational traffic emissions arising from journeys to and from the Proposed Development.
- Repair/ replacement and end-of-life of construction materials.
- Carbon sequestration associated with vegetation on-site.
- End-of-life emissions associated with deconstruction, waste processing and disposal of buildings on-site, assuming buildings on-site are demolished, rather than re-purposed.

¹ The term 'carbon' is used throughout this chapter and refers to greenhouse gas (GHG) emissions responsible for climate change. The major GHGs are carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O). Less prevalent, but very powerful, greenhouse gases are hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆).

7.6 The following carbon emission sources are scoped out of the assessment:

Construction

- Construction worker accommodation on-site: it is unlikely that a construction project of this scale and in this location will require construction worker accommodation on-site.
- Treatment and disposal of waste materials during construction: Carbon emissions from construction and demolition waste will be minimised through standard practice mechanisms such as a Site Waste Management Plan.
- Construction worker transport to and from the Site: information on construction worker transport to and from the Site was not available at the time of assessment, however this is expected to result in a minor impact on carbon emissions and for similar sized projects resulted in less than 1% of the total carbon footprint.
- Water use during construction: this is expected to result in a minor impact on carbon emissions. For similar sized projects, the impact of water consumption is likely to be less than 1% of the total carbon footprint.

Operation

- Treatment and disposal of waste materials: The Proposed Development will seek to reduce operational waste through implementation of the Waste Hierarchy approach. The Preliminary Operational Waste Management Plan (see Embedded Mitigation) provides a plan for waste management for the operation of the Proposed Development.
- Operation water use: Water consumption is likely to have a minor carbon impact from water treatment and supply (pumping), with it making up less than 1% of the carbon footprint for similar sized projects. The Proposed Development will aim to reduce the water consumption in use, with a goal of <110 litres/person/day in residential units.

ICCI Assessment

7.7 This assessment considers how the impacts of the Project on the receiving environment will be affected by future climate change, either directly or indirectly. The ICCI assessment can be considered to be an assessment of impacts against a future baseline that includes climate change. The ICCI assessment is most relevant to environmental receptors that are sensitive to weather and climate. The criteria for identifying significant effects in the ICCI assessment are the same as the criteria applied under each topic for impacts under current climate conditions.

7.8 Given the nature of the Proposed Development the following impacts have been considered in the ICCI assessment as there is a potential for likely significant effects to:

- Air quality: Sunnier, hotter and drier conditions could exacerbate dust generation and concentrations of certain air pollutants. Increased wind speed could influence dispersion of pollutants. Wetter conditions could suppress dust movement.
- Contaminated land: Increased temperatures may increase the release of volatile organic compounds causing unpleasant odours. Increased wind speeds may increase wind-blown dust. Increased frequency and intensity of rainfall and flooding may increase sediment runoff.
- Cultural heritage: there is the potential for climate change to impact views of the Site from protected viewpoints if changes in temperature, precipitation, disease and extreme weather events damage the vegetation and trees currently screening the view. In addition, changes in temperature and precipitation have the potential to increase the growing season and therefore the rate of growth of vegetation.

- Carbon: Increased frequency of extreme weather events could result in damage and increased material maintenance, repair and replacement. Increased temperatures could result in increased summer cooling demand in buildings.
- Ecology: Drier conditions, increased wind speed, flooding and variation in temperature and rainfall can result in habitat loss and fragmentation and may affect the ability of certain species to adapt. Climate change has been considered in the ecological assessment in relation to the choice of species planted on-site as summarised in **Appendix 7.4**.
- Human health: Temperature increases may affect thermal comfort. Hotter, drier conditions may cause reduced health and wellbeing for communities. Extreme weather events may impact quality and patterns of use of open spaces and create stress for people.
- Landscape and visual: Drier, hotter and wetter conditions may affect the type of vegetation which will change the landscape character. Increased windspeed could also cause tree loss. Climate change has been considered in the landscape and visual assessment in relation to the landscaping strategy on-site and the choice of species planted as summarised in **Appendix 7.4**. There is the potential for climate change to impact views of the Site from protected viewpoints if changes in temperature, precipitation, disease and extreme weather events damage the vegetation and trees currently screening the view.
- Noise and vibration: Increased temperature and changes in humidity in summer could result in a greater number of people sleeping with windows open. These climate changes can also alter propagation characteristics of sound through air and may lead to increased building services demand to cool buildings which may produce more noise. Climate change has been considered as part of the noise assessment in relation to these impacts as summarised in **Appendix 7.4**.
- Socio-economics: Temperature increases may change public behaviour and the pattern of the use of public spaces.
- Sunlight and daylight: This assessment may be affected by a potential change in cloud cover brought about by climate change. However, significant uncertainty exists regarding future projections of cloud cover, and therefore potential in-combination climate impacts are not likely to be identified that are thought to increase the significance of any residual effects. This topic is therefore not considered further in this chapter.
- Transport: Hotter conditions could result in variation to public transport and active travel methods and time spent outdoors. Increased temperatures and/or increased rainfall or cold weather could result in road, footpath and cycle path closures.
- Water resources and flood risk: Drought/wetter conditions could affect groundwater flows. Increased intensity of rainfall events could lead to increased flood risk, run-off, and discharge volume, and increased surface water run-off. High summer temperatures with lower rainfall levels could result in lower flows in watercourses, a reduction in groundwater levels, low river flows and reduced groundwater recharge and levels. Climate change has been accounted for in the design of the drainage system and the Flood Risk Assessment (FRA) and therefore these impacts are unlikely. The Proposed Development is located entirely within Flood Zone 1 and is therefore at very low risk of fluvial flooding from the River Cam (Stantec, 2021).
- Wind: This assessment may be affected by a potential change in wind speeds brought about by climate change. However, significant uncertainty exists regarding future projections of wind speed and direction, and therefore potential in-combination climate impacts are not likely to be identified that are thought to increase the significance of any residual effects. This topic is therefore not considered further in this chapter.

Climate Change Resilience Assessment

- 7.9 This assessment considers the resilience of the Proposed Development to the physical impacts of future climate change. The Institute of Environmental Management and Assessment (IEMA) guidance (**IEMA, 2022**) defines climate change resilience as the ‘ability to respond to changes in climate. If a receptor or project has good climate change resilience, it is able to respond to the changes in climate in a way that ensures it retains much of its original function and form. A receptor or project that has poor climate change resilience will lose much of its original function or form as the climate changes.’ The CCR assessment differs from other EIA topics in that it considers how resilient the Project itself is to future climate change (i.e. the impact of climate change on the Project, rather than the impact of the Project on the environment).
- 7.10 Given the nature of the Proposed Development, the following impacts have been considered in the CCR assessment as there is a potential for likely significant effects due to:
- High temperatures, increased sunshine, heatwaves and drought: Increase in local air quality pollutants and environmental damage. Reduction in building performance, potential breaching of temperature standards and regulated environments, health impacts and reduced productivity. Increased heating, ventilation and air conditioning (HVAC) system power demand;
 - Low temperatures, ice and snow: Freeze-thaw action. Fracture of surfaces. Risk to underground infrastructure. Increased maintenance requirements;
 - High precipitation, river, surface water and groundwater flooding: Local flooding and inadequate drainage. Increased risk of pollution incidents and release of contaminated surface water. Road damage caused by flooding. The Proposed Development is located entirely within Flood Zone 1 and is therefore at very low risk of fluvial flooding from the River Cam;
 - Low precipitation, drought and soil moisture deficit: Reduced water availability leading to mandatory water reductions and limitations, increased dust. Potential earthworks failure following subsequent rainfall events;
 - Humidity: Increase in mould, condensation and decreased thermal performance of buildings;
 - Storms/lightning strikes: Damage to buildings including the roofs, guttering and windows; and
 - Wind: Damage to vegetation, movement of dust, and stress and damage to above ground utility infrastructure.
- 7.11 The vulnerability of the Proposed Development to sea level rise was scoped out of the assessment in the scoping report on the basis that the inland location of Cambridge means it is not at risk of coastal flooding. The Site is approximately 67km west of the nearest coastline and ground levels are 6m above sea level and therefore the Proposed Development is not at risk of flooding from the sea.

Methodology

Sources of Information and Data

Desk-Based Study

Carbon Assessment

- 7.12 Biodiversity Net Gain metrics calculations associated with the current site was collected to inform the baseline assessment.
- 7.13 The Proposed Development is comprised of Detailed aspects (plots S4, S5, S6 and S7) which includes offices, multi-storey car park, labs and retail and Outline aspects (all other plots) which consist of residential and commercial buildings. The information provided in the Energy Statement and the Life Cycle Assessment for the Proposed Development is provided for the Detailed aspects only, whilst benchmarks and supplementary data have been used for the Outline aspects.
- 7.14 The data sources used to inform the carbon assessment for the Proposed Development are outlined in **Table 7.3**: Carbon assessment assumptions and limitations.

ICCI and CCR assessment

- 7.15 The following data has been collected to inform the baseline assessment:
- UKCP18, Gridded observation data sets (UKCP18, 2022);
 - UKCP18 Climate Projections (UKCP18, 2022) for the 'medium' and 'high' emission scenario referred to as Representative Concentration Pathways (RCP); and
 - Articles relating to extreme weather events (including heatwaves and snow events) since 2000 have been sourced from the BBC news website (BBC, 2022) and Cambridgeshire Live website news (Cambridgeshire News, 2022).

Study Area

- 7.16 The assessment assumes an opening year of 2027 and 60-year design life (2027-2087).
- 7.17 For the purposes of this assessment, a construction programme of 5 years is assumed (2023-2027) to align with the opening year of 2027.

Carbon Assessment

- 7.18 The study area for the carbon assessment considers the emissions arising from the Proposed Development, some of which are emitted within the Site boundary (e.g. construction processes that occur within the Site boundary) and some of which are emitted outside of the boundary (e.g. transportation of materials to site). This covers both construction and operational emissions.
- 7.19 The study period for construction emissions is based on the programme of works and assumes a five-year construction period (2023-2027). The study period for operational emissions will be based on the opening year with cumulative carbon emissions assessed over a 60-year design life starting from the opening year.

ICCI Assessment

- 7.20 The study area for the ICCI assessment is the study area defined as by each discipline, shown in the relevant topic chapters.

CCR Assessment

7.21 The study area for the CCR assessment is the land within the redline boundary.

Carbon Assessment

- 7.22 The carbon assessment has been undertaken in line with IEMA's guidance on 'Assessing Greenhouse Gas Emissions and Evaluating their Significance' (**IEMA GHG, 2022**). The IEMA guidance provides a framework for ensuring a proportionate, good-practice approach to assessment is adopted.
- 7.23 The carbon assessment follows a lifecycle approach as set out in PAS 2080 Guidance document (**Construction Leadership Council, 2022**) on carbon management in infrastructure. Where any lifecycle stage is excluded, justification has been provided.
- 7.24 The general approach to estimating carbon emissions for the baseline and the Proposed Development will be to quantify carbon emissions combining:
- activity data – a measure of the quantity of an activity; and
 - carbon factor – a measure of the carbon emissions per unit of activity.
- 7.25 Based on the generalised formula:
- activity data x carbon factor = carbon emissions or removals.
- 7.26 The assessment quantifies the carbon emissions from the construction and operation of the Proposed Development and is supported by a combination of carbon modelling tools, lifecycle software and publicly available information and benchmarks. Data of appropriate quality to satisfy the goal and scope of the assessment has been used. Where limited data is available due to the outline aspects of the application, appropriate assumptions or benchmarks have been used.
- 7.27 Significance will be determined in alignment with IEMA guidance (**IEMA, 2022**) and will consider how the Proposed Development's whole-life carbon emissions align with the UK's net zero trajectory by 2050. Although all emissions contribute to climate change, there are levels of significance:
- Major/ moderate adverse – a project that follows 'business as usual' or 'do minimum' practice and is not compatible with the UK's net zero trajectory, accepted aligned practice or area-based transition targets results in significant adverse effect. Professional judgment will be used to differentiate between the 'level' of significance i.e. major or moderate adverse effects;
 - Minor adverse – a project that is compatible with budgeted and/or science-based trajectory in terms of emissions reductions to net zero and complies with up-to-date policy and good-practice measures. This results in minor adverse effects considered not significant;
 - Negligible – a project that achieves carbon emissions mitigation that: go beyond the science-based trajectory to net zero, beyond existing and emerging policy, and has minimal residual emissions. Such a project has a negligible effect considered not significant; and
 - Beneficial – a project that removes carbon emissions from the atmosphere and actively reverses the risk of severe climate change has a beneficial effect and considered significant

- 7.28 The level of significance will therefore be based on the criteria listed above but also rely on the experience and professional judgment of the Climate Change team. Significance will be determined by taking into consideration the following elements: contextualisation of the Proposed Development's carbon emissions with national and local carbon budgets, design mitigation measures, and alignment with national and/or regional policies and strategies.
- 7.29 Existing policy and legislation may in some cases lag behind the necessary levels of carbon emissions reduction that are compatible with the UK's net zero target. Where this is the case, professional judgement will be used considering emerging policy/standards and guidance of expert bodies such as the Climate Change Committee on necessary policy developments.
- 7.30 Proposed mitigation measures to reduce the Proposed Development's carbon emissions are presented in the Embedded Mitigation section.

ICCI Assessment

- 7.31 An ICCI assessment was carried out by the climate change specialists for all topics scoped in the EIA, with support from the topic specialists, to understand how the Proposed Development's impact on the receiving environment will be affected by future climate change, either directly or indirectly. This was informed by climate change projections for the Proposed Development, recent and relevant science, policy and guidance for each topic, and the initial results from all topics' assessments.
- 7.32 The receptors relevant to the location, nature and scale of the project (identified as part of the EIA) were considered in the ICCI assessment. Existing or embedded mitigation measures have been highlighted.
- 7.33 The assessment involved considering whether there will be an impact on the susceptibility²/vulnerability/value and/or importance of the identified sensitive receptors because of climate change projections. It was then determined whether the sensitivity of receptors will be greater or lesser under future climate conditions and whether the probability and/or consequence of an effect at these receptors will change because of climate change.
- 7.34 The following climate hazards were considered in this risk assessment:
- High and low temperatures;
 - Diurnal temperature range;
 - High precipitation;
 - Soil moisture deficit;
 - Drought;
 - Humidity;
 - Ice and snow/cold;
 - Insolation (solar irradiation);
 - River, surface water and groundwater flooding;
 - Storms/lightning strikes; and
 - Wind.

2 IEMA defines susceptibility of the receptor as the ability to be affected by a change (the opposite of resilience) and the vulnerability of the receptor as the potential exposure to a change. The value and importance of a receptor are defined as how much a receptor is worth to the society and the economy.

- 7.35 Informed professional judgement was used to produce high level, qualitative statements about potential topic specific impacts resulting from projected climate change (i.e. changes and trends in climate averages and extreme weather events) for receptors and resources in the area surrounding the Proposed Development.
- 7.36 A qualitative assessment of the likelihood and consequence of the ICCI was then undertaken given existing or embedded mitigation measures.
- 7.37 The ICCI assessment has been reported in ICCI Assessment and a summary has been provided in **Appendix 7.4**.
- 7.38 Significance of the in-combination climate change impacts is assessed based on the impact's likelihood and consequence for the relevant environmental topic, given existing embedded mitigation measures, following standard methodologies for each relevant environmental topic.
- 7.39 Where required, mitigation measures have been developed with the topic teams to address adverse effects on the ability of the receiving environment to adapt to climate change, beyond those already suggested and allowances have been included for future measures and monitoring, to ensure continued resilience of the receiving environment.

CCR Assessment

- 7.40 The CCR assessment has been carried out using the current and future climate conditions and was an assessment of the risk of climate change impacts to the new assets created as a result of the Project. The CCR assessment involved:
 - Identifying potential climate change risks to the proposed development;
 - Assessing these risks; and
 - Formulating mitigation actions to reduce the impact of the identified risks.
- 7.41 The assessment of risk was based on a combination of likelihood and magnitude. Likelihood and magnitude were defined using the criteria outlined in **Table 7.1**.

Table 7.1: Likelihood and Magnitude Definitions

LIKELIHOOD CATEGORY	DESCRIPTION
High	The event occurs several times during the lifetime of the project (60 years), e.g. approximately once every five years, typically, 12 events.
Medium	The event occurs limited times during the lifetime of the project (60 years), e.g. approximately once every 15 years, typically 4 events.
Low	The event occurs during the lifetime of the project (60 years), e.g. once in 60 years.
Magnitude of impact	Description
Large adverse	Disruption to the Proposed Development lasting more than 1 week.
Moderate adverse	Disruption to the Proposed Development lasting more than 1 day but less than 1 week.
Minor adverse	Disruption to the Proposed Development lasting less than 1 day.
Negligible	Disruption to an isolated section of the Proposed Development lasting less than 1 day.

- 7.42 The assessment of the magnitude of impacts takes into account factors including:
- The acceptability of any disruption in use if the project fails;
 - Its capital value if it had to be replaced;
 - Its impact on neighbours;
 - The vulnerability of the project element or receptor; and
 - If there are dependencies within any interconnected network of nationally important assets on the new development.
- 7.43 Significance was defined using the matrix shown in **Table 7.2**. Any risks identified as being significant require mitigation.

Table 7.2: Significance Matrix

		LIKELIHOOD		
		Low	Medium	High
MAGNITUDE	Negligible	Not significant	Not significant	Not significant
	Minor	Not significant	Not significant	Significant
	Moderate	Not significant	Significant	Significant
	Large	Significant	Significant	Significant

- 7.44 The information supporting the risk assessment was generally qualitative and based on expert judgement of the relevant specialists. However, in some cases quantitative information was available, e.g. regarding flood risk (provided by the water environment topic).
- 7.45 Where aspects of the design remain at outline (high level descriptive) stage that precludes a qualitative CCR assessment being carried out, a set of design commitments and embedded mitigation were developed with the relevant specialists that ensured that no high risks to the Project remain in terms of climate change resilience.

Key Parameters for Assessment

Carbon Assessment

- 7.46 **Table 7.3** presents data sources, approach and assumptions used in the carbon assessment in relation to carbon emissions sources scoped into the assessment.

Table 7.3: Carbon Assessment Assumptions and Limitations

EMISSIONS SOURCE	DATA USED IN ASSESSMENT	APPROACH AND ASSUMPTIONS
Manufacture and production of construction materials; Construction material transport; Construction site works	Detailed: LCA Results Outline: Benchmarks and development schedule plot areas (m ² GIA).	³ Detailed: LCA Results ⁴ Outline: carbon assessment based on development schedule plot areas (m ² GIA) and use classes (refer to Table 7D.1 in Appendix 7.3), using GLA whole life carbon assessment benchmarks (kgCO ₂ e/m ² GIA) (GLA, 2022) (refer to Table 7D.2 in Appendix 7.3).

3 Detailed: Detailed development plots (S4, S6 & S7)
4 Outline: Outline development plots (S5, S8, S 9, S11, S12, S13, S14, S15, S16, S17, S18, S20, S21)

EMISSIONS SOURCE	DATA USED IN ASSESSMENT	APPROACH AND ASSUMPTIONS
Operational energy and Fuel use	<p>Detailed: Energy Strategy modelled energy consumption (kWh)</p> <p>Outline: Benchmarks and development schedule plot areas (m² GIA).</p>	<p>Detailed: Energy Strategy energy intensity (kWh) and BEIS Green Book grid decarbonisation projections (BEIS Green Book, 2012) (refer to Table 7C.3 in Appendix 7.3).</p> <p>Outline: carbon assessment based on development schedule plot areas (m² GIA) and use classes (refer to Table 7C.1 in Appendix 7.3), using BEES (Building Energy Efficiency Survey, 2016) energy intensity benchmarks for Outline plots and CIBSE Guide F, Energy efficiency in buildings (Chartered Institution of Building Services Engineers, 2012) energy intensity benchmarks for residential plots (refer to Table 7C.2 in Appendix 7.3) and BEIS grid decarbonisation projections.</p>
Carbon sequestration	Biodiversity Net Gain metrics of habitat type and area (m ²).	The carbon sequestration for the baseline and Proposed Development assessment was based on inputs to the Defra Biodiversity Metric 3.0 ecological data, and proposed landscape plans for the roof and ground floor (m ² of different habitat types) and carbon sequestration factors sourced from Natural England (Natural England, 2021) and 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Change, 2006) (refer to Table 7C.7 in Appendix 7.3).
Operational transport	Development Vehicle Trip Generation Summary.	<p>Trip generation data was sourced from PJA Transport Consultants. This indicated the number of trips for each part of the development. It has been assumed that 90% of the total trips are generated by cars and 10% by Heavy Goods Vehicles (HGVs) based on liaison with the Transport Consultant and professional judgement.</p> <p>Trip distances for were based on the average distance travelled from the BEIS national statistics average distance for 2010-2020 of 10.93km for cars and 101.45 km for HGVs (refer to Table 7C.5 in Appendix 7.3).</p> <p>Transport decarbonisation projections (shift from petrol and diesel to electric vehicles over time) were sourced from the TAG Databook (TAG Data Book, 2022) (refer to Table 7C.3 in Appendix 7.3).</p> <p>It has been assumed that lab and office trips occur on weekdays only and residential trips occur on weekdays and weekends.</p>
Repair/Replacement & End of Life of materials		<p>Detailed: LCA Results</p> <p>Outline: carbon assessment based on development schedule plot areas (m²) and use classes (refer to Table 7C.1 in Appendix 7.3), using GLA whole life carbon assessment benchmarks (kgCO₂e/m² GIA) (GLA, 2022) (refer to Table 7C.1 in Appendix 7.3).</p>

7.47 Carbon emissions are reported as tonnes of carbon dioxide equivalent (tCO₂e). CO₂e refers to a common unit employed to compare the emissions from various GHGs (methane, ozone, nitrous oxide etc.) based on their global-warming potential (GWP), by converting amounts of other gases to the equivalent amount of carbon dioxide (CO₂) with the same GWP. The adoption of CO₂e as the common metric, rather than CO₂, allows all GHGs to be included in the assessment and contextualised against local and national targets.

ICCI and CCR Assessment

- 7.48 The assessment has assumed that mitigation measures for effects assessed by other topics will be implemented effectively;
- 7.49 The measures set out in each discipline's chapters will provide appropriate mitigation for extreme weather-related effects during construction;
- 7.50 That assessment methods for all topics are adequate to be resilient to impacts arising from current weather events and climatic conditions; and
- 7.51 The degree to which the frequency and intensity of these potential hazards may change because of climate change is explained in the UKCP18 climate change projections (**UKCP18, 2022**). The level of uncertainty in these projections is also described in the UKCP18 reports. For example, there are large uncertainties on the direction of change in storms and high winds. It should be noted that the flood risk assessments cover all relevant sources of potential flooding hazards (river, surface water and groundwater flooding).

Baseline Conditions

Current Climate Baseline Data

Carbon Assessment

- 7.52 The baseline for the carbon assessment is the reference point against which the impact of the Proposed Development can be compared and assessed. The baseline reflects carbon emissions within the physical and temporal boundary of the Site (i.e. within the Site boundary and over the design life of the project) but without the Proposed Development.
- 7.53 The current site is vacant apart from a small number of single-storey vacant and railway-related structures which are not operational. Therefore, baseline carbon emissions associated with operational energy and transport are assumed to be zero.
- 7.54 The Site is also occupied by a car park linked to Cambridge North Station. The existing car park will be replaced with a multi-storey car park as part of the Proposed Development increasing the provision of spaces. The transport impacts associated with accessing the train station sit outside the scope of the Proposed Development's carbon assessment.
- 7.55 Baseline carbon emissions associated with the embodied carbon of current buildings on-site are considered to be zero as they have already occurred and are of a historical nature only.
- 7.56 The baseline carbon sequestration assessment was based on inputs to the Defra Biodiversity Metric 3.0 undertaken the Proposed Development (m² of different habitat types) and carbon sequestration factors sourced from Natural England (**Natural England, 2021**).
- 7.57 Baseline carbon emissions are presented in **Table 7.4**.

Table 7.4: Carbon Emissions (tCO₂e) associated with the Baseline Carbon Emissions

		BASELINE CARBON EMISSIONS (TCO2E)	
Stage	Emissions Source	Annually	Over 60-year design life
Construction	Construction emissions	0	0
Total construction		0	0
Operation	Operational energy	0	0
	Operational transport	0	0
	Carbon sequestration	-9.68	-580.70
Total operation		-9.68	-580.70
Total		-9.68	-580.70

ICCI and CCR Assessment

7.58 This section provides an overview of current climate and extreme weather events experienced in and around the Proposed Development in Cambridge. The Proposed Development is located in the jurisdiction of South Cambridgeshire District Council (SCDC), north of the Cambridge North train station.

Historic Climate Data

7.59 Baseline conditions have been assessed under the current climate conditions and each of the future climate scenarios for 2030-2049 and 2060-2079. Existing baseline climate conditions have been identified based on the latest 30-year averaging period of 1981-2010³⁵.

7.60 **Table 7.5** presents historic climate data which serves as the current climate baseline data for the Proposed Development for comparison with the future climate baseline data. The current baseline for average climate variables has been obtained from the Met Office gridded observational data made available as part of United Kingdom Climate Projections 2018 (**UKCP18, 2022**) at a spatial resolution of 25km for the time period 1981 – 2010.

7.61 One grid point reflecting the centre of the Proposed Development (547527, 261216) has been selected. The use of different data sets for different metrics allows more consistent comparisons to be made with the future climate projections.

Table 7.5: Historic Weather Data for the Proposed Development

PARAMETER		PROPOSED DEVELOPMENT
Temperature	Mean winter temperature [°C]	10.1
	Mean summer temperature [°C]	16.3
	Mean daily winter minimum temperature [°C]	1.3
	Mean daily summer maximum temperature [°C]	21.5
Precipitation	Winter mean precipitation [mm]	1.4
	Summer mean precipitation [mm]	1.6
Extreme weather events	Number of frost days (daily minimum temperature equal or lower than 0°C)	47.3
	Heatwaves (3 days with maximum temperature higher than 27°C)	1.5
	Number of hot days (daily maximum temperature higher than 25°C)	21
	Dry spells (10 days or more with no precipitation)	4.7
	Annual number of days per year when precipitation is greater than 25mm per day (Met Office definition of 'heavy rain')	0.9

Local Climate Change Impacts

- 7.62 The relevant articles in the media (**Cambridge City Council, 2021**), (**Climate UK, 2012**) contribute to an understanding of the local areas' exposure and vulnerability to extreme weather events and how prepared the relevant authorities are in responding to these events and impacts. These events serve as a proxy for the types of weather events which may become more frequent and intense in the future as a result of climate change as well as due to natural climate variability. Understanding exposure and vulnerability to extreme weather events can increase awareness of and action to prepare for future climate change and contributes to strategies for mitigating climate change related risks.
- 7.63 **Table 7.6** summarises the primary weather events currently affecting the region and provides a high-level overview of the types of impacts experienced. A review of the BBC News Website (**BBC, 2022**) and the Cambridgeshire Live website (**Cambridgeshire News, 2022**) was undertaken for relevant articles covering significant events published between 2010 and 2021.
- 7.64 The CaCC Climate Change Strategy (2021-2026) (**Cambridge City Council, 2021**), North East Cambridge Area Action Plan (2021) (**Greater Cambridge Shared Planning, 2021**) and Climate UK report (**Climate UK, 2012**) highlights that the three key risks for the East of England region are flooding, water shortages and droughts, and increased summer temperatures and heatwaves.

7.65

Table 7.6 summarises the primary weather events currently affecting the region (based on events experienced between 2010 and 2021) and provides a high-level overview of the types of impacts experienced. The findings show that the area is already at risk from a range of weather impacts.

Table 7.6: Summary of Weather Events and Associated Impacts Experienced in and around Cambridge

WEATHER EVENT	IMPACTS ON COMMUNITY AND LOCAL SERVICES
Excessive rainfall/flooding	<ul style="list-style-type: none"> • There has been an increase in excessive rainfall/flooding events reporting in the media in recent years. In 2021 there were 4 major flood events identified in the media in the Cambridge area. These events have a range of impacts on the community and local services: • Closure and costs to local businesses; • Damage to buildings and infrastructure; • Roads and rail closed; • Injuries and deaths; • Internal flooding and damage of properties; and • Pressure on emergency services. • There is expected to be an increase in frequency of rainfall in the future and a change in rainfall distribution across the country.
Frost/ice/snow	<ul style="list-style-type: none"> • Significant snow events have occurred most winters across the UK between 2010-2021. There is limited media coverage of these events specific to the Cambridge area. These events have a range of impacts on the community and local services: • Wide-ranging problems for UK transport and water infrastructure; • Limited supplies to shops; • Costs to business; • Disruption to processes (e.g. transport); • Roads and rail closed; • School closed; and • Danger to residents from the cold. • There is predicted to be an increase in average daily winter temperatures in the future, reducing the number of snow events.
High temperatures, dry periods/droughts or heatwaves	<ul style="list-style-type: none"> • There have been 13 high temperature/heatwave events in Cambridge reported in the media between 2010 and 2021. The majority of these events have been since 2018. These events have a range of impacts on the community and local services: • Illness/death of vulnerable residents including heat and sunstroke; • Water shortages and water supply restrictions; • Disruption to rail activities including buckling of tracks and delays; • Death of wildlife; • Increased risk of fires; • Highway disruption including tarmac melting and closed roads; • Damage to buildings; and • Damage to infrastructure. • Drier summers are predicted in the future along with increased average daily temperatures and increased frequency of heatwaves.

WEATHER EVENT	IMPACTS ON COMMUNITY AND LOCAL SERVICES
Storms, strong winds and lightning	<ul style="list-style-type: none"> • Four storms/high wind events have been reported in the media between 2010 and 2020 in Cambridge. These events have a range of impacts on the community and local services: • Damage to infrastructure (power cables, roads, train lines); • Flooding; • Damage to buildings; • Damage to infrastructure; • Disruption to processes; • Roads and rail closed; and • Homes without power

Future Baseline Conditions

Carbon Assessment

7.66 The baseline for the Proposed Development is assessed over the 60-year design life. Where appropriate decarbonisation profiles have been included in the assessment. This includes the shift from petrol and diesel to electric cars (in line with BEIS projections (**BEIS, 2021**) (refer to Table 7C.3 in **Appendix 7.3**) as part of the operational transport assessment and grid decarbonisation (in line with BEIS Green Book projections (**BEIS Green Book, 2012**) (refer to Table 7C.3 in **Appendix 7.3**) as part of the operational energy and transport assessment.

7.67 The baseline assessment assumes the Site will remain vacant indefinitely with no new construction coming forward and no associated operational impacts. This presents a worst case given that the Site has been designated for development, and that even if the current Proposed Development did not proceed an alternative development would likely come forward.

ICCI and CCR Assessment

7.68 This section presents the projected climate conditions and extreme weather events for the area encompassing the Proposed Development for two time periods reflecting its design life.

7.69 Future changes to the climate baseline have been identified for the operational life cycle stage. This data has been used to understand the Proposed Development’s vulnerability to future climate change.

7.70 In accordance with IEMA Guidance (**IEMA, 2022**), the climate projections for a range of meteorological parameters have been taken from the UKCP18 (**UKCP18, 2022**) medium emissions scenario RCP 4.5, and high emissions scenario RCP 8.5 (50% probability) 25km probabilistic projections. The scenarios which have been used to define the future baseline are:

- 2030-2049 future climate scenario; and
- 2060-2079 future climate scenario.

7.71 UK Climate Projections over the next 60 years show the following long-term seasonal averages and trends for the UK:

- Warmer, drier summers;
- Milder, wetter winters;
- An increase in annual average temperature;

- Fewer days with snow and frost;
- Increased likelihood of a higher frequency of very hot days;
- Increased likelihood of intense downpours of rain (particularly in summer); and
- An increase in dry spells.

7.72 Moreover, it is likely, although with increased uncertainty, that there will be a heightened probability of the following extreme weather events due to climate change:

- Short periods of intense cold weather (still expected due to natural variability); and
- An increase in the frequency of storms and high winds (generally considered as difficult to predict with any certainty).

7.73 Under the high emissions scenario, the average warming experienced in the UK could be as high as 5.4 °C in summer by 2070, with winters experiencing an increase of 4.2 °C. The high emissions scenario also predicts that on average the UK could experience a 35% increase in winter precipitation levels and a 47% decrease in summer precipitation levels. However, despite the decrease in overall precipitation volumes, projections indicate an increase in the intensity of heavy summer rainfall events. High or heavy rainfall events are linked to increased surface water on roads and an increased risk of flooding.

Proposed Scheme

7.74 Using the historic baseline data, two methods were implemented to assess future climate baseline data. The changes in average climate conditions were obtained from the UKCP18 25km probabilistic projections of climate change (**UKCP18, 2022**). The changes in extreme weather events were obtained using the UKCP18 Regional (12km) projections of climate change.

7.75 **Table 7.7** presents expected gradual changes in mean climate conditions, such as mean temperature and precipitation and **Table 7.8** presents changes in extreme weather events such as number of heavy rain days.

7.76 As in the rest of the UK, temperatures in Cambridge are anticipated to increase both in winter and summer. The largest increase in temperature is estimated to be in the mean daily maximum temperature in summer, which is expected to increase from 21.5°C in the baseline scenario to 27.8°C in the 2060-2079 period (high emissions scenario and 50% level). A higher increase in temperature is projected for the 2060-2079 time period than the 2030-2049 time period. Minimum daily winter temperatures are also predicted to increase from 1.3°C in the baseline scenario to 4.1°C in the 2060-2079 period (high emissions scenario and 50% level) with the potential of reaching 4.5 in the >90% high emissions scenario.

7.77 Mean winter precipitation is expected to increase slightly in the medium and high emissions scenario compared to current mean precipitation for the 2020s and increase slightly more in the 2080s, while it is expected to decrease in summer. Mean winter precipitation in the baseline is scenario is 1.4mm and is projected to increase to 1.6mm in the 50% high and medium emissions scenario by the 2060-2079 time period. Summer mean precipitation in the baseline is 1.6mm and is projected to decrease to 1.2mm in the 50% high emissions scenario by the 2060-2079 time period.

7.78 Projections for the changes in extreme weather events are only available for the high emissions scenario. As in the case of mean temperature, the number of hot days (where maximum daily temperature will be above 25°C) is anticipated to increase by up to 61.3 additional hot days per year in the 2080s for the mean high emission scenario compared to 20.4 days in the baseline scenario. The number of heatwaves per year will also increase by up to 13.2x more in the maximum high emissions scenario by 2060-2079. Similarly, the number of frost days is expected to decrease in all scenarios. In the case of extreme precipitation, the number of days with heavy rain (precipitation greater than 25 mm/day) is expected to increase from 0.9 days in the baseline to 1.5 days in the mean high emissions scenario by 2060-2079. The number of dry spells is also projected to increase from 4.7 days per year in the baseline to 5.9 days in the mean high emissions scenario by 2060-2079. This points to an increase in the variability of rainfall patterns in Cambridge.

7.79 The projected changes from current to future conditions are higher overall for the 2060-2079 time period compared to the 2030-2049 time period and for the high emission scenario.

Table 7.7: UKCP18 Climate Change Projections for Gradual Meteorological Changes for the Proposed Development

PARAMETER (BASELINE SHOWN IN BRACKETS, 1981- 2000)		2030-2049			2060-2079		
		MEDIUM EMISSIONS SCENARIO (50% LEVEL)	HIGH EMISSIONS SCENARIO (50% LEVEL)	RANGE ⁵	MEDIUM EMISSIONS SCENARIO (50% LEVEL)	HIGH EMISSIONS SCENARIO (50% LEVEL)	RANGE
Temperature	Mean winter temperature [°C] (10.1 °C)	11.2	11.4	10.1 – 12.6	11.8	12.6	10.4 – 14.3
	Mean summer temperature [°C] (16.3 °C)	17.6	18	16.6 – 19.2	18.7	19.9	16.8 – 22.4
Precipitation	Winter mean daily precipitation (1.4 mm/ day)	1.5	1.5	1.3 – 1.7	1.6	1.6	1.4 – 1.9
	Summer mean daily precipitation (1.6 mm/ day)	1.5	1.4	1.1 - 1.8	1.3	1.2	0.8 – 1.7

5 Range from 10% level low emissions – 90% level high emissions

Table 7.8: UKCP18 Projections for Extreme Weather events for the Proposed Development

PARAMETER (BASELINE SHOWN IN BRACKETS, 1981-2000)		2030-2049		2060-2079	
		HIGH EMISSIONS SCENARIO (MEAN)	RANGE (MIN – MAX)	HIGH EMISSIONS SCENARIO (MEAN)	RANGE (MIN – MAX)
Temperature	Number of frost days (daily minimum temperature equal or lower than 0°C) (48.1)	31.0	24.0 – 41.8	19.1	5.8 – 34.5
	Heatwaves (3 days with maximum temperature higher than 27°C) (1.5)	4.7	2.6 – 9.1	13.2	5.9 – 20.4
	Number of hot days (daily maximum temperature higher than 25°C) (20.4)	46.1	36.0 – 65.8	81.7	55.1-101.5
	Winter mean daily minimum temperature (1.3 °C)	2.6	1.8 – 3.2	4.1	2.9-4.5
	Summer mean daily maximum temperature (21.5 °C)	24.7	23.3-25.9	27.8	26.3-28.9
Precipitation	Dry spells (10 days or more with no precipitation) (4.7)	5.2	4.7 – 5.7	5.9	4.8-6.8
	Annual number of days per year when precipitation is greater than 25mm per day (Met Office definition of 'heavy rain') (0.9)	1.4	1.2 – 2.5	1.5	1.0 – 2.6

Embedded Mitigation

Carbon Mitigation

Life Cycle Assessment

- 7.80 A Life Cycle Assessment has been completed for the proposed buildings at plots S4, (**Hoare Lea S4, 2022**) S6 and S7 (**Hoare Lea S6 and S7, 2022**) as part of the planning application. The LCA was completed in line with BREEAM requirements, based on the Stage 2 (Concept) design and considers potential design options. These include four different Superstructure options, three different Substructure options and three different Hard Landscaping options. However, these design options are only 'exploratory' with no commitment made that this stage.
- 7.81 Based on the carbon footprint of each option the LCA results indicate that to minimise the S4 development's global warming impact each of the following design options are preferable:
- The substructure option of using reinforced concrete (RC) pile foundations,
 - The superstructure option of using a Steel Frame, Brick slip external wall and suspended CLT floors, and
 - The hard-landscaping option of using tarmac and natural stone paving with resin bound gravel.
- 7.82 When taking into account factors such as costs, construction programme and structural factors, the following options were deemed preferable by the client/design team:
- The substructure option of using RC pile foundations,
 - The superstructure option of using a RC Frame, Brick slip external wall, suspended concrete floors, and
 - The hard-landscaping option of using concrete paving and self-binding gravel.
- 7.83 The S6 and S7 development LCA results indicate that the following design options are preferable in terms of embodied carbon:
- The substructure option of using RC pile foundations,
 - The superstructure option of using a RC Frame, Brick slip external wall and suspended CLT floors, and
 - The hard-landscaping option of using natural stone paving and resin bound gravel.
- 7.84 When taking into account factors such as costs, construction programme and structural factors, the following options were deemed preferable by the client/design team:
- The substructure option of using RC pile foundations,
 - The superstructure option of using a RC Frame, Brick slip external wall, suspended concrete floors, and
 - The hard-landscaping option of using concrete paving and self-binding gravel.
- 7.85 No embodied or whole life carbon reduction targets have been set for the Proposed Development, however further LCA's with options appraisals will be completed during Technical Design for S4 and S6 & S7 to align with BREEAM Mat 01 requirements.

Energy Strategy/ Statement (Site wide and Detailed)

- 7.86 An Energy Strategy has been submitted to support the master plan hybrid planning application for the Proposed Development. In support of the full application an Energy Statement (**Hoare Lea ES, 2022**) has been prepared which deals with the detailed elements of the scheme, S4 (**Hoare Lea S4, 2022**), S6 and S7 (**Hoare Lea S6 and S7, 2022**). Both documents set out how the energy requirements of the Proposed Development can be addressed in a sustainable manner, in line with both national and South Cambridgeshire planning policy (**South Cambridgeshire Local Plan, 2018**).
- 7.87 The vision for the Proposed Development is to promote a low carbon development, which optimises building fabric performance, and energy efficient design, before introducing low carbon and renewable technology. The Energy Strategy and Energy Statement have been developed using the 'Be Lean, Be Clean, Be Green' energy hierarchy.
- 7.88 The principal targets are to achieve a 10% carbon reduction through the provision of Low and Zero Carbon (LZC) technologies, contribute to a 31% sitewide carbon reduction over a baseline development and achieve a minimum of 4 Ene 01 energy performance credits under BREEAM New Construction (NC) 2018 as required by the target for an 'Excellent' rating. A summary of the policy context is provided in **Appendix 7.2**.
- 7.89 To achieve the South Cambridgeshire planning policy for CO₂ emissions, the Proposed Development as a whole, targets a 10% reduction of energy through passive design in the commercial and residential sector. The Energy Statement indicates that the Proposed Development is expected to achieve approximately 30 % reduction in regulated CO₂ emissions through LZC technologies. The inclusion of on-site renewable energy generation has been assessed, and a combination of air source heat pumps to provide the heating and domestic hot water, and roof mounted solar photovoltaics are being proposed.
- 7.90 Across the Site, the Proposed Development is targeting the following:
- 10% carbon reduction through the provision of LZC technologies, resulting in approximately 30% sitewide carbon reduction over a baseline development;
 - BREEAM Excellent for the commercial buildings with aspirations for a BREEAM outstanding;
 - All electric systems across the development;
 - The development is aspiring to reduce the operational energy of the office and residential areas, and will undertake operational energy workshops and energy models at the next stage of analysis; and
 - Meet Part L 2021 and look towards Future Buildings Standard for the later phases.
- 7.91 Part L 2021 sets the standards for the energy performance and carbon emissions of new and existing buildings. The Future Buildings Standard comprises a newly-launched consultation principally focused on delivering improved energy and carbon performance of non-domestic buildings.
- 7.92 The Energy Statement and Energy Strategy indicate the following:
- Up to a 42% reduction in regulated CO₂ emissions should be achievable beyond the Building Regulations Part L 2013 'baseline' (using SAP 10.1 carbon factors) for the commercial aspects of the Proposed Development,

- Up to a 35% reduction in regulated CO₂ emissions should be achievable beyond the Building Regulations Part L 2013 'baseline' (using SAP 10.1 carbon factors) for the residential aspects of the Proposed Development, and
- The Proposed Development is aligned to planning policy requirements and development objectives.

Sustainability Strategy

- 7.93 A Sustainability Strategy has been prepared in support of the hybrid application of detailed and outline components for the Proposed Development. The Sustainability Strategy has been undertaken in line with national and local policy requirements, the Applicant's vision and sustainable design and development guidance and frameworks.
- 7.94 The Sustainability Strategy summarises the regulatory and planning policies applicable to the Proposed Development; setting out how it addresses the relevant policy requirements and outlining the proposed approach to sustainability.
- 7.95 The design of the Proposed Development is based on high sustainability aspirations and is compliant with industry best practice. In addition, it also attempts to push the boundaries of conventional construction by deploying innovative methods and approaches during design and construction. The strategy for the Proposed Development addresses key sustainability challenges and opportunities, responds to the requirements of the applicable policies, and implements the Applicant's aspirations.
- 7.96 The Sustainability Strategy outlines the following key measures that impact carbon emissions:

Passive Design and Performance:

- The building fabric will be designed with a high thermal performance, built to rigorous standards to minimise heat loss. The façade of each building will be carefully refined to maximise passive design features including external shading, thermally efficient insulation and deep recesses. Passive design and fabric performance will reduce heat demand and mitigate the risk of summer overheating in a warming climate.

Renewables and in-use emissions:

- The Proposed Development will have an all-electric system in combination with onsite electricity generation. Air source heat pumps and PV panels are proposed.
- The Proposed Development will follow a route to net zero carbon status which is supplemented by the aim of achieving BREEAM 'Excellent' as a minimum, with an aspiration to target 'Outstanding' as the design develops.
- All offices will be designed to target an EPC rating of A.LETI 2025, or LETI 2030 targets for in-use emissions in residential buildings.
- To assess compliance against these targets, monitoring and reporting technologies and practices will be implemented across the development. All buildings will have smart meters to record both energy and water usage. Post-completion, there will be the opportunity to optimise building services and controls to meet the development's energy targets.

Sustainable Transport:

- The development will incorporate new pedestrian and cycle pathways to existing network. The furthered cycle and pedestrian pathways will encourage the use of sustainable modes of transport to the Site as users will prefer cycling or walking while enjoying the local community and open spaces which benefits wellbeing.

- Cycle storage will be provided on-site and within close proximity from the building entrance with quantity being in line with the number of building users. Cyclist facilities such as lockers, showers and changing rooms will also be provided in each building in line with BREEAM and Policy requirements.
- The Proposed Development site will include a transport hub at the base of the S5 building. Initially the hub will include car parking, however in line with the ambitious sustainability goals there will be scope for further development and adaptation in order to facilitate a reduced car future.
- Vehicle and cycle parking provision will be in accordance with South Cambridgeshire standards with care taken to not over-provide vehicle parking. Dedicated car spaces could be provided for car sharers that are located nearest the development entrance. An appropriate quantity of electric vehicle charging points will be provided.
- Public transport access to the Site will be improved with, for example, the creation of new bus routes and bus stops.

Biodiversity:

- During the construction stages there will be a focus to mitigate construction impacts on existing biodiversity as to avoid simply reinstating biodiversity that previously existed pre-construction

Water efficiency:

- For residential units, fittings specified to reduce water consumption will be implemented in order to facilitate achieving the goal of <110 litres/person/day.
- the water consumption will be monitored and controlled throughout the construction process as well as in operation through the specification of water meters in all relevant areas

Minimising waste and sustainable material use:

- A sustainable sourcing strategy aligned with industry best practice (e.g. ISO 20400 Sustainable procurement guidance) will be implemented to deliver sustainable outcomes through the whole value chain. This will include targets regarding reuse, recycling and local sourcing of materials.
- A strategy to reduce, reuse and recycle materials will be produced to minimise construction waste generation as far as possible.

Preliminary Operational Waste Management Plan

- 7.97 The Preliminary Operational Waste Management Plan (P-OWMP) demonstrates compliance with the general objectives of Policies CS16 and CS28 of the Cambridgeshire and Peterborough Minerals and Waste Core Strategy (**Waste Core Strategy, 2021**).
- 7.98 The P-OWMP provides a plan for waste management for the outline and detailed aspects of the Proposed Development
- 7.99 The P-OWMP demonstrates that the Proposed development will:
- Minimise the number of vehicle movements necessary to manage waste generated by the Proposed Development through the use of a dedicated site FM team, coupled with on-site segregation and compaction,
 - Actively encourage the at-source segregation of waste / potentially recyclable materials, using a three-stream approach, rather than the minimum requirement of two streams.

- Provide three/four days storage, in excess of the minimum requirement of two days.
- The P-OWMP will be submitted as a draft as part of the planning application, with a final version developed at a later stage.

ICCI Assessment

7.100 The embedded mitigation relevant to the ICCI assessment has been considered within this chapter and is summarised by each discipline in this volume of the ES, shown in the relevant topic chapters.

CCR Assessment

7.101 The embedded mitigation relevant to the CCR assessment has been considered within this chapter and is summarised in Table 7E.1, **Appendix 7.5**.

Predicted Effects

Carbon Assessment

Construction and Operational Effects

7.102 **Table 7.9** presents the results of the Proposed Development’s carbon emissions assessment.

7.103 Carbon emissions associated with the Proposed Development were calculated at 496,904 tCO₂e over a 60-year design life.

Table 7.9: Proposed Development Carbon Emissions (tCO₂e) for Construction and Operational Phase.

PROPOSED DEVELOPMENT CARBON EMISSIONS (TCO ₂ E)						
Stage	Emissions Source	Detailed	Outlined	Annually	Total ⁶	Change in emissions between baseline and Proposed Development
Construction	Manufacture and production of construction materials	19,846	85,332	21,474	107,370	107,370
	Construction material transport	834				
	Construction site works	1,357				
Total Construction					107,370	107,370
Operation	Energy and fuel use	-	-	190	11,382	11,382
	Operational traffic emissions	-	-	5,789	347,351	347,351
	Repair/ Replacement & End of Life of materials	1,080	28,793	498	29,873	29,873
	Carbon sequestration	-	-	-1	-70	510
Total Operation					388,535	388,115
Total					495,904	496,485

⁶ Total emissions averaged over 5 years for construction period and 60 years over design life for operation

- 7.104 The change in emissions between the baseline and Proposed Development indicate an increase of 496,485 tCO₂e (the 'net' emissions). The results indicate that the construction phase contributes to 22% of the net increase in emissions and the operational phase contributes to 78% of the net increase in emissions.
- 7.105 For the detailed plots specifically, the manufacture and production of construction materials represents the majority of the net increase in construction emissions (90% of the construction carbon emissions for the detailed plots), with construction site emissions making up 6% and construction material transport making up 4%. It was not possible to provide a detailed breakdown of emissions for outline plots as these were assessed using benchmarks (kg CO₂e/m² GIA) covering the relevant emission sources together.
- 7.106 For the operational phase, operational transport makes up the majority of the net increase in operational emissions (89%), followed by repair, replacement and end-of-life of materials (8%) and operational energy use (3%). The net increase in emissions associated with operational transport is due to an increase in daily trips to the Site from zero (baseline) to 1,417 trips per day to and from the Site. In the absence of appropriate assumptions to use for trip length, a standard trip length of 10.94 km for cars and 101.45 km for HGVs has been assumed for these trips. This encompasses all projected arrivals and departures to and from the Site.
- 7.107 It should be noted that transport decarbonisation has been factored into the modelling of operational transport emissions, based on current data availability on car fleet mix projections (i.e. the shift away from petrol and diesel to electric vehicles) and grid decarbonisation. However, the transport sector is anticipated to decarbonise rapidly in light of the of the Department for Transport's Transport Decarbonisation Plan (**Department for Transport, 2021**), and may decarbonise more rapidly than the assumptions used in this assessment.
- 7.108 The increase in operational energy emissions are due to the current site not being operational and therefore having no operational energy demand. Energy modelling informed the assessment for the Detailed plots, however, benchmarks were used for the Outline plots.

Significance

- 7.109 The significance of the Proposed Scheme's carbon emissions is determined using IEMA's latest guidance on carbon emissions and EIA (**Institute of Environmental Management, 2022**) which states the following:
- "The crux of significance therefore is not whether a project emits carbon emissions, nor even the magnitude of carbon emissions alone, but whether it contributes to reducing carbon emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050⁷".*
- 7.110 In line with best practice, significance will be determined by taking into consideration the following elements: contextualisation of the Proposed Development's carbon emissions with national and local carbon budgets, design mitigation measures, and alignment with national and/or regional policies and strategies. It is important to note that as an outline planning scheme the level of detail is limited at this stage, and that significance will be based on professional judgment balancing both qualitative and quantitative assessments as well as the Proposed Development's goals and aspirations.

7 Or any other date as defined in targets for devolved administration or as may be defined for the UK or specific economic sectors in the future.

Contextualisation of Carbon Emissions

7.111 The carbon emissions for the Proposed Development have been compared to the Committee on Climate Change’s (CCC’s) UK carbon budgets (**Committee on Climate Change, 2022**), accounting for less than 0.01% of carbon emissions. This is set out in **Table 7.10**. Carbon emissions for the Proposed Development are grouped into the carbon budget periods in which they occur.

Table 7.10: Comparison of Proposed Development Net Emissions (tCO₂e) with the CCC Carbon Budgets

CCC CARBON BUDGET PERIOD	CCC CARBON BUDGET (TCO ₂ E)	PROPOSED DEVELOPMENT WITHIN BUDGET PERIOD (TCO ₂ E) ⁸	PERCENTAGE OF CCC UK CARBON BUDGET
4th carbon budget (2023 to 2027)	1,950,000,000	107,370	0.0055%
5th carbon budget (2028 to 2032)	1,725,000,000	53,900	0.0031%
6th carbon budget (2033 to 2037)	965,000,000	32,426	0.0034%

7.112 The CCC budgets are clearly defined and based on robust scientific evidence, however, are too high level for comparison for most individual projects, emissions of which will only ever make up a very small proportion.

7.113 The Tyndall Centre (**University of Manchester, 2022**) recommend city area targets and trajectories for emissions reduction in the UK required for alignment to the Paris Climate Change Agreement and a “well below 2 °C and pursuing 1.5 °C” global temperature target. The net emissions associated with the Proposed Development have been compared to the Tyndall Centre’s recommended carbon budgets for Cambridge⁹. These are presented in **Table 7.11**, grouped into the carbon budget periods in which they occur.

Table 7.11: Comparison of Proposed Development net emissions (tCO₂e) with the Tyndall Centre’s recommended carbon budgets for Cambridge to be aligned to a “well below 2 °C and pursuing 1.5 °C” global temperature target.

CARBON BUDGET PERIOD	RECOMMENDED CARBON BUDGET FOR CAMBRIDGE (TCO ₂) ¹⁰	PROPOSED DEVELOPMENT EMISSIONS WITHIN BUDGET PERIOD (TCO ₂ E) ¹¹	PERCENTAGE OF CAMBRIDGE CARBON BUDGET (%)
2018-2022	2,200,000	0	0.00%
2023-2027	1,200,000	113,855	9.49%
2028-2032	600,000	32,426	5.40%
2033-2037	300,000	32,426	10.81%
2038-2042	200,000	32,426	16.21%

8 Carbon emissions for the Proposed Development are grouped into the carbon budget periods in which they occur
 9 Defined in terms of the administrative boundary of the Cambridge area.
 10 Tyndall Centre present carbon budgets in CO₂, rather than CO₂e (equivalent). The differences between CO₂ and CO₂e for this purpose are unlikely to be significant.
 11 carbon emissions for the Proposed Development are grouped into the carbon budget periods in which they occur e.g. Proposed Development carbon emissions for 2018-2022 Tyndall Centre carbon budget period is representation of 2 years of construction emissions

CARBON BUDGET PERIOD	RECOMMENDED CARBON BUDGET FOR CAMBRIDGE (TCO ₂) ¹⁰	PROPOSED DEVELOPMENT EMISSIONS WITHIN BUDGET PERIOD (TCO ₂ E) ¹¹	PERCENTAGE OF CAMBRIDGE CARBON BUDGET (%)
2043-2047	100,000	32,426	32.43%
2048-2100	100,000	252,925	252.93%

7.114 Local budgets like those developed by the Tyndall Centre provide a more pertinent scale for individual projects and local decision making, however climate change impacts are not geographically circumscribed, and it is unclear whether emerging local authority budgets will add up coherently to the UK budget. The Tyndall Centre budgets provide recommendations for local authority areas and are not adopted. Emissions from most medium to large scale projects are likely to make up a considerable proportion of the Tyndall Centre carbon budgets when compared over a 60-year design life. It should also be noted that a large proportion of the Proposed Development’s carbon emissions are transport related, which can be influenced through design decisions up to a certain point, but are equally dependent on the transport sector and vehicle manufacturers accelerating the shift away from petrol and diesel fuel as well as improving efficiencies. The Proposed Development’s contextualisation with the Tyndall Centre’s recommended carbon budgets should also be used with caution, particularly with the later years (2048-2100) as carbon projections for elements such as the carbon intensity of the grid or the rate at which road vehicles switch to low carbon energy sources do not extend beyond 2050.

Design Mitigation Measures and Policy Alignment

7.115 Design embedded mitigation measures have also been considered in determining significance, as shown in Embedded Mitigation section. This includes the mitigation measures set out in the LCA, Energy Strategy and Statement, Sustainability Statement and P-OWMP. These documents outline how the Proposed Development has implemented, or plans to implement, measures to reduce carbon emissions.

7.116 The design mitigation measures considered are presented in Embedded Mitigation section, and not repeated here in full.

National and Regional Strategy and Policy Alignment

7.117 The UK has set a legally binding net zero target by 2050, in line with the Paris Agreement to limit global temperature rise to well below 2 degrees Celsius, aiming for 1.5 °C compared to pre-industrial levels.

7.118 The South Cambridgeshire Local Plan (**South Cambridgeshire Local Plan, 2018**) requires new developments to reduce carbon emissions by a minimum of 10% through the use of on-site renewable energy and low carbon technologies. The Energy Strategy indicates total potential savings for operational emissions of 42% for the detailed aspects of the Proposed Development over Part L 2021. For the outline aspects of the Proposed Development, a 42% reduction is targeted for the commercial aspects, and 30-35% targeted for outline residential aspects over Part L 2021. If achieved this meets the targets required by Building Regulations Part L 2021 and the South Cambridgeshire Local Plan.

7.119 The South Cambridgeshire Local Plan was prepared in 2018 in alignment with the previous climate change target of 80% reduction by 2050, rather than net zero. Given that the Proposed Development does not offset residual operational emissions, it cannot be considered to be a net zero development.

Significance Conclusion

- 7.120 Contextualising emissions against local carbon budgets indicated that the Proposed Development's emissions were substantial when compared to Tyndall Centre carbon budgets (**University of Manchester, 2022**) for Cambridge, whilst only a minor proportion of the CCC UK carbon budgets. Whilst the Tyndall Centre carbon budgets provide a more pertinent scale for individual projects and local decision making, these are not adopted, and it is unclear whether emerging local authority or regional budgets will add up coherently to the UK's budget. The CCC carbon budgets are clearly defined and based on robust scientific evidence, however these are typically too high level for most individual projects, with the majority very likely to fall below 1% of the budgets.
- 7.121 Design mitigation measures have also been considered as part of determining significance and several mitigation measures have been presented in the supporting documentation highlighting design decisions that could reduce carbon emissions. The supporting documents outline how the Proposed Development will meet policy and regulations. However, there is an apparent lag between the policy and the UK's requirement to meet net zero, with the measures outlined in the South Cambridgeshire Local Plan only enacted to meet the previous 80% emissions reduction by 2050.
- 7.122 Different design options have been considered as part of the LCA assessment in response to BREEAM requirements, but only at an exploratory level at this stage without any design commitments to be taken forward. As a result, the Proposed Development is expected to have a moderate adverse effect on carbon emissions that is significant for construction and operation. It is consistent with applicable existing policy requirements, but not consistent with emerging policy requirements to meet net zero by 2050 and will likely hinder the UK's trajectory towards net zero. However, further LCA options appraisals will be completed during the Technical Design stage which is an opportunity to further mitigate emissions and align with the UK's trajectory to net zero i.e. minor adverse effect that is not significant.

ICCI Assessment

- 7.123 ICCI assessments have been undertaken for each topic scoped into the ES. A summary of ICCI results is provided in Table 7D.1 in **Appendix 7.4**.
- 7.124 Potentially adverse significant effects because of climate change have been identified by the landscape and visual team, and the cultural heritage team in the operational phase, as outlined in **Table 7.12**.

Table 7.12: Landscape and Cultural Heritage ICCI Assessment Summary

RECEPTOR	CLIMATE HAZARD(S)	IMPACT OF CLIMATE HAZARD(S)	IMPACT ON SIGNIFICANCE OF THE EFFECT
Landscape character and visual receptors and designated landscapes, conservation areas and historic buildings	Heatwaves and drought/dry conditions	Could delay implementation of tree planting.	Potential change in significance as trees are required for screening of the Site and could die if planted too soon.
	Increased wind speed*	Impact on landscape and settings through potential tree losses. Could further disrupt views to and from the Site.	Wind may result in loss of trees, meaning that mitigation relies on existing vegetation outside of the Site in order to hide the development and enclose conservation areas (Fen Ditton, Bateswite Lock, and Stourbridge Common), and historic buildings (Anglesey Abbey 5km away) surrounding. This could result in a significant effect.
* There is considerable uncertainty in projecting wind changes, from wind speed to wind direction, and studies show statistically insignificant variation in wind speed.			

7.125 Potentially beneficial significant effects have been identified by the ecology team, highlighting that the open mosaic habitats on the Site are well adapted to stressed environments will benefit by the increase in extreme weather events (droughts, floods etc).

7.126 No significant ICCI effects have been identified by any other environmental topic.

CCR Assessment

7.127 A CCR assessment has been undertaken to understand the impact of climate change on the development. A summary of CCR assessment results are provided in Table 7E.1 in **Appendix 7.5**.

7.128 The methodology in paragraphs 7.40 to 7.42 have been followed to understand the likelihood and magnitude of impacts following discussions with design teams and using professional judgement. By following the significance matrix shown in **Table 7.2** and the likelihood and magnitude summarised for each risk (shown in Table 7E.1, **Appendix 7.5**), it has been identified that there are no significant adverse CCR impacts for any aspects of the design. This is because resilience has been achieved through design decisions, production of an SFRA, overheating analysis and maintenance/management plans.

7.129 As some plots of the hybrid application are outline design, a list of design guide measures have been prepared. These measures should be included in the detailed design when these plots come forward to ensure there are no significant CCR impacts. These are summarised in **Appendix 7.5** and have been included in the Design and Access Statement.

Mitigation

Construction

- 7.130 No significant effects have been identified and therefore no additional mitigation has been deemed to be required for the ICCI assessment associated with the Proposed Development at this stage of design.

Operational

Carbon Assessment

- 7.131 No additional mitigation has been identified with the Proposed Development at this stage of design. Design embedded mitigation measures are presented in the Embedded Mitigation section of the chapter.

ICCI Assessment

- 7.132 The following mitigation was identified by the landscape and visual topic and the cultural heritage topic as a result of the potential significant effects associated with the change in visibility of the Proposed Development during operation:
- The impacts on notable viewpoints will be monitored and existing planting will be used to soften some of the effects. As the areas impacted by climate change are buildings and land outside of the proposed scheme, there is therefore no control over these impacts within the scope of this project.
 - Woodland management on-site should include succession planting, as well as planting during favourable conditions.
- 7.133 No significant effects associated with climate change were identified by the Ecology topic, however, two suggested measures have been identified to reduce impacts. These include:
- Some micro-climates should be introduced on the roof top planting spaces, to provide shelter for invertebrates during high winds. This will include increasing both the height and the number of the deadwood piles and bee bank features and making sure the alignments are orientated to the SE and not the SW so there is shelter from the prevailing wind direction; and
 - Ensure planting in and around balancing ponds accounts for drought and flooding by containing the right balance of species.
- 7.134 No significant effects associated with climate change were identified by the Human Health topic, however, two suggested measures have been identified to reduce impacts. These include:
- Outside furniture (benches, floor surfaces and handrails etc) should be suitable for changing temperatures for example they should not be metal which could overheat; and
 - Ensure there is connectivity to outside spaces within the boundary of the Site. Provide routes for site users to enter buildings when weather outdoors becomes uncomfortable/ extreme.

CCR Assessment

- 7.135 No significant effects were identified within the CRR assessment however it was identified that the landscape management plan should include the following measures:

- The timing of the grassland cut may be increased if there are extended droughts/heatwaves anticipated; and
- Include consideration of increased lightning strikes in the design.

Residual Effects

Construction

- 7.136 No additional mitigation has been proposed, therefore residual effects remain as outlined in *Predicted Effects*.

Operation

- 7.137 The landscape and visual topic and cultural heritage topic identified potentially significant ICCI's relating to visual impacts and cultural heritage at locations surrounding the Proposed Development site. The topic specialists have confirmed that it is not possible to mitigate for changes due to the uncertainty surrounding potential changes. It is also not possible to mitigate for impacts that may occur within the wider landscape. Long term management and monitoring of planting is only feasible within the Proposed Development, effects could occur within the wider landscape.

Monitoring

- 7.138 No significant effects have been identified for the ICCI, assessment for any environmental discipline, for the CRR assessment or for carbon emissions and therefore no monitoring is required.

Cumulative Effects

Carbon Assessment

- 7.139 GHG emissions contribute cumulatively with all sources of GHG emissions globally to cause climate change. This assessment has considered GHG emissions in the context of the UK carbon budgets and no further consideration of the Proposed Scheme's GHG emissions with other sources of GHGs is necessary.

ICCI Assessment

- 7.140 The cumulative construction and operational effects are considered by the relevant disciplines (e.g. air quality, biodiversity). All other schemes will have produced FRAs, Overheating Assessments and Landscape strategies to enable them to adapt to climate change, and therefore no cumulative impacts are anticipated.

CCR Assessment

- 7.141 Vulnerability to climate change resilience is limited in spatial extent to the footprint of the Proposed Scheme, therefore no cumulative impacts with other developments is considered.

Conclusions and Summary of Impacts

Table 7.13: Summary of Impacts: Climate Change

DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION	IMPACT AFTER MITIGATION (RESIDUAL)			
				ADVERSE/ BENEFICIAL	REVERSIBLE/ IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE		ADVERSE/ BENEFICIAL	REVERSIBLE/ IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE
Impact of Construction Dust and PM10	Loc	Mod	Low	Adv	Irrev	ST	Min	Sheeting of loose aggregates; Use dust suppression tools; Regular inspection and cleaning of local highways; Ensure all construction plant and equipment is well maintained; No unauthorised burning of materials on-site.	Ben	Rev	ST	Neg
Carbon Assessment												
Carbon Emissions	Glob	High	n/a	Adv	Irrev	LT	Mod Adv	n/a.	n/a	n/a	n/a	n/a
ICCI Assessment												
Air Quality	Loc	High	n/a	Adv and Ben	Irrev	LT	Not Sig	None required.	n/a	n/a	n/a	Not Sig
Carbon	Glob	High	n/a	Adv	Rev	LT	Not Sig	None required.	n/a	n/a	n/a	Not Sig
Contaminated Land	Loc	High	n/a	Adv	Irrev	LT	Not Sig	None required.	n/a	n/a	n/a	Not Sig
Cultural Heritage	Loc	Med	n/a	Adv and Ben	Irrev	LT.	Sig	Monitoring the impacts on notable viewpoints with existing planting to soften some of the effects. As the areas impacted by climate change are buildings and land outside of the proposed scheme, there is therefore no control over these impacts within the scope of this project.	Adv	Rev	LT	Sig

DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION	IMPACT AFTER MITIGATION (RESIDUAL)			
				ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE		ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE
Ecology	Loc	High	n/a	Adv. and Ben	Irrev	LT	Not Sig	Woodland management on-site should include succession planting, as well as planting during favourable conditions. Not possible to mitigate for impacts that may occur within the wider landscape	n/a	n/a	n/a	Not Sig
Human health	Loc	High	n/a	Adv	Irrev	LT	Not Sig	Some micro-climates should be introduced on the roof top planting spaces, to provide shelter for invertebrates during high winds. This will include increasing both the height and the number of the deadwood piles and bee bank features and making sure the alignments are orientated to the SE and not the SW so there is shelter from the prevailing wind direction; and Ensure planting in and around balancing ponds accounts for drought and flooding by containing the right balance of species. Outside furniture (benches, floor surfaces and handrails etc) should be suitable for changing temperatures for example they not be metal which could overheat. Ensure there is connectivity to outside spaces within the boundary of the Site. Provide routes into buildings for site users when weather outdoors becomes uncomfortable/extreme.	n/a	n/a	n/a	Not Sig

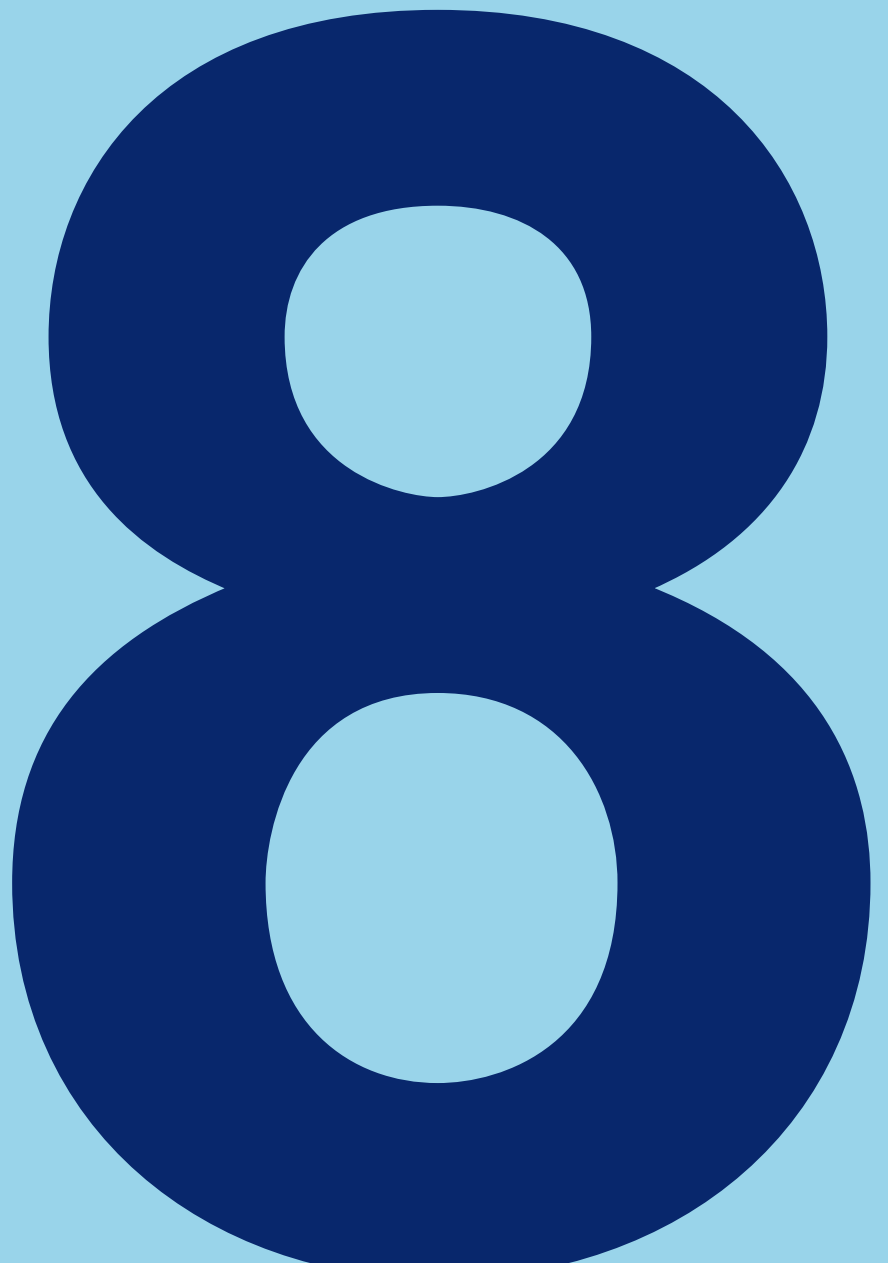
DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION	IMPACT AFTER MITIGATION (RESIDUAL)			
				ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	TERM	SIGNIFICANCE		ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE
Landscape and visual	Loc	Med	n/a	Adv	Irrev	LT	Sig	Monitoring the impacts on notable viewpoints with existing planting to soften some of the effects. As the areas impacted by climate change are buildings and land outside of the proposed scheme, there is therefore no control over these impacts within the scope of this project. Woodland management on-site should include succession planting, as well as planting during favourable conditions. Not possible to mitigate for impacts that may occur within the wider landscape	Adv	Rev	LT	Sig
Noise and Vibration	Loc	High	n/a	Adv	Irrev	LT	Not Sig	None required	n/a	n/a	n/a	Not Sig
Socio-Economics	Loc	Mod	n/a	Adv	Irrev	LT	Not Sig	None required	n/a	n/a	n/a	Not Sig
Traffic and Transport	Loc	Mod	n/a	Adv and Ben	Irrev	LT	Not Sig	None required	n/a	n/a	n/a	Not Sig
Water Resources, Flood Risk and Drainage	Loc	High	n/a	Adv	Irrev	LT	Not Sig	None required	n/a	n/a	n/a	Not Sig

DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION				IMPACT AFTER MITIGATION (RESIDUAL)			
				ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE	ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE	ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE
CCR Assessment															
Proposed Development	Loc	Mod	Low	Adv	Irrev	LT	Neg	The Landscape Management Plan should include the following measures: <ul style="list-style-type: none"> The timing of the grassland cut may be increased if there are extended droughts/heatwaves anticipated; and Include consideration of increased lightning strikes. 				n/a	n/a	n/a	Neg

Key:

Loc: Local Min: Minor Rev: Reversible Irrev: Irreversible Sig: Significant Maj: Major ST: Short Term Med: Medium
 Glob: Global Ben: Beneficial Sig: Significant Adv: Adverse Mod: Moderate Mod: Moderate LT: Long Term

Cultural Heritage



8.0 Cultural Heritage

Introduction

- 8.1 This chapter assesses the cultural heritage effects of the Proposed Development. It has been prepared by Turley to assess the impacts of the Proposed Development in relation to the effects it would have on the setting and significance of the designated heritage assets in the surrounding area. No non-designated heritage assets were identified through the consultation process that were considered to require assessment. The impact of the Proposed Development on archaeology was scoped out.
- 8.2 This chapter should be read in conjunction with ES Chapter 12 Landscape and Visual Impact and the non-EIA Archaeological Desk-Based Assessment that accompanies the planning application in order to gain a complete understanding of the cultural heritage impact of the Proposed Development.
- 8.3 In addition to the above, this chapter has also considered the impacts reported in other ES chapters where relevant to cultural heritage, including:
- 7 Climate Change;
 - 10 Flood Risk and Drainage;
 - 13 Lighting;
 - 14 Noise and Vibration;
 - 17 Soils and Groundwater; and
 - 18 Transport.
- 8.4 The following technical appendices support the Cultural Heritage ES Chapter:
- Appendix 8.1: Heritage Asset Plans
 - Appendix 8.2: Historic Maps
 - Appendix 8.3: Heritage Statement

Legislation and Policy Context

Legislative Framework

- 8.5 The applicable legislative framework for historic buildings is the Planning (Listed Buildings and Conservation Areas) 1990 Act (Planning (LB&CA) Act 1990) as amended by The Enterprise and Regulatory Act 2013.

National Planning Policy

National Planning Policy Framework (NPPF) 2021

- 8.6 This document sets out the Government's planning policies for England and how these are expected to be applied. The policies are set out under seventeen sections and constitute the Government's view of what sustainable development in England means in practice for the planning system. Section 16 sets out those principles and policies related to conserving and enhancing the historic environment (paragraphs 189-208). These apply to the heritage-related consent regimes for which local planning authorities are responsible under the Planning (LB&CA) Act 1990, as well as to plan-making and decision-taking.

Planning Policy Guidance (PPG) Last Revised 20 July 2021

- 8.7 The NPPF is supported by the PPG which is a web-based resource first published in April 2014 that provides direction over the practical application of NPPF policy. Section 18 of this resource provides advice on enhancing and conserving the historic environment and was last updated on 23 July 2019.

Development Plan

South Cambridgeshire Local Plan 2018

- 8.8 The South Cambridgeshire Local Plan sets out the planning policies and land allocations to guide the future development of the district up to 2031. It includes policies on a wide range of topics such as housing, employment, services and facilities, and the historic environment.
- 8.9 *Policy NH/14: Heritage Assets* sets out the criteria that development proposals must meet in order to be supported by the LPA. These criteria include:
- Sustaining and enhancing the special character and distinctiveness of the district's historic environment including its villages and countryside and its building traditions and details;
 - Creating new high-quality environments with a strong sense of place by responding to local heritage character including in innovative ways; and
 - Sustaining and enhancing the significance of heritage assets including their settings as appropriate to their significance and in accordance with the NPPF.
- 8.10 This policy is supported by text in paras 6.43-6.58 of the Local Plan.

North East Cambridge Area Action Plan (NECAAP), 2021

- 8.11 The Regulation 19 NECAAP was published in November 2021, but will not be consulted upon until the future of the Cambridge Waste Water Treatment Plant is determined as the AAP is dependent upon the relocation of this facility. It therefore currently carries negligible weight in the determination of planning applications.

North East Cambridge Heritage Impact Assessment (2021)

- 8.12 This Heritage Impact Assessment (HIA) is one of a suite of documents that have been produced to support the NECAAP and guide development in the area. It was commissioned to inform the development of the Townscape Strategy (see below) for the NECAAP. The HIA assesses the potential impact on the historic environment of future development in the NEC area that would lie within the parameters established by the Townscape Strategy.
- 8.13 The report concludes that of the designated heritage assets assessed within the document, only three Conservation Areas (Baits Bite Lock, Fen Ditton and Riverside & Stourbridge Common) would be slightly impacted, and the setting of Cambridge is unlikely to be significantly impacted subject to a number of considerations. It then sets out a number of recommendations re: height, siting of taller elements, architectural form and detailing, massing, materiality, lighting, uses, public realm and landscaping which would avoid or minimise harm to heritage assets.

North East Cambridge Townscape Assessment (2021)

- 8.14 This is another of the suite of documents that act as evidence base for the Townscape Strategy. It provides a baseline townscape analysis of the NEC area and its wider context and cross refers to the HIA. It highlights the recommended design parameters that are set out in the HIA, stating that development should follow these in order to avoid or minimise the potential

adverse impact on views onto and from above heritage assets in the area. It concludes that the townscape within the NEC area is diverse and fragmented, characterised by a patchwork of inward-looking development parcels. This offers an opportunity for development to establish its own sense of place through a co-ordinated approach to place-making.

North East Cambridge Townscape Strategy (2021)

- 8.15 This document brings together the Townscape Assessment and the HIA for the NEC area to provide a framework which will support the creation of a holistic, connected and high-quality place. It provides a broad range of recommendations for development of the area, some of which are noted to be aspirational and possibly more ambitious than can be achieved within the period of the NECAAP. It provides an illustrative framework that applies the recommendations of the document and informed the current version of the NECAAP.

North East Cambridge Landscape Character and Visual Impact Appraisal (2020)

- 8.16 The purpose of this document is to provide an appraisal of the existing landscape character and visual amenity at the NEC site and surrounding landscape. It then appraises the potential effects of high, medium and low development height scenarios at the Site from the Fen Edge landscape to provide a better understanding of the height of development that could potentially be accommodated at the NEC site. This document supported and informed the first iteration of the NECAAP and concluded that the adverse effects were least with the low option and that there was potential to reduce these effects through selective massing and layout of building heights across the Site.

Supplementary Planning Documents (SPDs)

- 8.17 These SPDs were adopted by SCDC to provide guidance to support previously adopted Development Plan Documents that have now been superseded by the South Cambridgeshire Local Plan 2018. These documents are still a material consideration when making planning decisions, with the weight in decision making to be determined having regard to consistency with national planning guidance and the adopted South Cambridgeshire Local Plan 2018.

Development Affecting Conservation Areas (2009)

- 8.18 This DPD provides further guidance on how national policy is interpreted in the local context. The guidance applies to new developments and works to existing buildings, as well as demolition of existing structures in Conservation Areas.

District Design Guide (2010)

- 8.19 This Guide seeks to ensure that design is an integral part of the development process. Its aim is to provide additional guidance on how developments can ensure they are sustainable and achieve a high quality of design in a way that respects the local context.

Listed Buildings (2009)

- 8.20 This SPD provides broad guidance on Listed Buildings regarding the policies of SCDC, and covers general approaches, typical works and when Listed Building Consent is likely to be required.

Landscape in New Developments (2010)

- 8.21 This SPD seeks to ensure consideration is given, wherever possible, to the retention of landscaping features within developments, or to incorporating new planting into new designs.

National Guidance

Historic Environment Good Practice Advice in Planning: Note 2 (HE GPA 2) – Managing Significance in Decision-Taking in the Historic Environment (2015)

- 8.22 This provides Historic England's advice on assessing the significance of heritage assets using appropriate expertise. It provides advice on sources of information, on when recording or further work is necessary, and on strategies for neglected or 'at risk' heritage assets.

Historic Environment Good Practice Advice in Planning: Note 3 (HE GPA 3) – The Setting of Heritage Assets (2015)

- 8.23 This document provides guidance on assessing setting and how development can affect it and how this affects the significance of the heritage assets identified. It makes it clear that setting is not a heritage asset nor a heritage designation in itself and its importance lies in what it contributes to the significance of the heritage asset. This guidance provides a staged approach to proportionate decision-making when assessing the effects of a development on the setting of heritage assets.

Historic England Advice Note 2 (HEAN 2): Making Changes to Heritage Assets (2016)

- 8.24 HEAN 2 provides general advice according to different categories of intervention in heritage assets, including repair, restoration, addition and alteration, as well as on works for research alone, based on the following types of heritage asset: buildings and other structures; standing remains including earthworks; buried remains and marine sites; and larger heritage assets including Conservation Areas, landscapes, including parks and gardens, and World Heritage Sites.

Historic England Advice Note 4 (HEAN 4): Tall Buildings (2022)

- 8.25 HEAN 4 provides advice on planning for tall buildings within the historic environment. It focuses on the information needed to support a plan-led approach to tall building development and to determine individual development proposals at application stage. It also provides guidance on how to identify appropriate locations for tall buildings and define design parameters in relation to the historic environment.

Historic England Advice Note 12 (HEAN 12) – Statements of Significance: Analysing Significance in Heritage Assets (2019)

- 8.26 HEAN 12 explores the assessment of significance of heritage assets as part of a staged approach to decision-making in which assessing significance precedes designing the proposal(s). It also describes the relationship with archaeological desk-based assessments and field evaluations, as well as with Design and Access Statements.

BS7913: 2013 – Guide to the principles of the conservation of historic buildings, British Standards Institute, 2013

- 8.27 This document provides general background information, advice and guidance on the principles of the conservation of historic buildings, including when considering conservation policy, strategy and procedure. This includes advice on the settings of historic buildings and other associated elements such as internal fixtures and fittings, and on the design of new work in the context of historic buildings.

ICOMOS: Guidance on Heritage Impact Assessments for Cultural World Heritage Properties, January 2011

- 8.28 This document provides guidance on the process of commissioning heritage impacts assessments for World Heritage properties in order to effectively evaluate the impact of potential development on the Outstanding Universal Value of properties. The guidance is addressed at managers, developers, consultants and decision-makers and is also intended to be relevant to the World Heritage Committee and States Parties. Appendix 3A sets out an example guide for assessing the value of heritage assets.

Design Manual for Roads and Bridges (DMRB) LA 106 – Cultural Heritage assessment, Revision 1 (January 2020)

- 8.29 This Advice Note provides guidance on the assessment of the impacts that road projects may have on the cultural heritage resource. The cultural heritage resource is defined as ‘a building, monument, site, place, area or landscape identified as having a degree of significance meriting consideration in planning decisions, because of its heritage impact’. Therefore, Historic monuments, historic groups of buildings and/or historic sites are covered by this advice note, whilst landscape and visual effects are dealt with in LA 107.

Principles of Cultural Heritage Impact Assessment (2021)

- 8.30 This publication provides a set of guiding principles to supplement existing guidance and provide a consistent framework for cultural heritage impact assessment in a variety of settings. It is a joint publication by IEMA, IHBC and ClfA. It specifically provides advice on understanding cultural heritage assets and evaluating the consequences of change.

Local Guidance

Baits Bite Lock Conservation Area Appraisal (2006)

- 8.31 The Baits Bite Lock Conservation Area was designated 8 November 1990. It was extended in 2006 as part of a review of Fen Ditton Conservation Area (see below). The adopted Appraisal sets out the special architectural and historic interest of Baits Bite Lock and the surrounding river frontage including Biggin Abbey to support the extended Conservation Area.

Castle and Victoria Road Conservation Area Appraisal (2012)

- 8.32 Originally designated as part of the Central Conservation Area in 1969 and extended in 1976 and 2012. The area was allocated as a separate Conservation Area in November 2018. The Appraisal provides an assessment of the character of the area and sets out measures for its future protection and improvement.

Fen Ditton Conservation Area Appraisal (2005)

- 8.33 The Fen Ditton Conservation Area was designated on 2 March 1973 and extended on 24 September 1991. The Appraisal was undertaken in 2005 and adopted in 2006, redrawing the boundary slightly to support an extended Baits Bite Lock Conservation Area which it adjoins at its northern boundary. Its southern/western boundary adjoins the Riverside and Stourbridge Common Conservation Area (within the City Boundary) and the three Conservation Areas together form a designated river corridor which permeates into the City centre.

Horningsea Conservation Area Appraisal (2005)

- 8.34 The Horningsea Conservation Area was designated on 17 May 1990. This document fulfils South Cambridgeshire District Council’s duty to ‘draw up and publish proposals for the preservation and enhancement’ of these areas as required by the Planning (Listed Buildings and Conservation Areas) Act 1990.

- 8.35 Riverside and Stourbridge Common Conservation Area Appraisal (2012).
- 8.36 Originally designated in 1969 as part of the Central Conservation Area, this section was separately designated in 2018. The Appraisal predates this separate allocation and encompasses the 1993 and 2012 extensions to the area. It defines what is special about the Riverside and Stourbridge Common area and to provide information about its landscape, architectural merit and historical development.

Potential Sources of Impacts

- 8.37 The scope of the built heritage assessment is confined to the potential effects on the setting (and therefore significance) of designated heritage assets in the surrounding area. The impact of the Proposed Development on archaeology has been scoped out.
- 8.38 The designated built heritage assets that are potentially impacted by the Proposed Development include Grade I, II* and II listed buildings, scheduled monuments, registered parks and gardens and Conservation Areas. Potential impacts on the heritage assets that have been identified through scoping include the following:
- The scale, height and massing of the new buildings and the nature of the proposed use could affect the significance of heritage assets within at least 1.5km of the Site boundaries through changes to the townscape and landscape character within the settings of these heritage assets.
 - Changes in noise conditions, light spillage and altered/increased traffic flows could also affect the character of the landscape and townscape which form part of the settings of the heritage assets in the area surrounding the Proposed Development.
 - Construction activities (including associated traffic), and servicing and maintenance, may affect perceptions, understanding and appreciation of the heritage assets in the area.
- 8.39 Potential alterations to drainage patterns that may lead to subsidence of buildings and monuments was identified in the Scoping Opinion (**Appendix 2.2**) as a potential impact. However, the Site is some distance away from the nearest designated heritage asset and both Flood Risk and Drainage (10), and Soils and Groundwater (17) ES Chapters do not envisage any significant effects. ES Chapter 10 predicts a negligible residual impact on drainage, and the drainage strategy will be controlled by planning condition. Similarly, ES Chapter 17 predicts neutral-minor adverse effects on the groundwater of the area.
- 8.40 In addition, potential alterations to drainage patterns that might lead to in situ decomposition or destruction of below ground archaeological remains and deposits was also highlighted in the Scoping Opinion (**Appendix 2.2**). However, as archaeology has been scoped out of the ES, any potential impacts related to this will be dealt with through the other non-EIA planning application materials.

Methodology

Extent of Study Area

- 8.41 The extent of the study area was determined initially by the October 2020 Scoping Opinion which was informed by Historic England's response to application ref: 20/03464/SCOP. This recommended that designated heritage assets within at least a 1.5km radius should be considered. This view was reiterated in the February 2022 Scoping Opinion, which was

informed by Historic England's and the LPA Conservation Officer's response to application ref: 21/05178/SCOP.

- 8.42 Following review of the Zone of Theoretical Visibility (ZTV) produced to inform the LVIA baseline, and in consultation with the Council and Historic England, the study area has been expanded to approx. 2km, with some assets up to 5km in distance from the Site included due to the topography.
- 8.43 Almost simultaneously with the submission of the scoping request (**Appendix 2.1**) application 21/05178, the LPA published a number of documents as part of the Evidence Base for the Proposed Submission North East Cambridge Area Action Plan (NECAAP). This included a Heritage Impact Assessment (November 2021), which largely corroborated those heritage assets that had been scoped into the built heritage EIA, and the extent of the study area.
- 8.44 The study area and heritage assets scoped into this assessment are shown on the plans in **Appendix 8.1**.

Method of Baseline Data Collection

Desk-based Study

- 8.45 Desk top research was carried out, collating information on the designation, historical development and origin of the building heritage assets in the area. The following types of designated heritage asset were identified within the study area:
- Listed Buildings;
 - Conservation Areas;
 - Scheduled Monuments; and
 - Registered Parks and Gardens.
- 8.46 The primary source on designated heritage assets (excluding Conservation Areas) is the National Heritage List for England (NHLE) which is an online database hosted by Historic England. This provides the record of all statutory listed buildings, scheduled monuments, registered parks and gardens, world heritage sites, protected wrecks and battlefields.
- 8.47 Conservation Areas have been identified with reference to the Cambridge Local Plan Proposals Map (2018) and the South Cambridgeshire District Council Proposals Map (2018). Additional information has been collected from the Historic Environment Record, primarily via its online interface, the Heritage Gateway.
- 8.48 All of the above sources have been supplemented by a review of cartographic evidence and other readily available primary and secondary sources.
- 8.49 Site visits have also been undertaken in 2021 and 2022 to assess the significance and settings of the various heritage assets considered most likely to be affected by the development of the Site. This primary evidence has supplemented the baseline data gathered by the desk top study.

Assessment Method

- 8.50 The assessment of significance has been undertaken with reference to national and sector best practice guidance. The significance of heritage assets has been considered with reference to the heritage interests approach established in the NPPF. This establishes that heritage

significance is derived from an asset’s archaeological, architectural, artistic and/or historic interest. These interests are defined in paragraph 006 of the PPG, except archaeological interest which is defined in Annex 2 of the NPPF.

- 8.51 This approach is set out in further detail in Historic England’s Advice Note 12 – Statements of Heritage Significance: Analysing Significance in Heritage Assets (HEAN 12), October 2019. Additional guidance is provided in Historic England’s Good Practice Advice in Planning: 2 – Managing Significance in Decision-Taking in the Historic Environment (HEGPA 2), March 2015.
- 8.52 The assessment of the setting of the heritage assets has been undertaken in accordance with Historic England’s ‘Historic Environment Good Practice Advice Note 3: The Setting of Heritage Assets’ (GPA 3) published in 2017. The assessment of setting set out in this document requires a staged approach:
 - Step 1: Identify which heritage assets and their settings are affected.
 - Step 2: Assess the degree to which these settings make a contribution to the significance of the heritage asset(s) or allow significance to be appreciated.
 - Step 3: Assess the effects of the Proposed Development, whether beneficial or harmful, on that significance or on the ability to appreciate it.
 - Step 4: Explore ways to maximise enhancement and minimise harm; and,
 - Step 5: Make and document the decision and monitor outcomes.

Significance Criteria and Assessment of Predicted Impacts

Baseline Sensitivity and Value

- 8.53 The sensitivity of the cultural heritage assets scoped into this assessment has been determined using professional judgement, consideration of existing heritage designations (both statutory and non-statutory) and relevant best practice guidance. The following sensitivity/heritage value table (2.1) has been based on the guidance in the NPPF (2021), ICOMOS Guidance (2011) and the DMRB (2020), and has been used to categorise the baseline sensitivity /heritage value of the identified assets.

Table 8.1: Sensitivity/Heritage Value

HERITAGE VALUE	DEFINITION/ CRITERIA
Very High	Assets of very high or international importance including: <ul style="list-style-type: none"> • World Heritage Sites • Other heritage assets of recognised international importance
High	Assets of high or national importance including: <ul style="list-style-type: none"> • Grade I and II* listed buildings, or other buildings that can be shown to have exceptional qualities in their fabric or historical associations which is not adequately reflected in their listing grade. • Scheduled Monuments and non-designated assets of schedulable quality and value • Registered Battlefields • Grade I and II* Registered Parks and Gardens • Conservation Areas containing very important buildings • Well preserved historic landscapes or townscapes, exhibiting considerable coherence, time-depth or other critical factors

HERITAGE VALUE	DEFINITION/ CRITERIA
Medium	Assets of medium or regional importance including: <ul style="list-style-type: none"> • Grade II Listed Buildings, or other buildings that can be shown to have considerable qualities in their fabric or historical associations and are of regional or more than local importance • Grade II Registered Parks and Gardens • Conservation Areas containing important buildings • Archaeological sites or features of regional importance • Historic townscapes or landscapes exhibiting original features or a main phase of development of interest, or the work of a regionally important designer or other considerations of note.
Low	Assets of low or local importance including: <ul style="list-style-type: none"> • 'Locally listed' buildings or parks and gardens • Unlisted buildings and townscapes or landscapes of modest quality with local (vernacular) characteristics • Archaeological sites of local importance
Negligible	Other assets of very low or local importance, including: <ul style="list-style-type: none"> • Non-designated assets (including sites and features) with no significant historic or archaeological value, or sites of former archaeological features • Unlisted buildings of no architectural merit, or of an intrusive character • Landscapes or townscapes with little or no significant historic interest, or whose value is limited by poor preservation

8.54 As there are no world heritage sites or other designated heritage assets of recognised international importance within the study area, the Very High category has not been used. Similarly, as the scope of this assessment is limited to designated heritage assets, the Low and Negligible categories have also not been used.

Magnitude of Change

8.55 The categorisation of the magnitude of change that has been used in the assessment of the effects on cultural heritage in the EIA is based on the descriptions set out in DMRB LA 104 Table 3.4N. These generic environmental factor descriptions have been expanded upon to establish what those factors may be in relation to the proposed scheme as they relate to cultural heritage specifically.

Table 8.2: Magnitude of Change

MAGNITUDE OF IMPACT (CHANGE)		DEFINITION/ CRITERIA
Major	Adverse	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements.
	Beneficial	Large scale or major improvement of resource quality; extensive restoration; major improvement of attribute quality.
Moderate	Adverse	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements.
	Beneficial	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality.

MAGNITUDE OF IMPACT (CHANGE)		DEFINITION/ CRITERIA
Minor	Adverse	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements.
	Beneficial	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact or attribute or a reduced risk of negative impact occurring.
Negligible	Adverse	Very minor loss or detrimental alteration to one or more characteristics, features or elements.
	Beneficial	Very minor benefit to or positive addition of one or more characteristics, features or elements.
No change		No loss or alteration of characteristics, features or elements; no observable impact in either direction.

Significance of Effects

8.56 The significance of an effect is generally considered to result from the combination of the ‘sensitivity and/or importance’ of the affected environmental receptor and the predicted ‘extent’ and/or ‘magnitude’ of the impact or change. Assessing the significance of effects ultimately relies on professional judgement, although comparing the extent of the impact with criteria and standards specific to each environmental topic can guide this judgement.

8.57 The definition of when an effect is significant is a key aspect of the EIA process, and is arrived at through the combination of the baseline sensitivity and the magnitude of change. Effects can be ‘adverse’ or ‘beneficial’. Those effects highlighted in red font in the table below are considered to be significant in EIA terms.

Table 8.3: Criteria for Assessing the Significance of Effects on Heritage Assets

HERITAGE VALUE / BASELINE SENSITIVITY ▼	MAGNITUDE OF IMPACT (DEGREE OF CHANGE) ADVERSE OR BENEFICIAL ►				
	NO CHANGE	NEGLECTIBLE	MINOR	MODERATE	MAJOR
VERY HIGH	Negligible	Minor	Moderate	Major - Moderate	Major
HIGH	Negligible	Minor	Moderate - Minor	Moderate	Moderate - Major
MEDIUM	Negligible	Minor - Negligible	Minor	Moderate - Minor	Moderate
LOW	Negligible	Negligible	Minor - Negligible	Minor	Moderate - Minor
NEGLECTIBLE	Negligible	Negligible	Negligible	Minor - Negligible	Minor

Consultation

- 8.58 Consultation was undertaken through the pre-application process with Historic England and the Historic Environment Team Leader at the LPA. Workshops to review and discuss the heritage viewpoints as part of the LVIA and consequentially which heritage assets were considered potentially affected, were held in the Spring and Autumn of 2021. At these meetings, the model of the Proposed Development was viewed live and potential viewpoints moved, added and discarded. Photographs of the viewpoints were also shared at these meetings to refine the scoped in heritage assets.

Existing Baseline Conditions

- 8.59 The development history of the Site is set out in the Archaeological Desk-Based Assessment (that accompanies the planning application) and the appended map regression (**Appendix 8.2**). In summary, the Site is considered to have been fields from the Medieval period up until the mid-C19 when the railway and its sidings were built. After several railway related uses, and gradual decline from the mid-C20, the Site was largely derelict by the end of the C20. In 2017, the new Cambridge North Station was opened with associated surface car parking. Since then, a new hotel has been built to the north of the station and a new office building is nearing completion to the west of the station.
- 8.60 In the surrounding area, within approx. 2km from the Site, there are approx. 80 designated heritage assets, with a further vast number of heritage assets lying between 2-5km of the Site (most of these contained within the Historic Core of Cambridge). Of the heritage assets within the wider 5km study area, 23 have been scoped into the initial baseline assessment set out below.

Heritage Assets within 1km from the Site Boundary

- 8.61 There are no designated heritage assets within the Site, nor within 400m of the Site boundary. The eastern edges of the Fen Ditton Conservation Area and the north-eastern edge of the Riverside and Stourbridge Common Conservation Area are just within 500m of its boundary. The majority of the Fen Ditton Conservation Area is located within 1km of the Site boundaries; all of the listed buildings within its boundaries that have been scoped in are located between 500m and 1km of the Site.
- 8.62 The northern/eastern half of the Riverside and Stourbridge Common Conservation Area is located within 1km of the Site; the southern/western half is partly within 2km of the Site, with the westernmost (and most developed) part lying within 3km of the Site.
- 8.63 The scoped-in heritage assets that lie within 1km of the Site Boundary are listed below. These assets are plotted on the maps in **Appendix 8.1** and all the numbers below correspond with the numbers on these maps.
- 8.64 Those designated heritage assets of *high sensitivity* are:
- (19) Fen Ditton Conservation Area (South Cambridgeshire District Council);
 - (20) Riverside and Stourbridge Common Conservation Area (Cambridge City Council);
 - (10) Barn to North West of Ditton Hall, Fen Ditton – Grade II* Listed Building; and
 - (1) The Old Rectory, Fen Ditton – Grade II* Listed Building.
 - (5) Ditton Hall, Fen Ditton – Grade II* Listed Building; and

- (4) Parish Church of St Mary Virgin, Fen Ditton – Grade II* Listed Building.

8.65 Those designated heritage assets of **medium sensitivity** are:

- (7) Riverside Cottage, Green End, Fen Ditton – Grade II Listed Building;
- (6) Grassey Cottage, Green End, Fen Ditton – Grade II Listed Building;
- (3) No.4, Green End, Fen Ditton – Grade II Listed Building;
- (11) Lode Cottage, Green End, Fen Ditton – Grade II Listed Building;
- (2) Poplar Hall, Fen Ditton – Grade II Listed Building; and
- (14) Garden and boundary wall to Ditton Hall, Fen Ditton – Grade II Listed Building.

8.66 The southern edge of the Baits Bite Lock Conservation Area lies just within 1km of the Site. However, as the bulk of this heritage asset lies beyond this distance, it is listed (together with the scoped-in listed buildings within its boundaries) below, in the next section.

Heritage Assets 1-2km from the Site Boundary

8.67 As noted above, this zone includes the central part of the Riverside and Stourbridge Common Conservation Area. The only heritage asset within this Conservation Area that has been scoped in lies just outside the 1km radius from the Site. The very eastern part of the Fen Ditton Conservation Area also lies within this zone.

8.68 The southern edge of Horningsea Conservation Area lies just within 2km of the Site, but the majority lies just outside, so is listed in the next section together with the only scoped-in listed building that lies within its boundaries.

8.69 The scoped-in heritage assets that lie within 1-2km of the Site Boundary are listed below. These heritage assets are plotted on the maps in **Appendix 8.1** and all the numbers below correspond with the numbers on these maps.

8.70 Those designated heritage assets of **high sensitivity** are:

- (23) Baits Bite Lock Conservation Area (South Cambridgeshire District Council);
- (8) Chapel of St Mary Magdalene Stourbridge Chapel – Grade I Listed Building;
- (13) Biggin Abbey, Horningsea – Grade II* Listed Building;
- (16) Multi-phased settlement east of Milton, Fen Road – Scheduled Monument; and
- (21) Milton Conservation Area (South Cambridgeshire District Council).

8.71 Those designated heritage assets of **medium sensitivity** are:

- (9) Wildfowl Cottage, Horningsea – Grade II Listed Building.

Heritage Assets 2-5km from the Site Boundary

8.72 As noted above, this area contains the westernmost part of the Riverside and Stourbridge Common Conservation Area (lying 2-3km from the Site).

8.73 The scoped-in heritage assets that lie within 2-5km of the Site Boundary are listed below. These heritage assets are all of **high sensitivity** and are plotted on the maps in **Appendix 8.1**; all the numbers below correspond with the numbers on these maps:

- (22) Horningsea Conservation Area (South Cambridgeshire District Council);

- (12) Church of St Peter, Horningsea – Grade I Listed Building;
- (18) Castle and Victoria Road Conservation Area (Cambridge City Council);
- (15) Cambridge Castle Mound – Scheduled Monument; and
- (17) Anglesey Abbey – Grade II* Registered Park and Garden.

8.74 None of the heritage assets are identified as being at risk. A number of climate change scenarios are, however, relevant and could form potential environmental problems for the heritage assets identified. These include:

- Increased wind speed;
- Hotter and wetter conditions; and,
- Drier/drought conditions.

Heritage Significance/Sensitivity

8.75 The significance of the 23 heritage assets listed above, including an assessment of their setting and what contribution this makes to their significance, is provided below. The contribution the Site makes to their setting and therefore their significance is also assessed. This significance and setting assessment is also set out in the Cultural Heritage Statement (**Appendix 8.3**). However, the significance, setting and contribution this (and the Site as part of the setting, if any) makes to the significance of each heritage asset is summarised here with references to the LPA's HIA Nov 2021, in order for the assessment of effects to be clearly demonstrated in this chapter.

8.76 Heritage viewpoints to demonstrate the potential impact of the Proposed Development have been included in the LVIA. Where relevant, these viewpoints are discussed below – please see ES Chapter 12 Landscape and Visual Impact for the location plan.

Assets of High Sensitivity

(19) Fen Ditton Conservation Area

8.77 Fen Ditton Conservation Area encompasses the Site of the original settlement at Green End which stretches along the River Cam, and the expanded Medieval village which runs eastwards from the church along High Ditch Road. The linear character of these two areas remains, with little modern backland development. Views are channelled along the routes through the village by the mostly traditional vernacular buildings and the canopies of the mature trees. Emerging out at the riverside meadows at the southwest, adjoining the Riverside and Stourbridge Common Conservation Area, suddenly allows longer views across the Cam and the surrounding rural area.

8.78 The attractive water meadows are within the Conservation Area and are a key part of its tranquil riverside setting. The surrounding open space visually separates the village from the city with the edge of the village defined by trees in views from the low-lying land of the meadows. Trees along the riverbanks are also an important part of this rural riverside setting.

8.79 The Site is largely screened in views from the Conservation Area, but some glimpses are just possible from the higher ground of Green End in winter, although possible views are still filtered by trees and buildings (see LVIA viewpoint 6). The hotel adjoining the Site is visible from this viewpoint, with the Site itself largely screened by the riverside planting. A clearer view of the area of the Site from the northern end of the Conservation Area is gained from LVIA viewpoint

8, but even here the low-lying / currently undeveloped state of the Site means that it is largely screened by the riverside vegetation. The hotel is again visible from this viewpoint, with the rest of the view being of the flat open fenland landscape beyond the riverside trees.

- 8.80 The Site is not currently visible from LVIA viewpoints 5, 9, 10, 23 and 24. The view from the High Street by the Church and war memorial (24) is channelled and enclosed by the buildings and canopies of the mature trees with limited visibility of the landscape beyond in the water meadows. The view from the water meadows (5) is enclosed by the riverside vegetation, whilst views 9 and 10 show the open fenland landscape in the wider surrounding area. View 23 is enclosed by the screening roadside planting to the A14.

(20) Riverside and Stourbridge Common Conservation Area

- 8.81 This large linear Conservation Area, as its name implies, covers the stretch of the River Cam from Victoria Bridge north-eastwards to the City boundary. It includes the river frontages and towpaths and the adjacent meadows, the 'Brunswick area', north of Maid's Causeway and the north side of Newmarket Road towards the Leper Chapel and the former Barnwell Junction Station. It borders the Chesterton Conservation Areas of 'Ferry Lane' and 'De Freville' to the north, the Kite Conservation Area to the south, the Cambridge Historic Core Conservation Areas to the west, and the Fen Ditton Conservation Area (South Cambridgeshire District) to the east.
- 8.82 Key to the character of the Conservation Area is the River Cam, its bridges and the two commons which run alongside it, with the slow-moving river contrasting with the often-busy parallel towpath. Other key characteristics of the Conservation Area include the backcloth of trees which surround the commons, softening and at times hiding the built-up area beyond, and the green wedge formed by the commons which penetrates the City east to west, providing a significant linear wildlife corridor. The area's association with medieval Cambridge, the development of Barnwell Priory and Stourbridge Fair and the enclosure of the East (Barnwell) Field in the C19 are all important aspects of its historic character.
- 8.83 The Riverside and Stourbridge Common Conservation Area is bordered on all sides by Conservation Areas which contribute positively to the setting of the Conservation Area. A stretch of the northern boundary along Fen Road is not bordered by another Conservation Area. This area is populated by mobile homes and modern housing which does not contribute to the setting of the Conservation Area.
- 8.84 Although well within the urban bounds of Cambridge, the Conservation Area has a semi-rural character derived from the river and commons which form the heart of the area and are an important landscape feature of the city. The rural character is strengthened at its eastern end as Fen Ditton is approached, and views are gained across the city boundary and into the rural parish, but there are no extensive views of countryside beyond.
- 8.85 Nonetheless, it is evident that the Conservation Area runs through a city and this urban character is particularly evident at the Brunswick and Abbey/Beche Roads area, where the former pumping station's chimney forms a local landmark, contrasting with the mostly 2-3 storey housing that characterises the development within and surrounding the Conservation Area. To the north of the Conservation Area, towards the Site, there is a strong element of intervening development and planting in the background and the Site is not currently visible. The light industrial character of this intervening development in the immediate surroundings of the Site is not a positive element of the Conservation Area's setting.

8.86 LVIA viewpoints 15, 16, 21 and 22 are all taken from this Conservation Area. Viewpoints 15 and 16 show the rural character of the western end of the Conservation Area, at Stourbridge Common/Ditton Meadows, and illustrates the riverside landscape with trees lining the course of the river and the flat topography of the area with relatively little built development visible. Although the Site itself is not visible in its current form, its location is identifiable in this viewpoint by the existing hotel adjacent to the Site which is visible through the trees and vegetation. In view 15, the under-construction office building and the station building itself, which are also adjacent to the Site, are also visible filtered through the trees and vegetation. The office building will also become more prominent in view 16 once completed, although largely screened by trees.

8.87 Viewpoints 21 and 22 are further west and further within the city boundary, and as a result show a greater juxtaposition of built elements (riverside housing in view 21 and the Newmarket Road and the Leper Chapel in view 22) with the landscape features of the area. The Site does not feature in its current form in these viewpoints, as it sits behind the existing buildings in these vistas.

(5) Ditton Hall, (10) Barn to NW of Ditton Hall and (14) Garden Boundary Wall

8.88 Ditton Hall and the Barn to the NW are Grade II* listed buildings and therefore of **high sensitivity**, whilst the Garden Boundary Wall is a Grade II listed building and therefore of **medium sensitivity**. They form a group, however, and their setting is closely interrelated and thus they have been assessed together.

8.89 Ditton Hall has great architectural and historic interest as a c1635 house incorporating the main range of an early 15th century building with an upper hall. It is red brick and timber framed with 19th century gault brick and plain tile roofs with a three 'bay' garden façade of particularly high architectural interest.

8.90 The separately listed barn to the north of the hall has great historic and architectural interest as an excellent surviving example of a late 15th or early 16th century trading hall and warehouse. It is timber framed and weather boarded, raised above ground level on limestone rubble and Barnack limestone foundations and has plain tiles on a crown post roof construction.

8.91 The 19th century boundary wall to Ditton Hall is separately listed. It is of historic interest for its varying dates of construction throughout the 19th century and materials of stone with brick rubble and local bricks. It has saw-tooth brick cornices with tiled copings and brick buttresses. The walls flank the gardens of Ditton Hall and extend to the barn at the north-west.

8.92 The immediate setting of Ditton Hall is defined by the boundary wall and grounds which contribute positively to the setting of the Hall. The Hall itself is the principal contributing factor to the setting of the boundary wall. The wall and mature trees create a secluded setting to the northern side of the house, separating it from its historic grouping with the church in the core of the village.

8.93 Long views south west from the house have clearly historically been cultivated through an avenue of trees through the grounds and this view contributes positively to the setting of the hall. Although the hall sits on rising grounds overlooking Ditton Meadows to the west, views in this direction are restricted by the grouping of historic buildings which comprise the historic working part of the house, as they are located closest to the river which was historically a trading area.

8.94 Within this western boundary of the hall's grounds lies the historic barn to the north of the hall which contributes to the historic setting of the Hall. The proximity of the barn to the River Cam is key to understanding its historical context as a merchants' trading hall and warehouse, trading goods which came in via the river. Views towards the open landscape and river to the west contribute positively to the setting of the barn.

8.95 LVIA viewpoints 5 and 24 best illustrate the setting of these heritage assets. The enclosed character of the High Street leading down to the river (view 24) and the strong belt of riverside vegetation in Ditton Meadows (view 5) show the lack of intervisibility between this group of heritage assets and the Site in its current form. The rural setting of the village, which is important to the setting and significance of the Hall, and the relationship to the river which is important to the setting and significance of the barn, are not affected by the Site.

(1) The Old Rectory and (4) the Parish Church of St Mary the Virgin – Grade II* Listed Buildings

8.96 The Church has high historic and architectural interest as a good surviving example of a Parish Church which originally dates to the early 14th century and developed through the centuries. It is a large, spacious and dignified building (Pevsner, 2015) which sits at the junction of the High Street and Church Street before the land falls westwards to the river. The immediate setting of the church is clearly defined by the churchyard and the boundary wall which surrounds the church.

8.97 Immediately to the north of the church is the Old Rectory, which is a complicated, partly timber-framed building of the C16-C19 with the early C18 red brick front visible from the churchyard. As part of the historic grouping of church, rectory and hall which form the focal point of the village, it is of great historic and architectural interest.

8.98 The wider rural surroundings of the Church and the Rectory contribute to their setting through representing the historically rural riverside and agricultural surroundings within which the church was established. Approaching the village from the west, from the river, the church and the Old Rectory's position on rising land above the water meadows, enables glimpses of them from behind the canopy of mature trees.

8.99 From the churchyard and The Old Rectory, views are similarly limited to glimpses of the river meadows and of the Hall from the churchyard. In these, the Site is not visible. LVIA viewpoint 24, as described above, shows how the Site does not contribute to the village's rural riverside context and does not therefore contribute to this important part of the church's or rectory's setting or significance.

(23) Baits Bite Lock Conservation Area

8.100 This Conservation Area is centred, as its name implies, on the River Cam lock which dates from 1700. There are only a handful of buildings in the Conservation Area, most inevitably historically connected with the lock and/or river in some way. These provide evidence of the working character that would have once created a small hub of activity at this point on the river, but today much of the area's character is derived from the verdant riverside landscape flanked by the flat fenland landscape beyond. The Conservation Area continues northwards from the Fen Ditton Conservation Area and further north is the Horningsea Conservation Area, while to the west, across the railway line, is the Milton Conservation Area.

8.101 Views from the Conservation Area are long and across the open landscape of the area, and only generally curtailed by trees and bends in the river. However, in some views south, the raised route of the A14 interrupts this rural idyll and glimpses of the existing hotel adjacent to the Site indicate the Site's location, although it is not in its current state visible from the Conservation Area. Views 7a, 7b and 7c demonstrate the strong planting in the Conservation Area which encloses and screens most views south and south west.

(8) Chapel of St Mary Magdalen Stourbridge Chapel, Newmarket Road, Cambridge – Grade I Listed Building

8.102 This building was the chapel of the leper hospital at Stourbridge and is one of the most complete and unspoilt examples of Norman architecture in the country. It is also of great historic interest as a rare mid-C12 hospital chapel

(13) Biggin Abbey, Fen Ditton – Grade II* Listed Building

8.103 Despite its name, this property was never an Abbey, but is the remnant of the summer residence of the Bishops of Ely. The surviving building is of the late C14 (with C17 additions and alterations) when the property became a manor house, and the remaining portion is probably a chamber block of some sort. It is of great historic and archaeological interest, with more modest architectural interest due to the significant C20 interventions which have obscured much of its C14 and C17 character.

8.104 It sits in an isolated position, back from the river, and viewed across open agricultural fields. Its buttressed chimneystack and red tiled roof add to its prominence in the wide panoramas enabled by the flat fenland landscape in its setting. This prominence in the landscape is an important reminder of its former high status and a crucial part of its setting in aiding our understanding of its former prestigious character. Detracting elements from this are the A14 road bridge and its accompanying traffic noise and the electricity pylons and overhead wires.

8.105 LVIA viewpoint 7c is taken from the public footpath that runs east from Bait's Bite Lock to the south of Biggin Abbey and demonstrates the isolated position of the property in an agricultural landscape, but with the A14 visible in close proximity and the hotel adjacent to the Site just glimpsed through the trees to the south of the building. The Site in its current form is not visible, nor part of the setting of this building.

(16) Multi-phased settlement east of Milton, Fen Road, Milton – Scheduled Monument

8.106 This multi-phased settlement dates from the Roman period to the 12th century. It derives its significance from the high-level survival of nationally important archaeological deposits from the Romano-British to early medieval period, for the diverse range of archaeological features and for its close spatial relationship to the Grade II* listed Church of All Saints within Milton.

8.107 There is little to evidence the existence of this asset above ground and thus the aspects of its setting that are important to its understanding are those elements that contribute to our appreciation of its historic interest. In this case, that is largely limited to the rural surroundings in which it is experienced and the proximity and any intervisibility there may be between the earlier survivals of Milton's development including the church. Its significance is not derived from wider strategic positioning or vistas with a designed intent to channel views or panoramas.

8.108 Fen Road, which the monument is positioned to the north of, is an old route and the presence of this road and connection with the settlement is also important, although the boundary between the two is heavily vegetated. As with the Conservation Area (see below), the proximity of the

A14 is unfortunately audible, detracting from the otherwise tranquil rural surroundings. LVIA viewpoint 17 demonstrates the rural setting of the monument and the heavily treed boundary along Fen Road which screens Fen Road, the A14 further south and the Site from view. The Site does not form part of the setting of the monument and does not contribute to its significance.

(21) Milton Conservation Area

- 8.109 Milton Conservation Area is formed of the historic core of the village, bordered by Ely Road to the west, rural fields to the north and east and Fen Road to the south. The railway line runs to the south east and beyond that runs the River Cam. The Conservation Area contains Milton Hall and parkland landscaped by Humphrey Repton, All Saint's Church dating from the 11th or early 12th century with 13th and 17th century additions, and historic cottages interspersed with modern housing. Distinct timber-framed houses with rendered walls and thatch, typical of the 17th century, remain in the village today, notably on Church Lane and Fen Road.
- 8.110 The Conservation Area represents a fairly concentrated and isolated area of surviving historic character in Milton and is mostly surrounded by modern development, particularly to the west and south of the medieval core, and therefore clear views particularly south and west are obscured. The formerly rural setting to this remaining historic cluster is only therefore really appreciated from the east in the approach from the river, where open fields remain with sparser development along Fen Road leading to Bait's Bite Lock. Fen Road is one of the oldest routes in Milton village and encompasses the scheduled monument of earlier settlement in the area near the railway. The eastern finger of the Conservation Area protrudes out (following the parkland of the Hall) and adjoins the scheduled monument, forming a designated corridor of association.
- 8.111 Dense tree planting screens the A14 from view, but the proximity of this busy route is prominently audible. Views to the east towards the river from the Conservation Area's edge are also screened by trees, filtering glimpses of the open flat fen countryside that borders the river. The eastern edge of the Conservation Area is shown in LVIA viewpoint 17, demonstrating that the Site in its current form does not contribute to the Conservation Area's heritage significance.

(22) Horningsea Conservation Area

- 8.112 Horningsea is a small village with buildings mostly arranged alongside the Fen Ditton to Waterbeach Road, together with two narrower ancient lanes leading down to the river to the west. The Conservation Area is focussed on the village centre, with the Church of St Peter (see below) at its heart. The southern part of the Conservation Area is largely characterised by cottages and public houses, but this changes with the large farm groups that define the northern part. Substantial farmhouses with fine gault brick walls define the roads to the west and large mature trees enclose many views of these important farm groups.
- 8.113 Key views from the Conservation Area tend to be focussed east and west, with those from the western edges focussed on the river, and those on the eastern edges, allowing glimpses across the open countryside. The view of the church rising above the single storey agricultural buildings is a particularly important one in the northern part of the Conservation Area. Views south, however, include the A14 amongst the open landscape. The Site does not contribute to the setting or significance of the Conservation Area in its current form as demonstrated by LVIA viewpoint 19, which is taken at the very southern end of the Conservation Area across the allotments that border the village before the flat fenland landscape is reached.

(12) Church of St Peter, Horningsea – Grade I Listed Building

- 8.114 This early C12 parish church is of very high heritage interest and lies at the heart of the Conservation Area, forming a historic grouping with the rectory and St John's Farm, one of the large farmsteads that typifies the northern part of the Conservation Area. Fine views of the church are gained across the buildings of St John's Farm, but in general, despite its position on rising ground, the church is largely hidden in views from within and into the Conservation Area as it is enclosed by development (mostly historic) and the mature trees of the churchyard. There are no views towards the Site from the church, as demonstrated by LVIA viewpoint 18, which shows the enclosed nature of the churchyard, restricting views out from and in towards the church.

(18) Castle and Victoria Road Conservation Area and (15) Cambridge Castle Mound, Castle Street, Cambridge – Scheduled Monument

- 8.115 This Conservation Area comprises the Roman settlement and Norman Castle with a huddle of small post-medieval streets off Castle Street, 19th century residential terraced streets south of Victoria Park estate to the north, Histon Road cemetery and the streets around it and the Edwardian development north-east of Huntingdon Road. The character is overwhelmingly urban, as is its setting, as it lies within a very built-up area with surrounding development between the Conservation Area and the Site.
- 8.116 The Conservation Area is, however, located in the highest part of Cambridge and includes the scheduled Castle Mound, views from which are long and uninterrupted, reflecting the monument's historic defensive function and location at a high point of the city, protecting it and the strategic river crossing below. In addition, the Castle provides one of the few publicly accessible viewpoints over the city and is important in enabling an appreciation of the development and setting of the city. A number of the city's key landmarks (mostly places of worship) are visible from this location.
- 8.117 As a key component of the Conservation Area, these long strategic views are also an important part of the significance of the Conservation Area and its setting. Although long-distance views are possible in most directions, they are focussed on vistas south across the Conservation Area and the adjoining Historic Core Conservation Area. Views east towards the Site are filtered by thick vegetation, as demonstrated by LVIA viewpoint 3, which shows how effectively the existing higher-level trees on the mound screen views towards the Site, which is over 3km away with continuous intervening development.

(17) Anglesey Abbey, Lode – Grade II* Registered Park and Garden

- 8.118 This garden lies just over 5km from the Site and is formed in the grounds of a priory of Augustinian canons with remains of their C13 building surviving in the present Grade I listed house. Following its dissolution, the gardens were remodelled over the following centuries with much of the present landscape character deriving from the designs of Lord Fairhaven in the early C20. The pleasure grounds are laid out in a complex series of walks and cross-walks, avenues and vistas, all punctuated by Lord Fairhaven's nationally important historic statuary collection, many of which are individually listed.
- 8.119 Coronation Avenue is the principal east/west planted route in the grounds, originally planted in 1937 to mark the coronation of George VI. It originally joined the Cross Avenue, which was planted contemporaneously and formed the western extent of the gardens. A small extension of Coronation Avenue 2 years later took it over Cross Avenue into the landscaped former farmland that now forms the western extent of the gardens.

- 8.120 The parkland is enclosed from the surrounding fen landscape by considerable boundary planting with extensive tree belts to the north, south and west. Dense tree avenues and woods therefore limit experiences of the skyline or longer distance views from the areas of open lawn in the gardens. Cross Avenue is similarly enclosed by thick tree planting and avenues channelling the view very narrowly south-west and out to the surrounding fenland. As the Site lies more west than south-west, it is completely screened by the designed planting in the gardens and is not visible from this principal avenue as demonstrated by LVIA viewpoint P8. Wider longer distance views towards the Site from around the perimeter of the gardens (from public footpaths outside the registered parkland) are similarly filtered and/or screened by intervening vegetation in the flat landscape and the Site is not visible.

Assets of Medium Sensitivity

(7) Riverside, (6) Grassey and (11) Lode Cottages, and (3) No.4, Green End, Fen Ditton – Grade II Listed Buildings

- 8.121 These historic cottages are set within the original area of settlement at Fen Ditton fronting onto Green End Road. This formed a strip of properties that ran parallel to the river between The Biggin to the north and the Church to the south. Wharves formerly stretched between the village and the river servicing the river traffic and trade, but between the C14 and C17 seaborne commerce declined and inland trade became increasingly important, leading to the growing importance of the road which turned east near the church and resulting in the expansion of the village in this direction from the C14 onwards. The Fen Ditton docks, however, retained a commercial purpose until around the arrival of the railway in 1845.
- 8.122 The wharves between the cottages and the river which runs to the west are now perceived as a long stretch of fields. Although their original function is no longer evident, the relationship with the river remains important to the understanding of the cottages' original purpose and position. This contributes positively to their setting. The east side of Green End has a dense border of shrubs and trees lining the road. The modern houses inserted between the historic houses on the west side of Green End do not contribute to the setting.
- 8.123 LVIA viewpoint 8 demonstrates the wider setting of these properties from the northern end of the Conservation Area and shows how close the northern fringe of Cambridge is to Fen Ditton, with only the River Cam really separating them. From this point, the Site is visible, with the adjacent hotel building and nearing completion office building demarcating the location. The low-rise intervening development along Fen Road is also visible, providing an urban fringe character to the visible area of Cambridge west of the river. From the domestic curtilages of the properties themselves, however, the Site is not visible and does not form part of their settings due to the intervening and strong riverside planting.

(2) Poplar Hall, Fen Ditton – Grade II Listed Building

- 8.124 This is a well preserved early C17 farmhouse set within a rural landscape with the River Cam running to the west. The outbuildings to the north east of the house and the surrounding fields contribute to the setting of the house by reflecting its historic use as a working farm. The A14 runs to the north of the farmhouse in close proximity. This significantly detracts from the historically tranquil and rural setting of the farmhouse and is a strong visual and audible intrusion.
- 8.125 The Site lies approx. 1km to the southwest of the farmhouse, but the riverside vegetation provides a strong intervening feature which largely screens views of the outer limits of Cambridge from the Hall which is itself enclosed by mature planting within its own curtilage. LVIA viewpoint 20 taken from the A14 road bridge over the River Cam shows the proximity

of the Site and Cambridge to the Hall, but also demonstrates the strength of the intervening riverside planting which largely screens any intervisibility.

(9) Wildfowl Cottage, Horningsea – Grade II Listed Building

- 8.126 This late C17 vernacular cottage sits close to the river's edge within the Bait's Bite Lock Conservation Area, part of the small cluster of buildings focussed on the lock. It has probable connections to the Biggin Abbey estate but was certainly once the Pike and Eel pub serving the barge traffic using the lock. The river is a fundamental part of its setting as it is the reason for its location and enables appreciation of its historic function.
- 8.127 Its position as part of the former working group of buildings at the lock is also an important part of its setting which is not extensive and largely limited to this grouping and its position at the water's edge. The Site does not form part of its setting and the verdant riverside planting which provides the property's secluded setting is demonstrated in LVIA viewpoint 7b.

Evolution of the Baseline Conditions without Development

- 8.128 Without implementation of the development, the baseline conditions are likely to remain largely unchanged. However, development is likely to occur in other locations around the Site which could impact on the LVIA viewpoints identified and affect the setting and significance of the identified heritage assets. The cumulative projects identified indicate the types of development that are likely to come forward. Within the surrounding area of the Site, the existing patchwork development that currently characterises the area is also likely to continue, accentuating the poor townscape quality of the area.

Predicted Impacts

Construction Impacts

- 8.129 The construction period is anticipated to extend over approximately 5-years. It will include the enabling works to the Application Site, the construction of the buildings contained within the detailed application, and the ongoing construction of the outline phases including the establishment of the landscaping.
- 8.130 In terms of its predicted impacts on the heritage assets surrounding the Site, the construction period is temporary and of a short-medium term nature due to the 5-year construction timescale. The impacts will be indirect through visual and aural changes in their setting and will be limited to those heritage assets in closest proximity to the Site. Construction activities which are considered to affect heritage assets and their settings, include:
- Presence of construction plant, and cranes in particular;
 - Floodlighting, particularly during winter months;
 - Temporary site compounds and hoardings;
 - Temporary access roads and car parking; and
 - Presence of construction traffic in the surrounding area.
- 8.131 The heritage assets considered to be affected by the construction impacts are limited to those listed below. The reason(s) the others are not considered to be affected is described in the next section and the Heritage Statement (**Appendix 8.3**):
- Fen Ditton Conservation Area; and
 - Riverside and Stourbridge Common Conservation Area.

- 8.132 ES Chapter 17 Transport does not identify Conservation Areas as receptors that are considered to be impacted by the construction or operational impacts and concludes that all residual transport related effects are minor or negligible.

Operational Impacts

- 8.133 Upon completion of the development, the Site will have changed from a largely undeveloped piece of scrubland to a new urban quarter focussed on Cambridge North Station. The hybrid planning application includes details of the proposed buildings, landscaping and public realm works that will transform the currently largely undeveloped Site with new office, residential and laboratory buildings, alongside a mobility hub, and new public squares and landscaped spaces.
- 8.134 The illustrative masterplan, planning drawings and parameter plans (**Appendix 4.1**) provide details of the development, which proposes buildings of 5-8 storeys and landscaping including tree planting. Further details of the mitigation strategy for the development are provided below, but for the purposes of assessing the operational impacts of the development, it has been assumed that the tree planting will not provide full mitigation until 15-years after its implementation. The assessment that follows is therefore undertaken on a worst-case scenario basis at Year 0/1 following completion of the development.
- 8.135 Operational impacts will have a wider reach than the construction impacts and will be permanent and long term, but will all still be indirect, as they will form visual changes to the setting of a very limited number of heritage assets. Operational impacts which are considered to affect heritage assets and their settings, include:
- Intensified views of development as more built form will be introduced into existing views;
 - Taller buildings breaking the skyline/established landscape enclosure;
 - Urbanising transitional boundaries at the eastern and northern edges of the Site; and
 - Erosion of the rural setting/character of Conservation Areas and the settings of listed buildings.
- 8.136 The heritage assets considered to be affected by the operational impacts are limited to those listed below. The reason(s) the others are not considered to be affected is described in the next section and the Heritage Statement (**Appendix 8.3**):
- Fen Ditton Conservation Area; and
 - Riverside and Stourbridge Common Conservation Area.

Evaluation of Predicted Impacts

Construction Impacts

Fen Ditton Conservation Area

- 8.137 The phasing of the Proposed Development means that the proposed buildings closest to the Conservation Area (mobility hub, S06 and S07) will be constructed first and form the longest extent of buildings along the eastern edge of the Site. These construction activities will therefore have the greatest impact on this heritage asset, which is the closest to the Site.
- 8.138 As glimpses of the Site in its current condition are already possible from the Conservation Area (LVIA viewpoints 6 and 8 in ES Chapter 12 Landscape and Visual Impact), although filtered by trees, the presence of cranes and site compounds, construction traffic parking and floodlighting

will be visible from points within the Conservation Area, highlighting the proximity of the urban edge of Cambridge, which will disturb the largely rural and tranquil character of the village.

- 8.139 This will be most noticeable at the northern edge of the village (see LVIA viewpoint 8) where the Site is most visible in its current form. Additional activity on the Site will draw attention to the Site, increasing its urbanising effect and impact on the prevailing rural character of Fen Ditton. However, viewpoint 8 demonstrates that the Site and the urban edge of Cambridge is already visible, and that larger buildings such as the station hotel and office buildings on the Business and Science Parks are already present in this view of Cambridge's fringe.
- 8.140 The crane for One Station Square, adjacent to the Site, provides an indication of the impact that additional cranes in this location will have during the building period (assumed to be 3 years) along this edge. Additional cranes for the later phases of the Site will be visible behind the under-construction buildings along this eastern edge and will have less visual impact. Once the eastern buildings are at least partly completed, they will also screen some of the later construction activities.
- 8.141 Cranes will be visible, as they are now, in the skyline of LVIA viewpoint 9. This will highlight the proximity of Cambridge's urban fringe to Fen Ditton village and will be seen across the agricultural setting of the Conservation Area to the west. However, this is not a view of a rural idyll, as the existing station hotel together with buildings on the Cambridge Business Park, Science Park and the Tarmac site on Cowley Road are also visible in the mid-long distance. The built elements of Fen Ditton village visible in this viewpoint are outside the Conservation Area, with the exception of the Grade II listed No.4 Green End, the gable end of which is also visible. The rural character of the Conservation Area, which is apparent within its boundaries, is not readily discernible in this viewpoint, and the addition of construction plant in the skyline will not affect it.
- 8.142 Further within the village, the construction activities are likely to have even less impact as there is far less intervisibility with the Site. Floodlighting may, however, be seen through the trees that filter the view at LVIA viewpoint 6, and possibly at viewpoint 5. Viewpoint 24 is unlikely to be affected. All of the impacts will be at their 'worst' in winter, with impacts reducing in the summer months as trees come into leaf, screening much of the Site.
- 8.143 The construction impacts on this high sensitivity receptor are predicted to be short term, temporary, indirect, reversible, unavoidable and negligible adverse in the worst-case scenario during the winter months. This will result in an effect of minor adverse significance before mitigation.

Riverside and Stourbridge Common Conservation Area

- 8.144 The orientation of the development means that, aside from at the very northern end of the Conservation Area where Stourbridge Common adjoins Ditton Meadows, and the Fen Ditton Conservation Area, the development is largely screened by the existing adjacent buildings of the station hotel and the new office building, One Station Square (currently under construction); see LVIA viewpoint 16. Further west and south within the Conservation Area, existing intervening, mainly residential development, screens the development, certainly once the Green Dragon Bridge is reached; see LVIA viewpoints 21 and E4.
- 8.145 Views from the new Chisholm Trail and from the finger of Stourbridge Common that extends to the Grade I listed Leper Chapel on Newmarket Road, are seen in the context of and through

the railway structures between LVIA viewpoints E1 and E2 and the Site, and are screened by vegetation from LVIA viewpoint 22. It is likely that cranes and floodlighting will be noticeable from the Chisholm Trail viewpoints closest to the Site (views E1 and E2), but these will be seen within the existing 'industrial' landscape of the railway gantries, overhead line and, bridge, with the existing station hotel and One Station Square also screening much of the new development. There will be no appreciable change from these viewpoints. Similarly, the intervening development and the distance between view 21 and the Site means that it is unlikely that much, if any, construction plant will be visible from this location. Any glimpses of cranes will be fleeting and filtered by vegetation, and thus there will be no appreciable impact from this viewpoint.

- 8.146 From viewpoint 16, visible construction activities will be limited to cranes and floodlighting, but much will be screened by the existing buildings adjacent to the Site and any visible plant will form only very minor incidents in the skyline and will be filtered by trees. The impact of the construction phases will be greater from viewpoint 15 as the Site is more exposed from this position but is again filtered in views from existing trees along the river. Cranes will, however, be noticeable, as will floodlighting, and construction activities will possibly be audible depending on the environmental conditions. Hoarding may also be visible in winter months but will likely be screened in summer months when trees are in leaf. Indeed, many of the construction impacts will be reduced in summer months when the vegetation will screen much of the Site.
- 8.147 The construction impacts on this high sensitivity receptor are predicted to be short term, temporary, indirect, reversible, unavoidable and negligible adverse in the worst-case scenario during the winter months. This will result in an effect of minor adverse significance before mitigation.

Operational Impacts

Fen Ditton Conservation Area

- 8.148 The orientation and extent of the development means that its eastern edge faces the western boundary of the Conservation Area, whilst the northern edge becomes visible at the northern end of the village where the main built settlement ends and footpath 85/6 leads northwards towards Bait's Bite Lock and the Conservation Area there. The development is also visible above the skyline in views outside and across the Conservation Area, west of the village along Horningsea Road, the B1049.
- 8.149 In LVIA viewpoint 6, the existing station hotel is already visible from Green End at an isolated point along the road, overlooking the car park to The Plough PH. This is not a particularly important view from the Conservation Area but does demonstrate that where the ground level is slightly raised (views of the development quickly disappear from within the grounds of the pub) and the intervening vegetation is sparser, then the urban fringe of Cambridge can intrude into the tranquil rural character of the Conservation Area.
- 8.150 In this case, the view of the eastern edge of the development is filtered through trees, but more buildings will be visible through these across the river, urbanising the riverside landscape setting of the Conservation Area, which is an important part of its significance as it enables the settlement's appreciation as a distinct rural village, separate from the city of Cambridge. However, existing buildings on the Cambridge Business Park are already visible across the intervening light industrial buildings and mobile homes around Fen Road on the other side of the river, and thus the proximity of Cambridge is already evident in this view. Much of the new development will be filtered, even in winter, by existing riverside vegetation, but the northern end will be more visible as the vegetation is sparser here.

- 8.151 Views of the development quickly disappear moving northwards into the old medieval heart of the village, with the street lined on both sides with a mixture of dwellings and dense and mature vegetation, screening views of the river from the public realm. However, views open up again where the built edge of the village stops on the western side of Green End and the land rises slightly, allowing a clear view of the eastern and northern edge of the development (LVIA viewpoint 8). The early-mid C20 northern suburbs of Chesterton are marked by the tower of the Grade II listed St George's Church, and the Cambridge Business Park is visible in the skyline with the station hotel and One Station Square also present. In the middle distance, the mobile homes along Fen Road are also visible, all of which demonstrates the existing visibility of the northern fringe of Cambridge from this point in the Conservation Area.
- 8.152 The development will bring a larger form of development into closer proximity to the Conservation Area, further urbanising the existing situation. However, this view already enables an appreciation of the proximity of Cambridge and is not a rural view of surrounding meadows and fenland that is characteristic of the Conservation Area. These views are better appreciated from further north and in the southern part of the Conservation Area where the development will not be visible (see viewpoint 5). Views from the core of the Conservation Area (see viewpoint 24) will be unaffected.
- 8.153 From outside the Conservation Area, looking west across it, from Horningsea Road (LVIA viewpoint 9) the development will be seen extending north from the existing station hotel, above the trees and rooftops of the village. As noted above, this view already encompasses significant elements of the urban fringe of Cambridge, with the Business Park, Science Park and Cowley Road Tarmac site visible through the trees on the horizon. Whilst the development further urbanises the existing situation, the existing view does not provide an appreciation of the relationship between the village and its rural surroundings of open space and river corridor which are a characteristic element of the village.
- 8.154 The operational impacts on this high sensitivity receptor are predicted to be long term, permanent, indirect, irreversible, unavoidable and negligible adverse in the worst-case scenario during the winter months. This will result in an effect of minor adverse significance before mitigation.

Riverside and Stourbridge Conservation Area

- 8.155 As noted in the construction section, the orientation of the development means that aside from at the very northern end of the Conservation Area (see LVIA viewpoint 15), the development is largely screened by the existing adjacent buildings of the station hotel and One Station Square (currently under construction); see LVIA viewpoint 16. Further west and south within the Conservation Area, existing intervening development, primarily residential, screens the development, certainly once the Green Dragon Bridge is reached; see LVIA viewpoints 21 and E4. In LVIA viewpoint 22 from Newmarket Road adjacent to the Grade I listed Leper Chapel; the Proposed Development is screened by intervening existing mature vegetation.
- 8.156 The operational impact is therefore limited to the very east/north end of the Conservation Area, where the rural character of the Conservation Area is stronger as the City boundary and the water meadows of Fen Ditton are reached. Upon completion, LVIA viewpoint 15 shows that the eastern frontage of the Proposed Development will be visible through the riverside trees and vegetation, but most of One Milton Avenue will be screened by the existing station hotel and One Station Square once completed. Only the uppermost floor and plant screen of One Milton Avenue will be visible above these existing buildings and will also be filtered by the

riverside trees. The eastern frontage of the Proposed Development will extend the existing built form further along the backdrop to the river but will be seen behind the existing Fen Road light industrial units. The openness of the backdrop to the riverside landscape will be more enclosed by the Proposed Development, but it is set well below the existing canopies of the trees and is seen as an extension of this already partially urbanised area.

- 8.157 LVIA viewpoints 16, E1 and E2 all demonstrate how well the existing station hotel and One Station Square screen the Proposed Development. In viewpoint 16, only the uppermost floors of One Milton Avenue will be visible adjacent to One Station Square; the majority of the building will be screened by the strong riverside vegetation. The Station Hotel is much more prominent in this view and screens the majority of the Proposed Development from this viewpoint.
- 8.158 Views E1 and E2 are similar to viewpoint 16, but closer and show more of the development because of the lack of vegetation along the railway line along which the Chisholm Trail runs. However, because of the orientation of the development, only the very northern end of the development is visible and is viewed in the context of the railway structures, and existing development to the east. In the closer of the two views (E1), elements of S08 will be seen to the west of the existing station hotel and part of the western side of One Milton Avenue will be viewed adjacent to One Station Square. However, these elements of the development will be viewed through the intervening railway infrastructure and in conjunction with the existing development adjoining the Site.
- 8.159 The operational impacts on this high sensitivity receptor are predicted to be long term, permanent, indirect, irreversible, unavoidable, and negligible adverse in the worst-case scenario in the winter months. This will result in an effect of minor adverse significance before mitigation.

Heritage Assets not Impacted

Baits Bite Lock Conservation Area, Grade II* Listed Biggin Abbey and Grade II Listed Wildfowl Cottage

- 8.160 LVIA viewpoints 7a, 7c and 7c show a series of vistas from where the development was considered to be potentially visible. Views 7a and 7b demonstrate that the Site is not visible from the Conservation Area nor Wildfowl Cottage in these locations where the existing secluded and rural character of the Conservation Area and riverside setting of the cottage would be maintained. The appreciation of the surrounding flat fenland landscape and limited visibility of Cambridge would be retained, ensuring the character and appearance of the Conservation Area and the setting and significance of the cottage would be preserved. Even during the construction phase, it is unlikely that construction activities would be visible through the dense intervening tree screen which would filter any minor incidental glimpses of cranes in the skyline.
- 8.161 Viewpoint 7c shows that there is marginal intervisibility of the development and the Conservation Area from limited points in the western side of the Conservation Area along the track to the north of the Grade II* Listed Biggin Abbey. However, although glimpses are just possible, these are heavily filtered by the existing trees along the A14 and the A14 road bridge itself which screens many views south from the Conservation Area and is the focus of the eye in such views. Any glimpses of the development in its construction phase, of cranes on the Site, would also be viewed in this context, which includes several large electricity pylons and a multitude of overhead wires.
- 8.162 The construction and operational impacts on both the high sensitivity receptors (Baits Bite Lock Conservation Area and Biggin Abbey) and the medium sensitivity receptor (Wildfowl Cottage)

are predicted to result in no change in even the worst-case scenario during the winter months. This will result in an effect of neutral significance before mitigation.

Fen Ditton Listed Buildings

- 8.163 The heritage assets identified within Fen Ditton include all either high sensitivity receptors (Grade II* Listed Buildings: The Old Rectory; Parish Church of St Mary Virgin; Ditton Hall; Barn to NW of Ditton Hall) or medium sensitivity receptors (Grade II Listed Buildings: Poplar Hall; No.4 Green End; Grassey Cottage; Riverside Cottage; Lode Cottage; Garden and Boundary Wall to Ditton Hall).
- 8.164 LVIA View 24 demonstrates that the development will not be visible from the key grouping of the Church, Rectory and Hall, and even during construction any potential minimal glimpses of the tips of cranes from the churchyard will be so limited as to not be discernible.
- 8.165 LVIA View 5 shows that although the landscape is open at the water meadows, and despite the slightly elevated position of the Hall, the intervening vegetation and topography does not allow any intervisibility between this heritage asset and the development. Similarly, Riverside Cottage, just north along the river from this viewpoint, will not be affected by the development as it sits in a low-lying position adjoining the river where the vegetation on the west wide of the Cam screens any intervisibility.
- 8.166 LVIA View 8 demonstrates the wider setting of the other Grade II listed cottages along Green End (No.4, Lode and Grassey), and shows the proximity and extent of the development, but this appreciation of the development is not discernible along Green End and within the domestic context of the properties. This is again due to the lower-lying position of the houses compared to the intervening riverside vegetation, which screens the development and preserves the properties' important and historic relationship with the river and their wider rural setting.
- 8.167 No.4 Green End is set on slightly higher ground on the east side of the road and it is visible in viewpoint 9 where the development is seen on the horizon above the visible properties of Fen Ditton. This appreciation of the Site is not, however, evident within the domestic setting of the property, where views towards the Site are limited to potential glimpses through the gaps between the buildings on the west side of Green End, and above and through the mature trees in the riverside gardens of those properties and along the western side of the River Cam. The property faces north, with only a single small upper floor window in the otherwise blank west street-fronting gable. The property's principal outlook is therefore towards the more rural landscape in the north and the Site does not feature in this vista. Any informal glimpses of the development from the property during construction or when completed will be against an existing backdrop which includes the buildings of the Business Park. The development will not materially further urbanise the existing context or affect the setting or appreciation of the property as a vernacular cottage in the early medieval core of the village.
- 8.168 LVIA viewpoint 20 is taken from the A14 road bridge over the River Cam, just to the north of Poplar Hall. Although the development is clearly visible in this elevated viewpoint which is clear of vegetation, from ground level within the vicinity of the Hall the riverside vegetation which encloses the river corridor screens views of the Site and the development. The Hall itself is also enclosed within a mature garden curtilage with large trees which limit views out from the property. The A14 is a highly visible and audible detracting feature within this setting and has far more impact on the appreciation of the building in a rural setting than the Proposed Development either during construction or once completed. The proximity of a large pylon is

also evident in the photograph below, which shows the wider context of LVIA viewpoint 20 including Poplar Hall (highlighted by the red arrow) and demonstrates the relative distance of the development (dark blue arrow) from the Hall in contrast to the pylon and A14.



Figure 8.1: View South of Poplar Hall and Site from A14 Road Bridge over River Cam

- 8.169 The construction and operational impacts on both the high sensitivity receptors (Grade II* listed buildings) and the medium sensitivity receptors (Grade II listed buildings) are predicted to result in no change in even the worst-case scenario during the winter months. This will result in an effect of neutral significance before mitigation.

Chapel of St Mary Magdalene, Newmarket Road, Cambridge

- 8.170 This Grade I Listed Building is located at the southern end of the finger of Stourbridge Common that extends from the river to Newmarket Road, retaining an element of the once wider rural setting of the Leper Chapel as it is often known. The new Chisholm Trail now enables better connections between Coldham's Common, Stourbridge Common and across the river to Cambridge North station and along the river to Fen Ditton, Baits Bite Lock and beyond. The trail enables a wider appreciation of the Leper Chapel, enabling easier and closer access to the building, which formerly sat rather isolated below the raised roadway of Newmarket Road although publicly accessible.

- 8.171 LVIA viewpoint 22 is taken from the elevated roadway with the Chapel in the immediate foreground and demonstrates that the development will not be appreciable within the setting of this important historic building due to the intervening mature trees and vegetation. The appreciation of its historic importance and architecture from within the vestiges of its historic setting will not be affected by the development, and thus the heritage benefit from the greater public experience of the asset from the new Chisholm Trail will be maintained.

- 8.172 The construction and operational impacts on this high sensitivity receptor is predicted to result in no change in even the worst-case scenario during the winter months. This will result in an effect of neutral significance before mitigation.

Milton Conservation Area and Multi-phased Settlement E of Milton (Scheduled Monument)

- 8.173 There is considerable modern development to the south of the Conservation Area, which is tightly drawn around the historic core of the village. The A14 and the elevated Milton interchange off it also sit between the Site and the Conservation Area, and there is a considerable amount of planting within the village and especially to the south around Todd's and

Dickerson's Pits and the Country Park. This intervening development and planting screens the development from views within the Conservation Area and will not affect its significance.

- 8.174 The Scheduled Monument to the east of Milton off Fen Road adjoins the very eastern edge of the finger of parkland associated with Milton Hall, which is within the Conservation Area. Viewpoint 17 is taken at this boundary and demonstrates the lack of visibility between the Conservation Area and the monument and the Site. There is no impact.
- 8.175 The construction and operational impacts on these high sensitivity receptors are predicted to result in no change in even the worst-case scenario during the winter months. This will result in an effect of neutral significance before mitigation.

Horningsea Conservation Area and Church of St Peter

- 8.176 LVIA viewpoint 18 is taken from the churchyard of the parish church of St Peter and demonstrates that the Site is not visible due to the significant enveloping mature tree planting and vegetation. The Church sits at the heart of the Conservation Area and is important in views in the northern part of this designated area, but the Site does not affect any of these key vistas.
- 8.177 LVIA viewpoint 19 is taken from the very southern edge of the Conservation Area, looking across allotment gardens towards the flat fenland landscape which stretches to the river corridor and beyond towards the Site. View 19 shows that although the very tallest element of building S04 may potentially be just visible amongst the trees in the distance, this will be such a minor incident that it will not be discernible. Even in the construction phase, the presence of the tops of cranes approx. 2km away filtered through trees, even in winter, will not materially affect this view out of the Conservation Area and will not affect the key characteristics of the Conservation Area as described in the baseline assessment.
- 8.178 The construction and operational impacts on these high sensitivity receptors are predicted to result in no change in even the worst-case scenario during the winter months. This will result in an effect of neutral significance before mitigation.

Castle and Victoria Road Conservation Area and the Castle Mound (Scheduled Monument)

- 8.179 LVIA viewpoint 3 is taken from the top of the scheduled Castle Mound, which lies within the Castle and Victoria Road Conservation Area. As an important part of the Conservation Area, the impact of the proposals on the setting and significance of Castle Mound could potentially impact on the Conservation Area, as the Castle enables public panoramic viewpoints from the Conservation Area. In this case, the viewpoint demonstrates that the trees that grow at a higher level on the mound limit the view to the northeast and would screen views of the development. Even in winter, the view would be obscured/filtered by the tree structure of the canopies to such a degree that it would be difficult to perceive the Proposed Development. In any case, even if it were able to be seen in winter, it would not affect the important spatial and visual relationship between the mound (and the Conservation Area) and the historic core of Cambridge. Neither would it compete with the appreciation of the landmark buildings which can be seen in the city skyline, nor erode distant views to the edges of the City. The Proposed Development would be, if visible at all, a barely discernible new element in the distant (over 3km) backdrop of the city.
- 8.180 The construction and operational impacts on these high sensitivity receptors are predicted to result in no change in even the worst-case scenario during the winter months. This will result in an effect of neutral significance before mitigation.

Anglesey Abbey

- 8.181 LVIA viewpoint P8 demonstrates how far off the axis of the important Coronation Avenue within the garden, the Proposed Development will sit. It will not feature in any designed views from the garden and the mature tree planting which flanks the avenue screens any informal views towards the Proposed Development from within the garden.
- 8.182 The construction and operational impacts on this high sensitivity receptor are predicted to result in no change in even the worst-case scenario during the winter months. This will result in an effect of neutral significance before mitigation.

Mitigation

- 8.183 The design of the Proposed Development has been the subject of a lengthy period of pre-application discussion with the LPA and engagement with Historic England. This has resulted in refinement of the Proposed Development to minimise the potential for adverse effects and is effectively built-into the scheme.
- 8.184 The application is a hybrid whereby the detailed elements (the mobility hub, One Milton Avenue and S06 and S07) have been subject to critique by the LPA through the pre-application process and they have been carefully shaped and detailed by the architects to respond to the context, paying particular heed to the sensitive edges of the Site. This has been tested throughout the pre-application process, which has also informed the parameters of the outline elements of the development and has been articulated in an illustrative masterplan for the whole Site. The whole development is underpinned by a detailed landscape masterplan and detailed hard and soft landscaping plans, which works with the detailed buildings to enhance the articulation of their massing and softening the edges of the development to reflect their sensitive edge conditions.
- 8.185 The landscaping will of course need time to mature and this is part of the mitigation strategy which will provide tree-planting along the sensitive eastern edge to soften the visibility of the proposals from the western edge of the Fen Ditton Conservation Area. Higher level planting is also proposed in planters on the façade of the mobility hub and in balconies and roof gardens on buildings S07 and S08; all of which will aid the integration of the development's eastern edge in particular with the adjacent fenland landscape. Full details of the landscaping proposals are contained within the Design and Access Statement submitted with the planning application, and the longevity of this mitigation feature can be secured by management measures through planning conditions and legal agreements which are in the control of the LPA through the planning application determination process.
- 8.186 The buildings have been designed with the recommended design parameters of the NE Cambridge Heritage Impact Assessment (Nov 2021) in mind and as a result:
- The tallest buildings are sited away from the more sensitive eastern edge of the Site.
 - None of the buildings are tall (10-13 storey) buildings.
 - The development does not terminate or form the focal point of designed lines of views from Anglesey Abbey.
 - The development does not create visually intrusive elements which would result in unacceptable changes in views from or towards heritage assets.

- A neutral palette of materials is proposed for the buildings which are characteristic of the 'earthy' or muted spectrum of the local context and are recessive in the wider landscape, minimising their visual intrusion and creating a harmonious fit within surroundings and skyline.
- Masonry facades, brick and other sturdy materials reflect the materiality of Cambridge and limited use of reflective materials avoids the development becoming a focal point in views from and towards heritage assets.

8.187 The same design principles, landscaping and materiality will inform the outline proposals when they come forward for reserved matters applications or detailed schemes. The illustrative masterplan submitted for the whole development provides an indication of the intended design quality for the outline buildings. This can be controlled by the LPA through the use of planning conditions on any outline consent, through the pre-application and application process for the reserved matters applications or detailed schemes and through any planning conditions attached to those consents. The effectiveness of the detailed design and landscaping proposals for the outline elements as mitigation has modest potential to minimise key heritage sensitivities, as the most sensitive elements of the Proposed Development are the detailed elements, which have already been designed and the maximum advantage of these mitigation measures has been taken from the project's inception. Nonetheless, good design of both the detailed and outline elements will reduce the potential harm and the design quality can be secured through planning conditions which are in the control of the LPA.

8.188 During construction, the setting of the Fen Ditton and Riverside & Stourbridge Common Conservation Areas will be affected by plant, traffic, floodlighting, etc. The effects of these will be minimised by the phasing of the development, the careful management of the Site to maintain a tidy appearance, and the use of hoardings to create acceptable site boundaries. Details of the mitigation measure will be controlled through the Construction Environment Management Plan (CEMP) (**Appendix 4.2**) which will be the subject of a planning condition. Tree planting will be undertaken at the earliest opportunity to ensure its establishment as quickly as possible, and this will also aid the screening of construction activities.

Residual Effects

8.189 Only two heritage assets, both Conservation Areas of high sensitivity, are predicted to be impacted by the Proposed Development: Fen Ditton and Riverside & Stourbridge Common Conservation Areas. All the other 21 identified heritage assets are not predicted to be impacted by the Proposed Development.

8.190 The in-built mitigation of the scheme has been carefully developed and designed to ensure maximum advantage is made of the design quality of the proposed buildings and landscaping strategy to minimise any predicted harm. Thus, given that the predicted effects on the cultural heritage are not significant, there is therefore no need for further mitigation. Nonetheless, the maturation of the landscaping will have a further beneficial impact as it will continue to soften the edges of the development which is particularly important along the eastern edge. Thus, the following residual effects assessment assumes landscaping at 15-years, as shown in the LVIA viewpoints assessment.

8.191 There will be negligible changes to some views from Fen Ditton Conservation Area and Riverside and Stourbridge Common Conservation Area. These changes are the introduction of

new urbanising elements in the settings of the Conservation Areas through the development of the Cambridge North Site which intensifies views of the edge of Cambridge. The views that are affected are, however, limited and are not key views from, or of, the Conservation Areas. These views already comprise urban elements within them and do not therefore reflect the overall rural character that characterises the Fen Ditton Conservation Area and the northern/eastern end of the Riverside and Stourbridge Common Conservation Area.

- 8.192 This predicted limited harm to the heritage significance of these assets has been mitigated by the sensitive application of materials and palette alongside articulation of the heights of the buildings, with heights following the strategy set out in the Regulation 19 NECAAP and its evidence base documents relating to design and built character. As a result, these changes in the setting of the Conservation Areas will form a negligible adverse residual effect.

Cumulative Effects

- 8.193 The cumulative projects that have been considered in the assessment of effects of the Proposed Development are listed in **Table 8.5** below.
- 8.194 The assessment of effects concluded that the cumulative projects are rarely appreciated in conjunction with the Proposed Development. Therefore, the potential cumulative impact was limited to a handful of heritage assets which are discussed below

Riverside and Stourbridge Common Conservation Area and Grade I Listed Leper Chapel

- 8.195 In LVIA viewpoint 22 from Newmarket Road, adjacent to the *Grade I listed Leper Chapel*, the Proposed Development is screened by intervening existing mature vegetation which also screens the St John's Innovation Park development (20/03523/FUL).
- 8.196 The St John's Innovation Park development (20/03523/FUL) falls within the vista of viewpoint 15 but sits behind the Proposed Development and is thus not visible. Planning application 21/02450/REM lies to the west of (behind) this viewpoint and is of a mass and form which does not affect the wider appreciation of the rural river landscape of the Conservation Area. The other cumulative schemes (Water Treatment Centre and Waterbeach Barracks) are at sufficient distance and/or of such a form/massing that they are not appreciated in conjunction with the Proposed Development. There is no cumulative impact.
- 8.197 The St John's Innovation Park application sits to the west of the Proposed Development in viewpoint E1 from the Chilsholm Trail Bridge over the River Cam, and may potentially be seen across the railway line, through the trees and above the intervening development (houses in the middle distance). Given that the existing view consists of railway infrastructure and a mixture of development of no particular character (including the existing station hotel) the cumulative impact of the visibility of the St John's Innovation Park development would be neutral as it would not materially affect the character of the Conservation Area at this point.

Castle and Victoria Road Conservation Area and Cambridge Castle Mound (Scheduled Monument)

- 8.198 Planning application 20/03523/FUL (St John's Innovation Park) sits to the west of the Proposed Development and is similarly screened/filtered by the high-level trees on the mound. It is very unlikely even in winter that the Proposed Development and the St John's Innovation Park development would be seen together, in the distant backdrop of the city. Even if views were possible, the two developments are separated by some distance and do not form an 'urbanised' wall of development in the backdrop of wider views. There is no cumulative impact.

Grade II* Registered Park and Garden - Anglesey Abbey

8.199 It is notable that planning application 21/02450/REM, sits directly in the centre of the axis of the view southwest from Coronation Avenue. There is, however, no cumulative effect from the Marleigh development off Newmarket Road and the proposed Cambridge North development, as any impact on the Garden arises solely from the Newmarket Road development which would not be appreciated in conjunction with the Cambridge North development which cannot be seen from the garden.

Cumulative Effects Conclusion

8.200 In the majority of LVIA viewpoints and in the assessment of heritage assets, it was evident that the orientation of the developments, the distances involved, or the intervening built form or landscaping would avoid any cumulative impact.

8.201 From Anglesey Abbey, as evidenced by LVIA viewpoint P8, the Marleigh Development off Newmarket Road in Cambridge would have potentially a far greater impact on this high sensitivity heritage asset than the proposed Cambridge North development, which would have no impact. The potential impact from the cumulative project, however, was limited to that project alone and was not a cumulative impact from the additive effects of the Cambridge North project in conjunction with the Marleigh development. There are therefore no cumulative effects arising.

Table 8.5: Cumulative Effects Projects

PLANNING APPLICATION TYPE	APPLICATION NAME	SITE ADDRESS AND DISTANCE FROM SITE
Major development with planning consent which is either under construction or not yet commenced	21/02450/REM Reserved matters application detailing, appearance, landscaping, layout and scale for the construction of 421 new homes with associated infrastructure, internal roads and open space as part of Phase 2 pursuant to condition 5 (reserved matters) of outline planning permission S/2682/13/OL	Address: Land North of Newmarket Road Cambridge CB5 8AA Distance from Site: 1.94 km
Major development where a planning application has been submitted and information is in the public domain, but the application has not yet been determined	20/03524/FUL Upgrade to existing access roads and Cowley Road (as part of a wider proposal 20/03523/FUL for the erection of a 5-storey building and a 6-storey building for commercial/business purposes, erection of a transport hub, gymnasium, surface parking, landscaping and associated infrastructure including demolition of the existing building (St John's House) and associated structures).	Address: Land in The North West Part of The St Johns Innovation Park Cowley Road Cambridge CB4 0WS Distance from Site: 1.36 km

PLANNING APPLICATION TYPE	APPLICATION NAME	SITE ADDRESS AND DISTANCE FROM SITE
Major development proposals currently at scoping stage	21/04640/SCOP Request for a Formal Scoping Opinion for an Order granting Development Consent for the Cambridge Wastewater Treatment Plant Relocation (the Proposed Development) Cambridge Waste- Water Treatment Plant Relocation Horningsea Road Fen Ditton Cambridgeshire	Address: Cambridge Waste Water Treatment Plant Relocation, Horningsea Road Fen Ditton Cambridgeshire Distance from Site: 0.88 km
	17/1616/CTY EIA Scoping Opinion Waterbeach New Town Waterbeach Barracks and Airfield Site Waterbeach Cambridgeshire	Address: Waterbeach New Town Waterbeach Barracks and Airfield Site Waterbeach Cambridgeshire Distance from Site: 6.36 km

Monitoring

8.202 No likely significant effects are predicted and thus no specific monitoring is proposed. Routine monitoring of planning conditions and management of landscaping for example will be required to ensure that it becomes established and is properly maintained.

Summary of Impacts

8.203 The Proposed Development will result in no significant residual effects on the historic environment in the surrounding study area of the Site. There will be no significant adverse effects on the designated heritage assets during either the construction or operational phases of the development.

8.204 A summary of impacts can be found in the summary of impacts table (**Table 8.6**).

Table 8.6: Summary of Impacts Table: Cultural Heritage

DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION	IMPACT AFTER MITIGATION (RESIDUAL)			
				ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE		ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE
Visual intrusion of Construction Activities on Fen Ditton Conservation Area including the presence of cranes in the skyline, the visibility of floodlighting in the rural river landscape and noise disturbance in the tranquil river areas.	Loc	High	Neg	Adv	Rev	ST	Slight	Phasing of the works, careful management of the Site to maintain a tidy appearance and use of hoardings to create acceptable Site boundaries. Early establishment of trees.	Adv	Rev	ST	Min
Visual intrusion of Construction Activities on Riverside and Stourbridge Common Conservation Area including the presence of cranes in the skyline, the visibility of floodlighting in the rural river landscape and noise disturbance in the tranquil river areas.	Loc	High	Neg	Adv	Rev	ST	Slight	Phasing of the works, careful management of the Site to maintain a tidy appearance and use of hoardings to create acceptable Site boundaries. Early establishment of trees.	Adv	Rev	ST	Min
Urbanising effect of completed development affecting limited views of and from Fen Ditton Conservation Area, detracting from rural character and setting.	Loc	High	Neg	Adv	Irrev	LT	Slight	Careful articulation of building form, height management, use of neutral/muted material palette and sturdy materials which are characteristic of Cambridge. A robust soft landscaping strategy that includes significant tree planting to soften the development's edges, aiding the transition with the sensitive Fen Edge, assumed to be mature at 15 years.	Adv	Irrev	LT	Min

DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION	IMPACT AFTER MITIGATION (RESIDUAL)			
				ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE		ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE
Urbanising effect of completed development affecting limited views of and from Riverside and Stourbridge Common Conservation Area, detracting from rural character and setting.	Loc	High	Neg	Adv	Irrev	LT	Slight	Careful articulation of building form, height management, use of neutral/muted material palette and sturdy materials which are characteristic of Cambridge. A robust soft landscaping strategy that includes significant tree planting to soften the development's edges, aiding the transition with the sensitive Fen Edge, assumed to be mature at 15 years.	Adv	Irrev	LT	Min

Key:

Loc: Local
 Irrev: Irreversible
 Neg: Negligible
 Min: Minor
 Adv: Adverse
 ST: Short Term
 LT: Long Term

Ecology

9

9.0 Ecology

Introduction

- 9.1 This chapter of the Environmental Statement (ES) assesses the likely significant effects resulting from the construction and operation of the Proposed Development on ecology and nature conservation.
- 9.2 The aims of the ecology assessment are to:
- Identify relevant ecological features (i.e. designated sites, habitats, species or ecosystems) which may be impacted by the Proposed Development;
 - Provide an objective and transparent assessment of the likely ecological impacts and resultant effects of the Proposed Development. Impacts and effects may be beneficial (i.e. positive) or adverse (i.e. negative);
 - Facilitate objective and transparent determination of the consequences of the Proposed Development in terms of national, regional and local policies relevant to nature conservation and biodiversity; and
 - Set out what steps would be taken to adhere to legal requirements relating to the relevant ecological features concerned.
- 9.3 The Proposed Development site is located in Chesterton off Cowley Road, approximately 1 km south of the A14 in the northern part of Cambridge. The Site is located at approximate National Grid Reference 547500, 260900. The Site is irregular in shape and covers an area of approximately 10 ha.
- 9.4 The Proposed Development site is wholly within the former Chesterton Station Interchange area, which was subject to a successful application for Cambridge North Station, approved in 2016. An ES was produced in 2015 for this Development which included the Proposed Development site.
- 9.5 The Proposed Development site is currently occupied by the now operational Cambridge North Station and its car park and an interchange facility, the newly constructed hotel at 2 Cambridge Square, and the office building under construction at One Cambridge Square (both in Phase 1 of the Brookgate development) and well as remaining areas of disused and operational railway sidings and a waste transfer site (for aggregates/building material for re-use) and the aggregates handling yard.
- 9.6 The majority of the Site was in 2014/15 densely vegetated but areas have been disturbed or cleared and some of these areas have now been built on while other disturbed areas are regenerating naturally. This periodic clearance and regeneration is an ongoing feature of the Site and informs much of the ecology present.
- 9.7 This chapter summarises the information from ecological surveys contained within the Ecology Survey Report included in **Appendix 9.1**. The surveys summarised in **Appendix 9.1** are:
- Desk study information 2020;
 - Invasive Species Survey 2018;
 - Reptile Survey 2018;

- Reptile Translocation 2019;
- Breeding Bird Survey 2018;
- Breeding Bird Scoping Survey 2019;
- Bat Activity Survey 2018;
- Preliminary Bat Roost Assessment 2019;
- Bat Emergence Survey 2020;
- Invertebrate Survey 2020 and 2021;
- Detailed Botanical Survey 2020 and 2021; and
- Breeding Bird Surveys 2022 which are currently ongoing.

9.8 This chapter is also supported by the Ecological Design strategy in **Appendix 9.2** and the Cambridge North Biodiversity Net Gain Assessment Report in **Appendix 9.3**.

Potential Sources of Impact

9.9 The following impacts as identified during scoping (see Scoping Request and Scoping Opinion at **Appendix 2.1** and **Appendix 2.2** respectively) may result in significant impacts and have therefore been included within this assessment:

- Loss of Open Mosaic Habitat;
- Spread and management of invasive species;
- Loss of reptile habitat on-site and a small residual risk of reptiles being killed or injured during construction;
- Loss of bird nesting habitat and risk of nesting birds being disturbed during construction;
- Loss of bat commuting and foraging habitat;
- Loss of notable (previously county value) invertebrate habitat.

Planning Policy and Legalisation Context

9.10 The National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government 2021) sets out the national planning policies for England and the Government's desire to enable sustainable development. One of the overall aims of the NPPF is the planning system should aim to conserve and enhance the natural and local environment by minimising impacts on biodiversity and providing net gains in biodiversity where possible.

9.11 The UK Biodiversity Action Plan (UKBAP) (JNCC, 2011) was the UK Government's response to the Convention on Biological Diversity, which called for development and enforcement of national strategies and associated plans to identify, conserve and protect existing biological diversity and to enhance wherever possible. UK BAP priority species and habitats were those that were identified as being the most threatened and requiring conservation actions under the UK Biodiversity Action Plan. They were reviewed and updated in 2007 and now known as UK Priority Habitats and Species.

9.12 The Cambridgeshire and Peterborough Biodiversity Action Plans. The UK Priority Habitats and Species form the basis of the Cambridgeshire action plans with other locally important habitats and species. The Local Habitat and Species Action Plans were first produced in 1999 and reviewed in 2003 and 2008.

- 9.13 The South Cambridgeshire Local Plan 2018 sets out the planning policies and land allocations to guide the future development of the district up to 2031. Relevant policies include, SS/4 Cambridge Northern Fringe East and Cambridge North Railway Station and NH/4 Biodiversity, where new development must aim to maintain, enhance, restore or add to biodiversity.
- 9.14 The Greater Cambridge Biodiversity Supplementary Planning Document (2022) provides details on how policies seeking to ensure that biodiversity is adequately protected and enhanced throughout the development process will be implemented.
- 9.15 The Greater Cambridge Sustainable Design and Construction Supplementary Planning Document (2020) states that development proposals must demonstrate that they achieve a biodiversity net gain.

Emerging North East Cambridge Area Action Plan (NEC AAP)

- 9.16 The Proposed Submission version of the emerging NEC AAP (Regulation 19) was reported to the respective decision-making committees of the Councils over December 2021 to January 2022 and was approved for public consultation. However, the Proposed Submission Plan is not able to progress to public consultation until the Development Consent Order (DCO) process for the relocation of the Cambridge Waste Water Treatment Plant has concluded.
- 9.17 In May 2019 MKA Ecology Ltd was commissioned to undertake an ecological appraisal of North East Cambridge (NEC). The purpose of this assessment was to provide ecological and biodiversity information to support a developing Area Action Plan (AAP). The assessments included a Preliminary Ecological Appraisal of the North East Cambridge Area and the production of constraints and opportunities maps for the North East Cambridge Area
- 9.18 The overall aim of the assessment was to provide a biodiversity vision for NEC that can be incorporated into the developing AAP.
- 9.19 The Conservation of Habitat and Species Regulations 2019. This is the most recent legislation to implement in law European Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (Habitats Directive) adopted in 1992. The 2019 legislation supersedes earlier legislations which were subject to a series of amendments.
- 9.20 The Natural Environment and Rural Communities Act 2006 places a duty on all public authorities to have regard to the purpose of conserving biodiversity.
- 9.21 The Wildlife and Countryside Act 1981 (as amended) is the principal legislative protection for wildlife in England. It established protection for certain species of plants and animals and allows protection in law of various designated sites.

Consultations

Table 9.1: Consultation Responses Relevant to this chapter

DATE	CONSULTEE TYPE AND RESPONSE	POINTS RAISED	HOW AND WHERE ADDRESSED
3 rd February 2022	South Cambridgeshire District Council -EIA Scoping Response	Satisfied that 'open mosaic habitat' (OMH) has been appropriately identified, providing planning weight as both a UKBAP habitat and habitat of principle importance under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006.	Update survey information provided in Appendix 9.1 detailing the current value of 'open mosaic habitat' (OMH)
3 rd February 2022	South Cambridgeshire District Council -EIA Scoping Response	Note the ongoing survey effort on-site, some of the habitat and protected species surveys cited are over 2 years old and will require updating to inform the EIA.	Update survey information in provided in Appendix 9.1 . Detail on what further survey work wasn't needed also provided in the survey report.
3 rd February 2022	South Cambridgeshire District Council -EIA Scoping Response	The term 'wild habitat' requires further definition to understand the proposed habitat types, long term management and status. Support the 'wild habitat' identification as a sensitive lighting receptor. Would also request Bramblefields Local Nature Reserve (LNR) be considered in this category.	Further information is provided in the Ecological Design Strategy (Appendix 9.2) – although the specific term 'wild habitats' is not now used in the design. OMH provision north of Cowley Road will still be provided.
3 rd February 2022	South Cambridgeshire District Council -EIA Scoping Response	Support the proposed 10+ % BNG ambition for the Site. The proposed use of extensive biodiverse roof is supported, however, their suitability for many invertebrate groups associated with OMH requires consideration and may dictate the ultimate habitat condition scores within the BNG metric.	The sensitivity of the adjacent LNR is acknowledged and built into the design. To provide suitable habitat for many invertebrate groups in addition to roof OMH, ground based OMH creation has also been provided for.
3 rd February 2022	South Cambridgeshire District Council -EIA Scoping Response	Cumulative ecological effects of wider proposed AAP should be considered, particularly with regard habitat connectivity.	Scoring in the Metric reflects differences in OMH provision at ground level and at height of invertebrates. Cumulative impacts of the development have been considered in this chapter

Methodology

- 9.22 The assessment of ecological value and determination of effect significance has been undertaken with reference to Chartered Institute of Ecology and Ecological Management (CIEEM) Guidelines for Ecological Impact Assessment (2019).
- 9.23 This section sets out the methods used for identifying important ecological features that could be affected by the proposed works and how impacts have been assessed.
- 9.24 In line with the CIEEM guidelines, the terminology used within the chapter draws a clear distinction between the terms 'impact' and 'effect'. For the purposes of this chapter these terms will be defined as follows:
- Impact – actions resulting in changes to an ecological feature; and
 - Effect – outcome resulting from an impact acting upon the conservation status or structure or function of an ecological feature.
- 9.25 The impact assessment has also been undertaken in accordance with the following guidance, where relevant:
- British Standards Institution (BSI) (2013) Biodiversity – Code of Practice for Planning and Development BS42020:2013 (BSI,2013); and
 - CIEEM (2017) Guidelines for Preliminary Ecological Appraisal (CIEEM, 2017).

Study Area

- 9.26 For this chapter, a study area of the Cambridge North development boundary (plus a 2km buffer area for the data search) was used. The red line boundary for the Phase 1 Habitat Survey and protected species surveys is shown on **Figure 9.1**.

Baseline Studies

- 9.27 Information on the ecology and nature conservation within the desk study search area was collected through a detailed desktop review of existing datasets.
- 9.28 The Natural England GIS dataset of statutory designated sites was consulted to obtain boundary shapefile information on statutory designated sites within 2km of the Site. A search was made for details of any Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Ramsar Sites, National Nature Reserves (NNRs), Sites of Special Scientific Interest (SSSI's) and Local Nature Reserves (LNRs).
- 9.29 The Natural England (NE) website (<http://designatedsites.naturalengland.org.uk>) was consulted to obtain citations and information on the designated features of SSSIs and LNRs.
- 9.30 Ecological records within a 2km search area were requested and provided from Cambridgeshire and Peterborough Environmental Records Centre (CPERC) in June 2020. The data search was limited to protected species records recorded within the last ten years and sites of local nature conservation interest.
- 9.31 The review of previous ecological work undertaken on the Site, including the Environmental Statement 2015 was undertaken to assess what further survey work would be required.

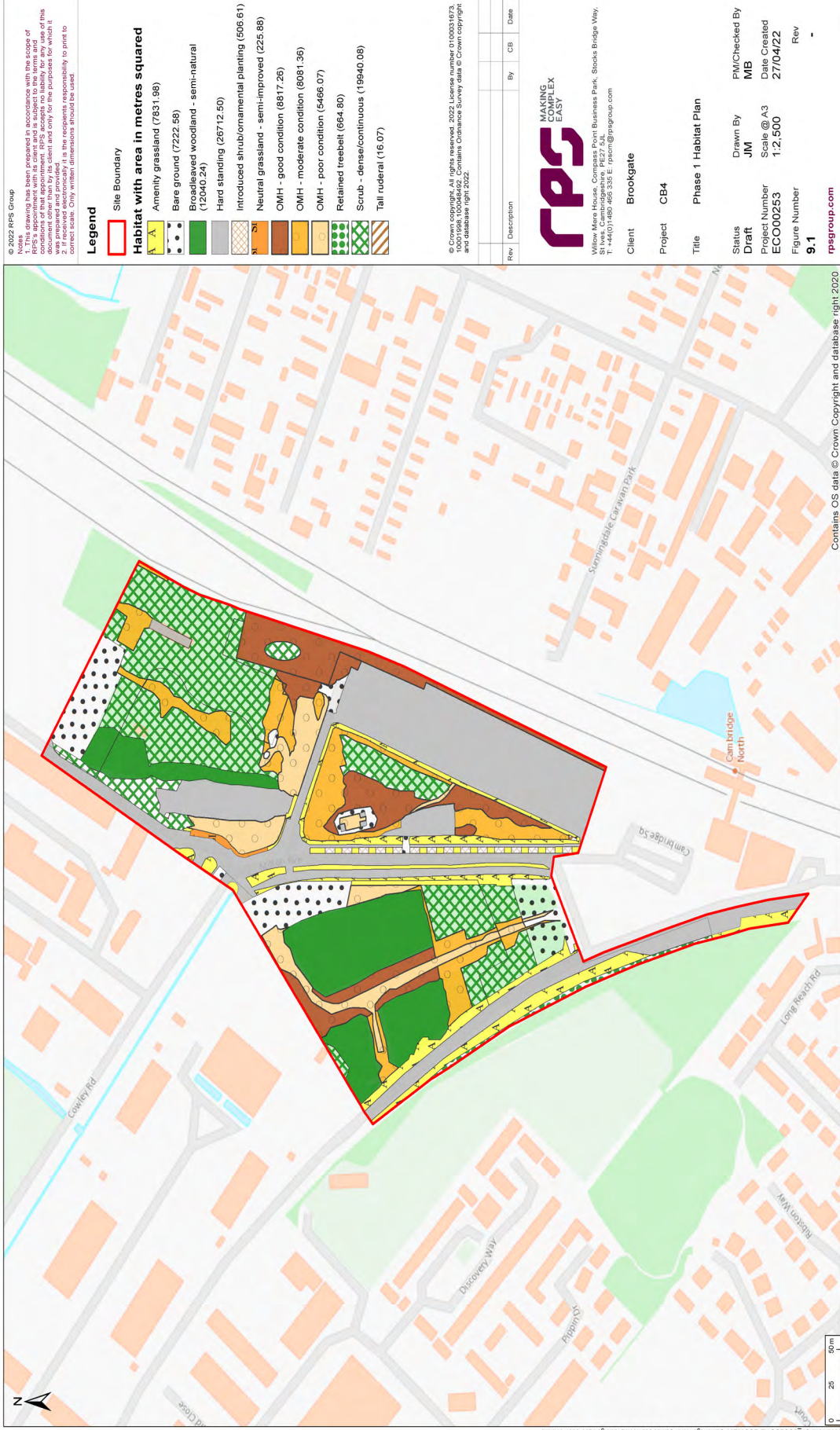


Figure 9.1: Phase 1 Habitat Plan

Site Specific Surveys

- 9.32 In order to inform the assessment, the Site-specific surveys listed below have been undertaken. These surveys have been undertaken following published guidance from the relevant body as a matter of best practice.
- 9.33 Based on the information from the desk study, Phase 1 Habitat Survey and previous survey work undertaken on-site, the following protected species were scoped out – amphibians, badger, dormouse, water vole and otter.

Invasive Species Survey 2018

- 9.34 A survey for invasive species was conducted on 2nd July 2018 following best practice as described by the Environment Agency (2006, amended in 2013), Royal Institute of Chartered Surveyors (RICS, 2012) and the Property Care Association (PCA, 2013).
- 9.35 The survey entailed a detailed search within the boundary of the Site including searching for signs of dead stems, old crowns or leaves, along with a careful search of the immediate surrounding vicinity and what could be seen of neighbouring properties.

Reptile Survey 2018

- 9.36 Artificial refugia in the form of sheets of roofing felt, approximately 0.5 m² in size, were placed in likely basking spots (for example, un-shaded patches next to cover, in areas of long grass and next to potential hibernation sites such as piles of rubble, logs or disused rabbit burrows). Surveys were undertaken in August and October 2018.
- 9.37 The Site was visited during suitable weather conditions. Each visit involved walking slowly around the entire site, checking suitable reptile basking and refuge areas and checking all the reptile sheets on-site.

Reptile Translocation 2019

- 9.38 A total of 84 sheets were set out in February 2019 and the Site was visited on 14 days in March during suitable weather conditions.

Breeding Bird Survey 2018

- 9.39 The breeding bird survey was based on a standard territory mapping methodology as outlined in Gilbert et al. (1998) and Bibby et al. (2000). Surveys for breeding birds were undertaken in June 2018.
- 9.40 The survey area was walked at a slow pace in order to locate and identify all individual birds. Visits were undertaken early in the morning, finishing before midday. The whole survey area was covered in each visit, using suitable optical equipment to observe bird behaviour and all areas of the Site were approached to within 50-100m, where possible.
- 9.41 On each visit, registrations were recorded directly into ESRI Arcpad GIS software loaded onto handheld PDA devices, with a 1:10,000 scale Ordnance Survey base map of the study area (and adjacent land). A fresh map was used for each survey. Registrations of birds were recorded using standard British Trust for Ornithology (BTO) two letter species codes (BTO 2009). Specific codes were also used to denote singing, calling, movement between areas, flight, carrying food, nest building, aggressive encounters and other behaviour.

- 9.42 Confirmed Breeding: includes species for which territories were positively identified as a result of the number of registrations, the location of an active nest, and the presence of recently fledged young or downy young.
- 9.43 Possible Breeding: includes species observed in breeding season in suitable nesting habitats or singing male present (or breeding calls heard) in breeding season in suitable breeding habitat.
- 9.44 Non-Breeding: fly-over species observed but suspected to be on migration, or species observed but suspected to be summering non-breeder.

Breeding Bird Survey 2019

- 9.45 A breeding bird scoping survey was undertaken on the 10th and 24th June 2019 in the area of the temporary carpark.

Bat Activity Survey 2018

- 9.46 Bat activity surveys consist of a walked route or transect around the Site to record bat activity. During the transect, the ecologist walks a planned route at constant speed (so the sampling area is the same per unit time) with the aid of a bat detector and appropriate recording equipment for ultrasonic sound. The ecologist will record observations such as numbers of bats, flight directions, behaviour (e.g. commuting or foraging) and relative speed and flight height.
- 9.47 Three dusk activity surveys were undertaken on-site in June, July and August 2018.
- 9.48 The transect route included all the habitat types encountered within the Site boundary to ensure an accurate representation of the bat species present on-site. Routes were slowly walked by an experienced surveyor, with regular stop points of five minutes to record the presence of bats. The number of bat contacts along the transect routes were recorded, together with the species and time of detection. All bat passes were recorded, and all bats were identified to species level on-site, where possible.
- 9.49 The dusk surveys commenced at sunset and lasted for 2 hours after sunset. The surveys were carried out following current guidelines (Collins, 2016).
- 9.50 Three static bat detectors were also deployed on-site on three occasions between June and August 2018. The detectors were programmed to switch on 30 minutes before sunset time and switch off 30 minutes after sunrise time. These devices are triggered to automatically record sounds within an appropriate frequency range to record bat calls. Data was analysed using Analook software, to identify bat species recorded in each survey location.

Preliminary Bat Roost Assessment 2019

- 9.51 A detailed bat preliminary roost assessment was carried out on the buildings and trees on-site by a qualified ecologist on the 7th of January 2020 following best practice as described by the Bat Conservation Trust (Collins, 2016), English Nature's Bat Mitigation Guidelines (Mitchell-Jones, 2004) and the Joint Nature Conservation Committee's Bat Worker's Manual (Mitchell-Jones & McLeish, 2004).
- 9.52 Trees were assessed for the potential to support bat roosts by checking for features such as holes, cavities or splits, and evidence like dark staining on a tree below a feature caused by the natural oils in the bats' fur, scratch marks around the feature or droppings below.
- 9.53 Trees' suitability for roosting bats was also assessed by examining the surrounding habitat. Important habitat features surrounding the structure which may influence roost potential include

whether the structure is in a semi-rural or parkland location, its proximity to significant linear habitat features such as a watercourse, mature hedgerow, wooded lane or an area of woodland.

Bat Emergence Survey 2020

- 9.54 Further to a Preliminary Ecological Appraisal (PEA) in May 2019 and a Preliminary Roost Assessment (PRA) in January 2020, RPS conducted several emergence/re-entry surveys on trees assessed as having potential to support roosting bats.
- 9.55 Two experienced bat surveyors, led by Matt Fasham, and two infra-red cameras paired with static detectors were positioned in multiple locations to ensure features suitable for supporting bats were covered in all locations.
- 9.56 Surveys were completed between August 2020 and September 2020 and included 3 dusk emergence surveys.

Invertebrate Survey 2020 and 2021.

- 9.57 The surveys were carried out over eight dates in August 2020, and May and June 2021.
- 9.58 The survey area was sampled using a sweep net and by general searching. During the sweep netting, the net was swept from side to side as the surveyor paced slowly through the survey area. Specimens were extracted from the net potted into 30ml soda glass tubes. The contents were killed with ethyl acetate and the tubes labelled. A limited ground search was undertaken in the open, sparsely vegetated areas.

National Vegetation Classification Survey 2020 and 2021.

- 9.59 A number of Phase 1 Habitat surveys have been undertaken on the application site since April 2012. This includes update surveys undertaken in September 2013, April 2015, April 2017, October 2019, and July 2021. Detailed botanical surveys were undertaken in August 2017, June 2018, October 2019 and July 2021.
- 9.60 The appropriate 'Condition sheet' was first selected via the Table TS1-1 in the technical supplement provided by Crosher et al. (2019).
- 9.61 The condition sheet was then used to assess the individual habitats by comparing how they scored against pre-set condition assessment criteria. The criteria describe what components are needed for the habitat to be of good, moderate or poor value

Breeding Bird Surveys 2022

- 9.62 The Breeding Bird survey is in the process of being updated as there is anecdotal evidence that a pair of Black Redstart are being regularly sighted in the area. The breeding bird survey will be based on a standard territory mapping methodology as outlined in Gilbert et al. (1998) and Bibby et al. (2000). Surveys for breeding birds are being undertaken between May and July 2022. The results of these, together with any implications for the likely significant effects, will be provided in an ES Addendum.

Data Limitations

- 9.63 The reptile survey did not cover the dense scrub on-site due to the lack of suitable basking areas, but reptiles are likely to utilise these areas while foraging, hibernating and when dispersing to other areas on-site. The scrub contains a number of wooden sleepers, stumps and debris piles that are potential hibernacula.

- 9.64 Since the breeding bird surveys were conducted in June 2018, it is possible that some species breeding earlier in the season could have been missed.
- 9.65 The bat activity data results show a number of contacts for different bat species. It is important to understand that the number of contacts does not equate to number of individual bats, as several contacts can be generated by one bat flying past the surveyors several times. Instead, number of contacts provides an index of bat activity, which can be used to identify areas of habitat of greater or lesser importance for bats.
- 9.66 Bats can have seasonal use of roosts and being so mobile may arrive and start using a site after it has been surveyed, or roost somewhere else during the period it was surveyed. Additionally, features in trees can change rapidly, potentially becoming more suitable as time passes.
- 9.67 Much of the invertebrate survey area is covered by dense birch and willow scrub, so sampling was confined to the open mosaic areas and the scrub margins. Over the winter 2020-21 much scrub was cleared from large areas leaving bare substrate with limited habitat remaining to sample. The Site was visited mid-August 2020 and early and late May 2021. Four days allows good coverage across the season, although the potentially important late June to July period was not covered.

Assessment Criteria and Assignment of Significance

- 9.68 The significance of likely effects has been assessed in the context of the baseline condition taking into account any anticipated changes in the baseline that may occur prior to the commencement of the Proposed Development.
- 9.69 The assessment of the ecological effects of the Proposed Development focusses on Important Ecological Features (IEFs). These are species and habitats that are valued in some way and could be affected by the development. Other IEF may be present on or in the vicinity of the Site but do not need to be considered because there is no potential for them to be affected significantly. The interaction between IEF sensitivity and impact magnitude informs the overall significance of effect.
- 9.70 Once the importance of the ecological features was understood, and impacts on the features were characterised, the significance of the effect has been assessed.
- 9.71 Proposals that could result in cumulative impacts have been identified through the scoping process. Cumulative impacts have been addressed through consideration of the potential for nearby schemes to result in impacts on ecological features identified in the assessment.

Receptor Sensitivity/Value

- 9.72 The approach to the assessment of the sensitivity and value of IEFs has considered the conservation status and importance of the feature present on the Site or within surrounding zones of influence.
- 9.73 The resources used to assess the value and importance of features also help to define their importance within a geographical context. The CIEEM guidelines (CIEEM, 2018) state that the significance of effects on ecological features should be qualified with reference to the appropriate geographic scale. Therefore, to provide a framework that is consistent for both assessing the importance of ecological features and determining the significance of effects,

the importance of ecological features is described at one of the following geographic scales described in **Table 9.2**.

Table 9.2: Definitions of Sensitivity or Value

SENSITIVITY	TYPICAL DESCRIPTORS
Very High (International)	A feature (e.g. habitat or population) which is either unique or sufficiently unusual to be considered as being one of the highest quality examples in an international/national context, such that the Site is likely to be designated as a site of European importance (e.g. a SAC). Habitats or species that form part of the cited interest within an internationally protected site, such as those designated under the Habitats Directive (e.g. SACs) or other international convention (e.g. Ramsar site).
High (National)	Habitats or species that form part of the cited interest within a nationally designated site, such as a SSSI or a NNR. A feature (e.g., habitat or population) which is either unique or sufficiently unusual to be considered as being one of the highest quality examples in a national context for which the Site could potentially be designated as a SSSI. Presence of UKBAP habitats or species, where the action plan states that all areas of representative habitat or individuals of the species should be protected, including national importance.
Medium (Regional)	Including regional or county importance. A feature (e.g. habitat or population), which is either unique or sufficiently unusual to be considered as being of nature conservation value from a county to regional level. Habitats or species that form part of the cited interest of a LNR, or some local-level designated sites, such as a Local Wildlife Site (LWS), also referred to as a non-statutory Site of Importance for Nature Conservation (SINC) or the equivalent, e.g., Ancient Woodland designation. Presence of Local Biodiversity Action Plan (LBAP) habitats or species, where the action plan states that all areas of representative habitat or individuals of the species should be protected.
Low (Local)	A feature (e.g. habitat or population) that is of nature conservation value in a local context only, with insufficient value to merit a formal nature conservation designation. This would include features of local importance.
Negligible (Site)	This would include features of site level importance.

- 9.74 The valuation of sites takes full account of existing value systems such as SSSIs and LWS designations. Judgement is required for the valuation of sites of less than county importance.
- 9.75 The valuation of habitats considers parameters including extent, diversity, naturalness, rarity, fragility, typicalness, recorded history, position in an ecological or geographical unit, current condition and potential importance.
- 9.76 Criteria for the valuation of habitats and plant communities include Annex III of the Habitats Directive, guidelines for the selection of biological SSSIs and criteria used by local planning authorities and the Wildlife Trusts for the selection of local sites. Legal protection status is also a consideration for habitats where these are features of statutory designated sites.
- 9.77 Species populations are valued on the basis of their size, recognised status (such as recognised through published lists of species of conservation concern and designation of BAP

status) and legal protection status. For example, bird populations exceeding 1% of published information on biogeographic populations are considered to be of international importance, those exceeding 1% of published data for national populations are considered to be of national importance, etc.

- 9.78 In assigning importance to species populations, it is important to consider the status of the species in terms of any legal protection to which it is subject. However, it is also important to consider other factors such as its distribution, rarity, population trends, and the size of the population which would be affected. Thus, for example, whilst GCN is protected under the Habitats Directive, and therefore conservation of the species is of significance at the international level, this does not mean that every population of GCN is internationally important and thus, of very high value. It is important to consider the particular population in its context. Thus, in assigning values to species the geographic scale at which they are important has been considered. The assessments of value rely on the professional opinion and judgement of experienced ecologists.
- 9.79 Due regard has been paid to the legal protection afforded to such species in the development of mitigation measures to be implemented during construction and operation of the project. For European Protected Species (EPS) there is a requirement that a scheme should not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range, i.e. to maintain favourable conservation status, a scheme should not affect the long-term availability of sufficient habitat required by the population, the long-term viability of the population, or the long-term natural range of the species.
- 9.80 Assessing feature values requires consideration of both existing and future predicted baseline conditions, and therefore, the description and valuation of ecological features takes account of any likely changes, including trends in the population size or distribution of species, likely changes to the extent of habitats and the effects of other Proposed Developments or land use changes.

Magnitude of Impact

- 9.81 Impacts may be described in terms of changes to the structure or function of an ecological resource and are characterised according to a number of parameters where these are relevant to understanding ecological effects. These parameters include:
- Type of impact - beneficial or adverse;
 - Extent – the geographical range of the impact;
 - Magnitude – the size of the impact in terms of the amount the feature is affected;
 - Reversibility of the impact – whether the impact is naturally reversible or reversible through mitigation measures;
 - Timing of frequency of the impact, in relation to ecological changes; and
 - Likely duration of the impact – short-term (< 1 year), medium-term (< 5 years) or long-term (5 or more years).
- 9.82 **Table 9.3** gives the magnitude categories and descriptors used in this assessment, taking into account the CIEEM guidance.

Table 9.3: Definitions of Magnitude

SENSITIVITY	TYPICAL DESCRIPTORS
Major	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements (Adverse).
	Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial).
Moderate	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements (Adverse).
	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial).
Minor	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements (Adverse).
	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial).
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse).
	Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial).
No change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.

Significance of Ecological Effects

- 9.83 Having followed the process of assessing the importance of the feature and quantifying the magnitude of impact (through consideration of the sensitivity of the feature and duration of effect), the final stage of the EIA process is to establish the significance of the impact.
- 9.84 An ecologically significant effect is defined as an impact on the integrity of a defined site or ecosystem and/or the conservation status of habitats or species (CIEEM, 2018). The effect is assessed within a specific geographic context, i.e. at the scale at which the ecological feature was valued (e.g. local/national/international).
- 9.85 **Table 9.4** shows the assessment matrix used to guide the assessment of significance. The terminology used in the matrix is based on CIEEM guidance and therefore varies slightly from the matrix used in Chapter 2.

Table 9.4: Matrix for Determination of Significant Effects

SENSITIVITY	MAGNITUDE OF IMPACT			
	Negligible	Minor	Moderate	Major
Negligible	Negligible	Negligible or minor	Negligible or minor	Minor
Low	Negligible or minor	Negligible or minor	Minor	Minor or moderate
Medium	Negligible or minor	Minor	Moderate	Moderate or major

SENSITIVITY		MAGNITUDE OF IMPACT		
High	Minor	Minor or moderate	Moderate or major	Major
Very high	Minor	Moderate to major	Major to substantial	Substantial

9.86 Using the above matrix, further consideration is then given to the following:

- Substantial: Only adverse effects are normally assigned this level of significance. They represent key factors in the decision-making process. These effects are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change in a site or feature of local importance may also enter this category;
- Major: Effects are likely to be important considerations at a regional or district scale but which, if adverse, are potential concerns to the Project, depending upon the relative importance attached to the issue during the decision-making process;
- Moderate: Effects, if adverse, while important at a local scale, are not likely to be key decision-making issues. Nevertheless, the cumulative effect of such issues may lead to an increase in the overall effects on a particular area or on a particular resource;
- Minor: Effects may be raised as local issues, but which are unlikely to be of importance in the decision-making process. Nevertheless, they are of relevance in the detailed design of the Project; and
- Negligible: No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

9.87 For the purpose of this assessment, any effects with a significance level of minor or less are not considered to be significant in terms of the EIA Regulations.

Cumulative Effects

9.88 Other Proposed Developments that could result in cumulative impacts (when considered alongside this project) have been identified through the scoping process. Cumulative impacts have been addressed through consideration of the potential for other Proposed Developments to result in impacts on ecological features identified in the assessment, and which could contribute to the combined impact on that feature, that would be greater than that anticipated from the project alone. The cumulative effects are presented later in this chapter.

Baseline Conditions

9.89 The sections below describe the current baseline as derived from the desk study and surveys undertaken in 2018, 2019, 2020 and 2021.

Designated Sites

9.90 There are 13 statutorily designated sites for nature conservation value within 2 km of the Site. The closest of these is Bramblefields Local Nature Reserve, approximately 0.45 km from the Site.

9.91 Eleven non-statutory sites are located within the 2 km search radius of the Site. The closest of these is the Milton Road Hedgerows City Wildlife Site (CiWS), located 0.25 km from the Site.

9.92 A summary of these sites is provided in **Table 9.5** below and the location of each site is detailed in **Figure 9.2**.

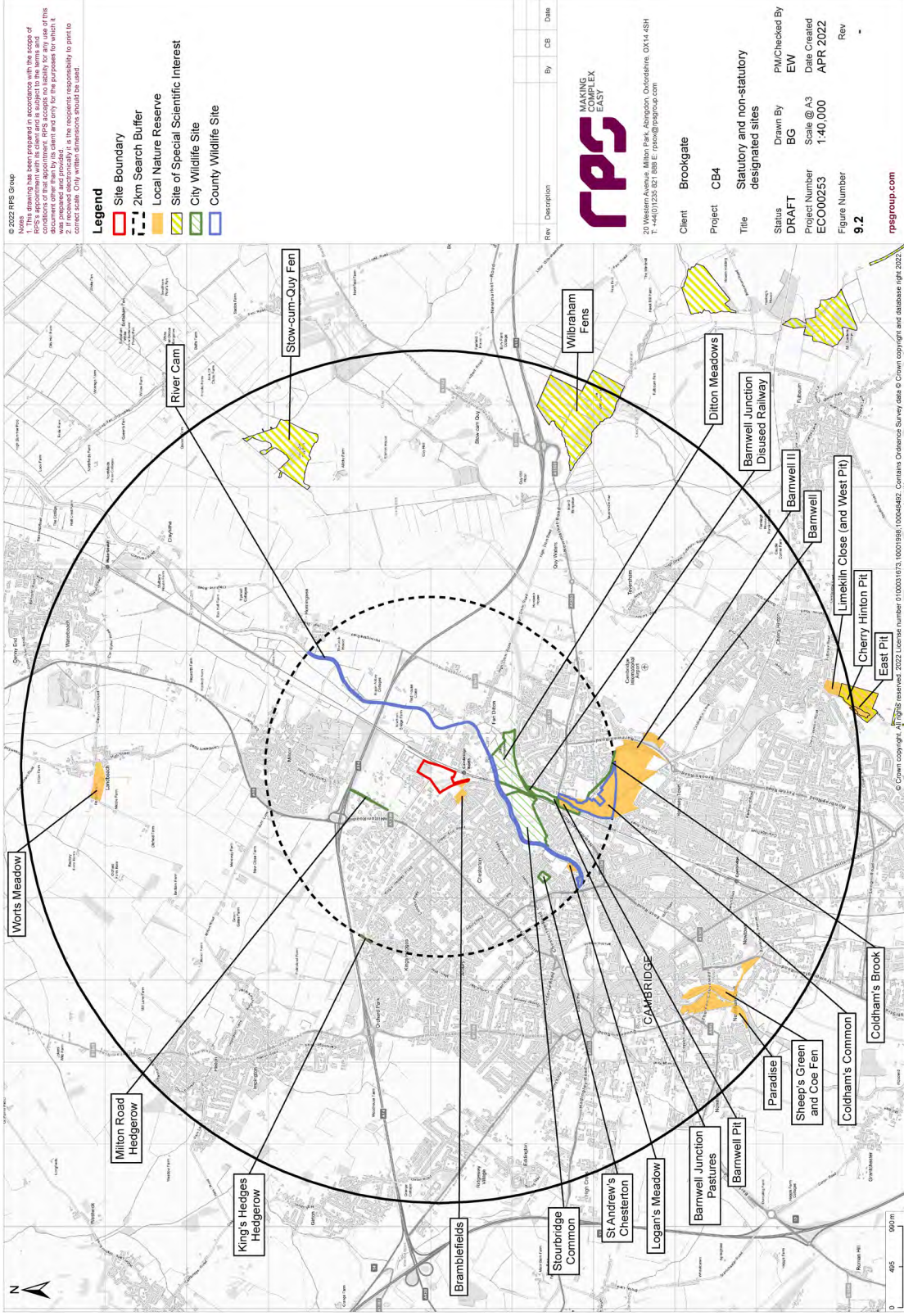


Figure 9.2: Statutory and Non-Statutory Designated Sites

Table 9.5: Summary of Statutory and Non-Statutory Sites in Relation to the Proposed Development Site

SITE NAME	TYPE	APPROX. AREA (HA)	INTEREST FEATURES	DISTANCE FROM SITE (KM)
Statutory Sites				
Bramblefields	LNR	2.08	The Site is mixture of grassland and scrub and also contains a pond in which with newts and frogs. The Site is noted for its bird population, Song Thrush <i>Turdus philomelos</i> in particular.	0.45
Coldhams Common	LNR	49.28	Areas of unimproved grassland. These areas contain the ant hills of Yellow Meadow Ants <i>Lasius flavus</i> and are an indication that the Site has never been ploughed. Management encouraging species such as the Pyramidal Orchid <i>Anacamptis pyramidalis</i> may appear which is found on other parts of the common.	1.31
Logan's meadow	LNR	1.11	Small site next to the River Cam. Wildlife includes warblers <i>Sylviidae</i> , starting roost in autumn, small tortoiseshell <i>Aglais urticae</i> and comma butterflies <i>Polygonia c-album</i> , freshwater mussels in the river and bats.	1.71
Barnwell II West	LNR	3.75	The wildlife corridor formed along the Coldham Brook has valuable habitats used by a variety of birds. The Brook is managed to encourage water voles <i>Arvicola amphibius</i> . Species include blackthorn <i>Prunus spinosa</i> , hawthorn <i>Crataegus monogyna</i> and wild rose <i>Rosa sp.</i> Scrub. Birds include kingfishers <i>Alcedo atthis</i> , nightingales <i>Luscinia megarhynchos</i> , redwings <i>Turdus iliacus</i> and fieldfares <i>Turdus pilaris</i> . Invertebrates include speckled wood <i>Pararge aegeria</i> , and orange tip butterflies <i>Anthocharis cardamines</i> , dragonflies <i>Anisoptera sp.</i> And damselflies <i>Zygoptera sp.</i>	1.04
Barnwell	LNR	2.61	Habitats include grassland, scrub and pond. Species include blackthorn, hawthorn and wild rose scrub. Bee orchids <i>Ophrys apifera</i> in early summer. Birds include blackcap <i>Sylvia atricapilla</i> , willow warblers <i>Phylloscopus trochilus</i> , redwings and fieldfares. Frogs and toads breed on site and grass snakes <i>Natrix natrix</i> occur. Butterflies include common blue <i>Polyommatus icarus</i> and meadow brown <i>Maniola jurtina</i> .	2.39
Stow-cum-Quy Fen	SSSI	29.86	Stow cum Quy Fen possesses areas of floristically rich calcareous loam pasture. In addition, a number of pools formed on Chalk Marl are present and these support a range of aquatic plants including some uncommon species. Both the grassland and open water habitats described above are rare in the British Isles	3.63
Sheeps Green and Coe Fen	LNR	16.87	The main habitat of Sheep's Green and Coe Fen is improved or semi-improved grassland. There are some clumps of bramble and other shrubs and hedges adding structural variation, shelter and a food source for birds, small mammals and insects.	3.83
Wilbraham Fens	SSSI	61.99	The Site is a large area of fen and neutral grassland with associated scrub and open water communities. Similar fens are now rare in Britain and now occur only in a few scattered inland localities, mainly in East Anglia.	3.93
Worts Meadow	LNR	5.65	The main wildlife interest is to be seen during the summer months when the hedges provide habitat for yellowhammers <i>Emberiza ironella</i> , and whitethroats <i>Sylvia communis</i> and turtle dove <i>Streptopelia turtur</i> .	3.96
Paradise	LNR	2.19	This woodland contains a central marsh area, wet woodland and a number of riverside mature willows. Notable species include Butterbur <i>Petasites hybridus</i> and the Musk beetle <i>Aromia moschata</i> .	4.36

SITE NAME	TYPE	APPROX. AREA (HA)	INTEREST FEATURES	DISTANCE FROM SITE (KM)
Limekiln Close (and West Pit)	LNR	2.86	Undulating terrain as these sites were quarries in the past and are now important grassland habitats. There is some scrub. Chalk grassland flowers include meadow cranesbill. The rare moon carrot is found at West Pit LNR. Birds include warblers and breeding sparrow hawks <i>Accipiter nisus</i> .	4.69
East Pit	LNR	12.94	The quarry supports a variety of habitats that harbour some rare plants and insects. The steep cliffs surrounding the exposed chalk and scrub providing nesting and feeding sites for more than 60 species of bird.	4.84
Cherry Hinton Pit	SSSI	12.78	This area is primarily notified for the populations of four nationally uncommon plant species which occur on the Site. These are great pignut <i>Bunium bulbocastanum</i> , moon carrot <i>Seseli libanotis</i> , perennial flax <i>Linum perenne</i> ssp. <i>Anglicumand</i> and grape hyacinth <i>Muscari neglectum</i> . In addition, areas of herb-rich chalk grassland are present, and these represent a habitat type which has almost disappeared from the eastern counties of England.	4.85
Non-statutory Sites				
River Cam	CoWS	N/A	Is a major river (together with adjacent semi-natural habitat) that has not been grossly modified by canalisation and/or poor water quality. Additionally, it has areas with concentrations of mature pollard willows.	0.41
Ditton Meadows	CoWS	15.96	Lies within the flood plain of the River Cam. Central drain qualifies as species rich linear water body and also for NVC S6 Greater Pond-sedge swamp. Coldham's Brook qualifies as unmodified chalk stream.	0.54
Milton Road Hedgerows	CoWS	0.25	Site qualifies for its potential value as it just misses criteria for hedgerows and is likely to meet them in the future.	0.65
Stourbridge Common	CoWS	17.76	Area of undeveloped floodplain directly associated with the River Cam County Wildlife Site.	0.66
Barnwell Junction Disused Railway	CoWS	0.58	Hedgerow at least 100m in length and 2m in width at widest point with 4 or more woody species. Also satisfies criteria for calcareous and neutral grassland.	0.83
Barnwell Junction Pastures	CoWS	2.32	Neutral grassland with two or more strong neutral grassland indicator species in frequent numbers.	0.91
Barnwell Pit	CoWS	2.45	Calcareous grassland with six or more calcareous grassland indicator species in frequent numbers.	1.3
Coldham's Brook	CoWS	0.95	Chalk stream together with adjacent semi-natural habitat that has not been grossly modified through canalisation and/or poor water quality.	1.31
Coldham's Common	CoWS	41.53	Locally frequent numbers of at least 8 neutral grassland indicator species, 3 strong; habitat mosaic >10ha supporting three habitats (semi-improved grassland, woodland, scrub) in close association, at least one of which is of or approaching CWS standard.	1.31
King's Hedges Hedgerow	CoWS	0.08	Supports hedgerow at least 100m in length and 2m in width at its widest point with four or more woody species, and with at least part of the hedge allowed to flower and fruit.	1.99
StAndrew's, Chesterton	CoWS	1.02	Qualifies for its potential value as it supports grassland with five or more neutral grassland indicator species but not in sufficient numbers to qualify.	1.53

Habitats within the Site

9.93 The habitats outlined below follow that of UK habitat classifications (UK Hab).

U1a – Urban, Open Mosaic Habitats on Previously Developed Land (OMH) (Area 22,364.69m², 22.93% of site)

9.94 Large areas of open mosaic habitat (OMH) were identified across the Site. These are located to the north east of the Site and west of the Site within disturbed areas of ground. The species composition was consistent across all areas of OMH with dominant species such as wild carrot *Daucus carota*, teasel *Dipsacus fullonum*, hairy Willowherb *Epilobium hirsuta*, perforate St johns-wort *Hypericum perforatum*, Cat's ear *Hypericum perforatum* and purple toadflax *Linaria purpurea*. A full species list is provided in **Appendix 9.1**.

9.95 Two notable species were identified within the OMH, lesser calamint *Clinopodium calamintha* designated as 'Vulnerable' and 'Nationally Scarce', and burmuda grass *Cynodon dactylon* designated as 'Nationally Rare'. The OMH across the Site varied in condition, as detailed below.

Poor Condition, Recovering.

9.96 OMH west of the informal car parking area was in moderate condition, previously disturbed 2017/2018 and now is recovering. No mulleins, evening primrose or other OMH perennial plant community species (e.g. legumes/labiates) were present. Any areas of OMH comprising of compacted track barely vegetated with mainly moss was also considered to be a poor condition, recovering.

Poor Condition

9.97 Areas of recently bare ground which was disturbed in 2018/2019 so considered poor condition OMH and still comprises mostly bare ground. Few taller herb spp. present, mainly docks and no St John's-wort yet and no OMH perennial plant community species present (mulleins/evening primrose/legumes/labiates). Areas comprising of recently disturbed OMH (2015-2018) with sea buckthorn establishing. Also some areas of scattered young buddleia but the range of OMH perennial plant community species present is poor only including tares and St John's-wort.

Moderate Condition, Recovering

9.98 OMH previously disturbed in 2017/2018 but now with St John's-wort and other early successional plants coming back. Few/no OMH perennial plant community species present (mulleins/evening primrose/legumes/labiates) better range of annual species present.

9.99 Recently disturbed (2018), recovering OMH with little or no buddleia, willow and birch. The typical range of OMH perennial plant community species is present and scrub species are absent.

Moderate Condition

9.100 Areas of OMH recovering from station construction disturbance during 2015-18. More bare ground present, approximately 30%+ than the less disturbed areas to the east and a typical range of OMH perennial plant community species present and scrub species absent.

Good Condition

9.101 Areas of OMH not recently disturbed with scattered young buddleia (a good marker for disturbance) as well as a range of OMH perennial plant community species present (occasional mulleins/legumes/labiates) including also tares, and evening primrose.

- 9.102 Areas of OMH with full range of OMH perennials including mulleins, evening primrose, St John's-wort and tares/vetches. Also present are occasional young buddleia, birch and willows. These areas were less disturbed in station construction during 2015-2018.

U – Urban, Amenity Grassland (Area 8,073.93m², 8.28% of site)

- 9.103 Verges along the road consisted of amenity grassland. Species here included yarrow *Achillia millefolium*, scarlet pimpernel *Anagalis arvensis*, Yorkshire fog *Holcus lanatus* and cats ear *hypocharies radicata*.

Poor Condition.

- 9.104 Amenity grassland re-seeded by Network Rail (NR) but not maintained and recently (2019) disturbed by passing HGV's so soil is churned up and muddy. Little remaining grass cover, but still present. There are few flowering perennials associated with the OMH plant communities (or grassland indicator spp), rather a mix of vigorous weed species such as abundant dock spp., with thistle spp. re-establishing bramble from the adjacent scrub patch (undesirable species – in condition table). As the grasses decrease in abundance it merges into the tall herb ruderal habitat to the south.

U1b – Urban, Developed Land, Sealed Surface (Hard Standing) (Area 26,712.50m², 27.39% of Site)

- 9.105 Areas of hard standing consisted of road and pedestrian walkways running through the centre of the Site.

U1c – Urban, Artificial Unvegetated, Unsealed Surface (Bare Ground) (Area 7,222.58 m², 7.40% of Site)

- 9.106 Multiple areas of bare ground were identified. These were used as material storage and parking for construction works.

Poor Condition

- 9.107 The Volker Fitzpatrick site compound/car parking area with compacted gravel bare ground, now being re-used as a contractor's car park. Bare ground with little or no vegetation cover, given the compaction and the current use by vehicles.

- 9.108 New bare ground pile of aggregate rubble/materials - unvegetated.

- 9.109 New aggregate track so mostly bare ground 80%, some buddleia and bramble growing through the gravel and is starting to re-establish some characteristics of OMH. Bare ground. Pile of aggregate – unvegetated.

- 9.110 Compacted access track – 80% bare ground, with moss regenerating as disturbance pressure has been removed in 2019. Dense scrub was cleared February 2019 and has regenerated into scattered birch and willow scrub. These are young shoots from remaining stumps of birch and some willow and sea buckthorn. Abundant bramble and a rather sparse ground flora with occasional reed sweetgrass and leaf litter.

H2h – Heath, Mixed Scrub (Area 20,446.69m², 20.97% of Site)

- 9.111 Multiple areas of mixed scrub were identified across the entirety of the Site. The more significant areas were to the north east and south of the Site.

9.112 The species here varied between the two areas with dormant species to the north east including silver birch *Betula pendula*, downy birch *Betula pubescence*, dog rose *Rosa canina* and buddleia *Buddleia davidii*.

9.113 The area of scrub to the south also consisted of these species however with the addition of sea buckthorn *Hippophae rhamnoides* a notable species designated as 'Nationally Scarce'.

Poor Condition

9.114 Dense scrub patch with young birch establishing. Dominated by bramble, with frequent buddleia and occasional sea buckthorn. Little to no ground flora under the dense growth.

9.115 Dense scrub with young birch establishing. Dominated by even aged bramble, with frequent buddleia and occasional willow and sea buckthorn. Little ground flora under the dense growth. Birch dominated dense scrub 80%+ with bramble/buddleia understorey and occasional willow.

W1g– Woodland, Other woodland, Broadleaved (Area 12,705.54m², 13.03% of site)

9.116 Three blocks of woodland were identified to the west of the Site. These areas were of planted origin with the vast majority of trees being of a similar size and age. The dominant species were downy birch with other species such as sycamore *Acer pseudoplatanus*, dogwood *Cornus sanguinifolia*, and *Salix caprea*. A few large trees were also identified, these were ash *Fraxinus excelsior* and weeping willow *Salix babalonica*.

Poor Condition

9.117 Young birch dominated woodland grading to south into dense birch scrub. Less willow and alder in these patches, up to 80% + birch cover (both sides of track). Bramble dominated understorey and species-poor ground flora.

Moderate Condition

9.118 Tree line of more mature birch (15-20 years approx.) in a tree belt 4-5m wide. So young open woodland with a dense bramble understorey, mixed with frequent buddleia and a very limited ground flora due to shading from the bramble.

9.119 Young birch/alder woodland with willow, bramble and buddleia understorey and species-poor ground flora.

9.120 In terms of habitats of value, the following habitats are considered to have value at greater than site level. Open Mosaic Habitat. These habitats can be extremely diverse and occur on a wide range of sites and show evidence of previous disturbance with spatial variation developing across the Site. This type of habitat can support a rich assemblage of invertebrates. Open mosaic habitats on previously developed land is a UK Biodiversity Action Plan (UK BAP) Priority habitat listed on section 41 of the Natural Environment and Rural Communities Act 2006.

9.121 No other habitat types are considered to be of importance at more than site level.

Species

9.122 For full information on baseline ecological surveys, refer to CB4 Phase 2 Survey Report. (**Appendix 9.1**) The sections below summarise the key species groups.

Invasive Species

9.123 No Schedule 9 invasive species were found to be present within the boundary of the application site. *Cotoneaster Cotoneaster sp*, a Schedule 9 NNIS was recorded external but adjacent to the

Site. As the area is currently well managed, spread of this species is contained and no further action is necessary. Management of these areas should be maintained.

- 9.124 Tree of Heaven *Ailanthus altissima* was recorded within the Site boundary. This species is located in the north-east corner of the Site. Tree of Heaven is not currently listed as a Schedule 9 NNIS but can be highly invasive in an unmanaged setting and should be controlled (see below).
- 9.125 Buddleia *Buddleja davidii* is present throughout the Site. Whilst this species is not a Schedule 9 NNIS, it is considered invasive due to its quick spreading nature. Control is therefore recommended.

Reptiles

- 9.126 During the initial reptile surveys, it was found that the Site supported a low population of grass snake *Natrix natrix* and a low/medium population of common lizard *Zootoca vivipara* and both were considered to be of district importance.
- 9.127 A translocation was undertaken, and the reptiles found on-site during a later survey were considered to be a remnant population. This relict population is considered of importance at a site level only.
- 9.128 The hard standing on the north of the Site is not suitable to support reptiles. The Open Mosaic Habitat around the scrub on-site is of limited suitability for reptiles as the stony substrate provides little cover.

Birds

- 9.129 A total of 29 species were recorded on-site with 12 species confirmed as breeding and 1 possibly breeding within the survey area.
- 9.130 Two of the confirmed breeding species, Dunnock and Song thrush are listed as UK BAP priority species. 1 species, Song thrush, is included in the BoCC Amber list and 1 species, Dunnock, on the Red list.
- 9.131 The breeding bird assemblage is considered to be of low local importance.

Bats

- 9.132 No bat species were recorded within trees T1 or T2 on-site during the 2020 survey. The locations of these trees are shown on **Figure 2.1** within the CB4 Phase 2 Survey Report (**Appendix 9.1**) Three species of bat were recorded commuting/foraging through and within the Site. These included common pipistrelle *Pipistrellus pipistrellus*; soprano pipistrelle *Pipistrellus pygmaeus* and noctule *Nyctalus noctula*.
- 9.133 The two buildings on-site were classed as having low potential (small brick building to the west) and negligible potential (large open shed). However, neither building will need to be demolished for the development but only as part of the final layout for the Wild Park public open space. Commuting and foraging habitats on-site were assessed in accordance with Wray *et al.* (2010) with the common and soprano pipistrelle commuting and foraging habitat as having District, Local or Parish level importance and noctule commuting and foraging habitat as having County importance.
- 9.134 No evidence of bat roosts was found during the surveys.

- 9.135 The timing of the first contacts of common pipistrelle after sunset on the second and third survey suggests that these bats were not roosting close to the Site. However, during the first survey the timing of the first bat contact of common pipistrelle after sunset suggests that this bat was roosting in close proximity to the Site.
- 9.136 The data from the static detectors support the conclusion of the activity surveys that the most commonly encountered bats on-site are common pipistrelle, soprano pipistrelle and noctules.
- 9.137 Nathusius' pipistrelle *Pipistrellus nathusii* bats were recorded in June and September and both Brown long-eared *Plecotus auritus* and Serotine *Eptesicus serotinus* bats were recorded in July. Three contacts from an unknown Myotis bat were recorded in September. Common and Soprano pipistrelle contacts comprised nearly all the total contacts recorded. Therefore, it is considered that the other species are only sporadically using the Site.
- 9.138 The hardstanding and roads are considered to have little potential to support foraging bats. However, the vegetated areas are considered to have low to moderate bat foraging potential. The Site does not contain linear features such as tree lines or hedgerows which would provide good value commuting habitat for bats, although the pockets of scrub are likely to benefit bats commuting between areas of more favourable habitat in the wider area. The results suggest that the Site is not used by large numbers of foraging or commuting bats.
- 9.139 Overall the Site is considered to be of local value for foraging bats.

Invertebrates

- 9.140 A 3-day survey in May 2021 has been combined with the scoping survey of August 2020 to produce a robust assessment of the current invertebrate assemblage present on-site.
- 9.141 The survey identified 482 species of invertebrates, of which 68 (14.1%) are considered as Species of conservation concern. This is a high proportion of scarce and rare species and confirms that the Site supports a valuable assemblage of invertebrate species.

Important Ecological Features

- 9.142 Important Ecological Features (IEFs) are sites, habitats and species of ecological or nature conservation importance that could be significantly affected by a project. The following **Table 9.6** presents the IEFs identified within the Site and surrounding area.

Table 9.6: Important Ecological Features within and Surrounding the Site

IEF	COVERING LEGISLATION AND GUIDANCE	LEVEL OF IMPORTANCE
Bramblefields LNR	Local Authority	Local
Milton Road Hedgerow CiWS	Local Authority	
Open Mosaic Habitat on Previously Developed Land	Open mosaic habitat on previously developed land is a UK Biodiversity Action Plan (UK BAP) Priority habitat listed on section 41 of the Natural Environment and Rural Communities (NERC) Act 2006.	Regional
Invertebrate assemblage	Considered in local authority policies under the domestic planning regime with applications made to local authorities.	Regional

IEF	COVERING LEGISLATION AND GUIDANCE	LEVEL OF IMPORTANCE
Reptiles	All common UK reptile species (adder, grass snake, common lizard and slow worm) are protected through part of section 9 (1 and 5) of the Wildlife & Countryside Act 1981 (as amended) and are UKBAP species.	Local
Birds	The breeding bird species recorded during the surveys are Priority Species of the UK BAP and included in the BoCC Amber and Red list.	Local
Bats	All bat species are protected through inclusion in the Conservation Regulations 2017. Noctule, Soprano pipistrelle and Brown long-eared bats are UKBAP Priority Species.	Local

Future Baseline Conditions

- 9.143 In the absence of the Development and lack of habitat management, the Site will progressively change through natural succession of vegetation communities. It is likely that the habitat within the development site would become more uniform, with competing tall, dense scrub becoming increasingly dominant shading and drying out the other habitats present. It would limit and start to change, and potentially decrease, the biodiversity and species assemblage present.
- 9.144 However, there would be opportunities for other species to use the habitat as it developed over time. It could be expected that more woodland species of flora would take up residence as the scrub matured.
- 9.145 A different assemblage of birds, invertebrates and plants could use the habitat as the vegetation developed over time and more woodland species could be expected to take up residence as the scrub matured. There would be an opportunity for bats to use the habitat as a foraging area as the habitat became more sheltered and mature. It could be expected that some bats may start to roost at the Site as trees aged and started to develop suitable roost sites.
- 9.146 Climate change could influence the future ecological baseline situation at the Site in the longer term. For example, an increase in temperatures may place increased stress on ecosystems within designated sites in the local area. However, ecological change associated with climate will be gradual and long term. Consequently, within the operational lifetime of the project any changes to ecosystems are predicted to be extremely small.

Potential Impacts - Construction

- 9.147 The potential impacts during the construction phase of the development include:
- Vegetation clearance/loss of habitat;
 - Vegetation clearance/loss of microhabitats and features for invertebrates;
 - Injury/fatality of protected species;
 - Spread of invasive species;
 - Access and travel on/off-site, including temporary access routes for construction vehicles;
 - Acoustic disturbance and vibration from construction activities;
 - Potential airborne pollutants;

- Potential run-off pollutants; and
- Lighting.

Potential Impacts – Operation

9.148 Operational activities, following implementation of mitigation, are unlikely to give rise to negative effects based on fragmentation and direct mortality and have the potential to add beneficial value. The following impacts are may arise once the Proposed Development is operational:

- Bramblefields LNR - Access to the Site Recreational pressure;
- Lighting;
- Potential airborne pollutants; and
- Potential run-off pollutants.

Assessment of Effects

Construction

Bramblefields LNR

9.149 Bramblefields LNR is owned by CCiC and was designated in 2003. It lies within a residential area, surrounded on three sides by housing and a primary school. Allotments and railway sidings border it to the north. The Site is divided into two with a public area and fenced private section. The 2.08ha site comprises various habitats including scattered scrub, two ponds and semi-improved neutral grassland. The Site is bordered by broad-leaved semi-natural woodland and individual trees. The Site is typical of successional scrub/grassland mosaic habitat and forms part of an important wildlife corridor.

9.150 Bramblefields LNR is an important refuge for breeding and wintering birds and is particularly suitable for all stages of reptiles' life-cycle. It was a receptor site for a reptile translocation in 2010-11 with its habitat managed for reptiles. The Species Specific Survey observed Common Lizards present on the private part of the LNR and considered it likely that they use this area for breeding.

Magnitude of Impact

9.151 The construction of Proposed Development is unlikely to impact the habitats and species of the neighbouring Bramblefields LNR. The development will not result in loss of land to the LNR and noise and lighting levels at the LNR are predicted not to increase significantly. Any disturbance would be managed during the construction of the development through appropriate lighting and controlled working areas. The impact is predicted to be of local spatial extent, long term (permanent) duration, continuous and irreversible. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be minor.

Sensitivity of the Receptor

9.152 Bramblefields LNR is typical of successional scrub/grassland mosaic habitat and forms part of an important wildlife corridor. The LNR is an important refuge for breeding and wintering birds and is particularly suitable for all stages of reptiles' life-cycle. It was a receptor site for the previous reptile translocation with its habitat managed for reptiles. The receptor is therefore considered to be of medium vulnerability, medium recoverability and regional value. The sensitivity of the receptor is therefore, considered to be medium.

Significance of Effect

- 9.153 Overall, it is predicted that the minor impact on the medium sensitivity receptor would result in a minor adverse effect, which is not significant in EIA terms.

Further Mitigation or Enhancement

- 9.154 The design and implementation of mitigation and enhancement measures arising for the Cambridge North station application (Atkins EDS 2015) with respect to Bramblefields LNR have already been agreed with the LPA and have been undertaken by Cambridgeshire County Council. This is summarised below. Full details are provided in the Ecology Design Strategy (**Appendix 9.2**).
- 9.155 Mitigation measures included:
- Retention and enhancement of existing buffer vegetation with no direct access from the development site;
 - Pedestrians encouraged elsewhere through provision of/focusing on other access means;
 - Creation of grassy verges of varying sward heights and composition;
 - Beetle banks;
 - Provision of additional refugia;
 - Provision of south-east facing bird boxes;
 - The protection of reptiles through translocation and installation of reptile fence & artificial refugia; and
 - Watching brief during construction works in Bramblefields LNR.
- 9.156 Enhancement measures include:
- Increasing the overall biodiversity value through provision of additional under-storey planting and species rich/wildflower grassland, as appropriate, together with selective thinning of existing trees/scrub.
 - Establishment of new wetland habitat & enlargement of existing pond within the LNR.
 - Control of invasive weed swamp stonecrop (*Crassula helmsii*) in existing pond and provision of new aquatic planting.
 - Provision of new interpretation boards and litter bins.
 - Provide new, larger information boards at each entrance to the Site.
 - Provide a new legal warning sign at each entrance to instruct no riding of motorcycles or horses and no dumping of rubbish.
 - Contribution to an updated 10-year habitat Management Plan in collaboration with the LPA ecologist.
- 9.157 The following measures are documented within the Construction Environmental Management Plan (CEMP) and will be implemented to mitigate impacts that may arise during construction activities:
- Control of contractors with clear definition of duties and responsibilities, including restriction and control of working hours;

- Appointment of an Ecological Clerk of Works ('ECoW') to monitor construction and ensure compliance with all relevant requirements, Method Statements and plans;
- Erection of effective fencing around construction areas to prevent loss or damage to ecological resources and to prevent animals falling into excavations as appropriate;
- Contractor compliance with Environment Agency good practice in respect of implementation of pollution prevention measures, including regular checking of construction vehicles for oil/ fuel/ hydraulic oil leaks and that they are provided with spillage contingency kits;
- Strict control of dust and other emissions from construction vehicles.
- Removal of existing vegetation will be limited to the minimum needed for safe implementation of the works. Any woody material will be logged and stored for re-use on-site, where appropriate.
- Restoration of all temporary working areas on completion of construction works to replace existing habitat.

Residual Effect

- 9.158 The residual effect following further mitigation is predicted to be a minor adverse effect, which is not significant in EIA terms.

Milton Road Hedgerow CiWS

- 9.159 This comprises a well-established mature species rich hedgerow with trees along Milton Road. Located within a largely urban area. It is part of a relic hedgerow system remnant from the former farming landscape in the area. It is an important foraging and refuge habitat also providing connectivity and species dispersal.

Magnitude of Impact

- 9.160 The construction of Proposed Development is unlikely to impact the habitats and species of the Milton Road Hedgerow CiWS. Due to the distance of the Site to the CiWS, the development will not result in loss of land or be impacted by noise or lighting disturbance. The magnitude is therefore considered to be negligible.

Sensitivity of the receptor

- 9.161 The CiWS is a well-established mature species rich hedgerow with trees and is an important foraging and refuge habitat and provides connectivity and species dispersal. The receptor is therefore considered to be of medium vulnerability, medium recoverability and regional value. The sensitivity of the receptor is therefore, considered to be medium.

Significance of effect

- 9.162 Overall, it is predicted that the negligible impact on the medium sensitivity receptor would result in a negligible adverse effect, which is not significant in EIA terms.

Open Mosaic Habitat on Previously Developed Land

- 9.163 As shown in **Table 9.7**, the construction phase would result in the loss of up to 1.84ha of open mosaic habitat. The open mosaic habitat is considered to be of national value and is a UK Biodiversity Action Plan (UK BAP) Priority habitat listed on section 41 of the Natural Environment and Rural Communities (NERC) Act 2006. The quality of the habitat ranges from poor to good across the Site, where there is high species diversity.

Table 9.7: Area of OMH lost during Construction and the Area created as part of the Proposed Development.

OPEN MOSAIC HABITAT	BASELINE (HA)	LOST (HA)	HABITAT CREATED (HA)
Good	0.9323	0.7659	2.3234
Moderate	0.8081	0.5901	
Poor	0.5074	0.4773	
Total	2.2478	1.8333	2.3234

Magnitude of Impact

9.164 The construction of Proposed Development would result in the loss of up to 1.83 ha of open mosaic habitat. The impact is predicted to be of local spatial extent, long term (permanent) duration, continuous and irreversible. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be major.

Sensitivity of the Receptor

9.165 The open mosaic habitat is considered to be of national value and is a UK Biodiversity Action Plan (UK BAP) Priority habitat listed on section 41 of the Natural Environment and Rural Communities (NERC) Act 2006. The quality of the habitat ranges from poor to good across the Site, where there is high species diversity. The receptor is therefore considered to be of medium vulnerability, medium recoverability and regional/national value. The sensitivity of the receptor is therefore, considered to be medium.

Significance of Effect

9.166 Overall, it is predicted that the major impact on the medium sensitivity receptor would result in a moderate adverse effect, which is significant in EIA terms

Further Mitigation or Enhancement

9.167 In order to mitigate the effect on open mosaic habitat on previously developed land, mitigation comprising retention and enhancement and the creation of replacement habitat is proposed. The proposed mitigation is summarised below and detailed in the Ecology Design Strategy (**Appendix 9.2**).

- Retention and enhancement of existing woodland and scrub along the south west boundary of the Station/Interchange Area to form a buffer zone.
- Introduction of productive species that are beneficial to invertebrates and birds including spring blossom and fruiting species of scrub.
- Mature trees that are not in direct conflict with the design will be retained and existing vegetation will where possible be retained and enhanced on the western Boundary.
- Enhancements to the western boundary will include the introduction of a varied fringe of scrub (through diverse native woody species planting) to increase the structure, niche availability and interface variation along its length;
- Retaining wherever practicable the small number of mature trees located within the Site to provide habitat for invertebrates and birds;
- Boundary planting to assist habitat connectivity across the Site and links to other habitats beyond the Site boundary to provide commuting routes for a range of wildlife;
- Additional planting to the eastern border where feasible to create an edge of OMH or flower-rich planting;

- Tree planting; and
- Orchard tree species including spring blossom and autumnal fruits, and in time deadwood.

Residual Effect

9.168 The residual effect following further mitigation is predicted to be a minor adverse effect, which is not significant in EIA terms.

Invertebrates

9.169 The construction of the Proposed Development would result in the loss of up to 1.84ha of invertebrate habitat. The invertebrate assemblage is considered to be of local/regional value with a number of rare invertebrate species recorded on-site. The quality of the invertebrate habitat ranges from poor to good across the Site.

Magnitude of Impact

9.170 The impact is predicted to be of local spatial extent, long term (permanent) duration, continuous and irreversible. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be major.

Sensitivity of the Receptor

9.171 The invertebrate assemblage is considered to be of local/regional value with a number of rare invertebrate species recorded on-site. The quality of the invertebrate habitat ranges from poor to good across the Site. The receptor is therefore considered to be of medium vulnerability, medium recoverability and regional value. The sensitivity of the receptor is therefore, considered to be medium.

Significance of Effect

9.172 Overall, it is predicted that the high impact on the medium sensitivity receptor would result in a moderate adverse effect, which is significant in EIA terms.

Further Mitigation or Enhancement

9.173 In order to mitigate the effect on invertebrate habitat, mitigation comprising the retention and enhancement and the creation of replacement habitat is proposed. This is summarised below, with full details provided in the Ecology Design Strategy (**Appendix 9.2**).

- Flower-rich planting/ flower-rich grassland;
- Flower-rich open habitat mosaics;
- Log piles/ dead wood habitat;
- Scrub retention and tree and shrub planting;
- Bee beaches;
- Butterfly and beetle banks;
- Brown and green roofs mimicking OMH; and
- Open water, swales and rain garden.

9.174 An important habitat feature on-site for invertebrates is the sunny eastern bank next to the station car park, which will be lost and re-engineered and replaced. The deadwood is to be retained on-site and re-distributed along the guided busway, the northern edge boundary and within the enhanced habitats north of Cowley Road. Some of the deadwood resource will also

be utilised on the green roof planting. There remains the opportunity to also enhance the deadwood component of the Cowley Road cycleway verges.

Residual Effect

- 9.175 The residual effect following further mitigation is predicted to be a minor adverse effect, which is not significant in EIA terms.

Reptiles

- 9.176 Reptiles are still mainly absent from the Site. However, construction of the Proposed Development would result in the loss of an area of suitable reptile habitat. The Site habitats are of limited suitability for reptiles and it is assumed that only a remnant population is present since the translocation in 2019. However, the clearance of habitat in the absence of mitigation would likely cause death or injury to any reptiles that may be present on-site.

Magnitude of Impact

- 9.177 Therefore, the impact is predicted to be of local spatial extent, long term (permanent) duration, continuous and irreversible. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be minor.

Sensitivity of the Receptor

- 9.178 The Site is limited suitability for reptiles and only a remnant population is now present, however the clearance of habitat in the absence of mitigation would likely cause death or injury to any reptiles that may be present on site. The receptor is therefore considered to be of medium vulnerability, medium recoverability and site value. The sensitivity of the receptor is therefore, considered to be low.

Significance of Effect

- 9.179 Overall, it is predicted that the minor impact on the low sensitivity receptor would result in a minor adverse effect, which is not significant in EIA terms.

Further Mitigation or Enhancement

- 9.180 Due to the possible presence of a remnant population of reptiles on-site, measures will be implemented to ensure that no reptiles are harmed during construction activities. These include a controlled approach during site clearance within areas of the Site that provide suitable habitat for reptiles. Suitable reptile habitat will also be retained across the Site, including north of the Cowley Road and the verges along the busway and cycleways. These areas will be managed to benefit reptiles and other wildlife and act as corridors to other areas of suitable reptile habitat offsite.
- 9.181 The retention of existing vegetation along the boundary of the Site and the Bramblefields LNR acts as a buffer zone separating the area of most value for reptiles from the construction site. This area will also be used as a receptor site for any reptiles that are found during site clearance.
- 9.182 In order to mitigate the effect of the loss of reptile habitat from the Site, the creation of new habitat for reptiles, including the attenuation pond area to the north of the Site and enhancement of existing habitats, will provide an alternative habitat to that which is being lost.

Residual Effect

- 9.183 The residual effect following further mitigation is predicted to be minor beneficial, leading to a minor beneficial significance of effect, which is not significant in EIA terms.

Breeding Birds

- 9.184 The construction of the Proposed Development would result in the loss of an area of breeding bird habitat. Although the Site habitats are of limited suitability for breeding birds, the clearance of habitat in the absence of mitigation would likely cause death or injury to any breeding birds that may be present on-site.

Magnitude of Impact

- 9.185 Therefore, the impact is predicted to be of local spatial extent, long term (permanent) duration, continuous and irreversible. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be minor.

Sensitivity of the Receptor

- 9.186 The Site is limited suitability for breeding birds, however the clearance of habitat in the absence of mitigation would likely cause death or injury to any breeding birds that may be present on-site. The receptor is therefore considered to be of low vulnerability, medium recoverability and site value. The sensitivity of the receptor is therefore, considered to be low.

Significance of Effect

- 9.187 Overall, it is predicted that the minor impact on the low sensitivity receptor would result in a minor adverse effect, which is significant in EIA terms.

Further Mitigation or Enhancement

- 9.188 To ensure that no nesting birds are disturbed during construction works, compliance with legislation in relation to the timings of construction activities (e.g. vegetation clearance and removal of bird breeding habitat) will be undertaken outside the breeding season (March to September inclusive). If this is not possible, all vegetation and buildings that are cleared during the breeding season will be checked for nesting birds by an experienced Ecological Clerk of Works.
- 9.189 Suitable nesting bird habitat will also be retained across the Site, including the verges along the busway and cycleways.
- 9.190 A range of nest box types will be included in the Landscape Ecological Management Plan (LEMP), which will be a condition to the planning application, to support a wide range of species (sparrows, starlings, swifts and other hole-nesting species). Consideration will also be given to providing other more specialist boxes where appropriate (kestrel/peregrine etc) on the tallest buildings once completed.

Residual Effect

- 9.191 The residual impact following further mitigation is predicted to be minor beneficial, leading to a minor beneficial significance of effect, which is not significant in EIA terms.

Bats

- 9.192 The construction of the Proposed Development would result in the loss of an area of bat habitat. Bat activity surveys indicated a very low level of use of the Site habitats and no bat roosts were recorded on-site.

Magnitude of Impact

- 9.193 Therefore, the impact is predicted to be of local spatial extent, long term (permanent) duration, continuous and irreversible. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be minor.

Sensitivity of the Receptor

- 9.194 The Site is considered to provide limited suitability for foraging and commuting bats. The receptor is therefore considered to be of low vulnerability, medium recoverability and site value. The sensitivity of the receptor is therefore, considered to be low.

Significance of Effect

- 9.195 Overall, it is predicted that the low impact on the low sensitivity receptor would result in a minor adverse effect, which is significant in EIA terms.

Further Mitigation or Enhancement

- 9.196 Measures adopted as part of the Proposed Development will include the use of directional lighting during construction in areas where construction lighting is required to minimise the disturbance from light spillage on foraging and commuting bats.
- 9.197 Low levels of foraging and commuting bats were recorded across the Site, although it is unlikely that bats will be affected by the loss of habitat, suitable habitat is being retained across the Site including the verges along the busway and cycleways.
- 9.198 The two buildings on-site classed as having low potential (small brick building to the west) and negligible potential (large open shed) will be inspected again pre-commencement and if required further survey or mitigation will be undertaken at the time. These are located within the final layout for the Wild Park public open space.
- 9.199 Taking the above information into account, and on the basis that the mitigation measures set out above are implemented and adhered to, the magnitude of the impact has been assessed as minor and the sensitivity of the receptor is considered to be low. The effect will therefore be of minor adverse significance, which is not significant in EIA terms.

Residual Effect

- 9.200 The residual impact following further mitigation is predicted to be minor beneficial, leading to a minor beneficial significance of effect, which is not significant in EIA terms.

Invasive Species

- 9.201 The construction of the Proposed Development may result in the spread of invasive species within the Site and surrounds including the Bramblefields LNR. *Cotoneaster*, a Schedule 9 NNIS was recorded external but adjacent to the Site. Tree of Heaven was recorded within the Site boundary and Buddleia is present throughout the Site. These species are not a Schedule 9 NNIS but are considered invasive due to their quick spreading nature.
- 9.202 If the removal of these species from site is not managed there is a risk that they may spread to the local area including the Bramblefields LNR.

Magnitude of Impact

- 9.203 Therefore, the impact is predicted to be of local spatial extent, long term (permanent) duration, continuous and irreversible. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be minor.

Sensitivity of the Receptor

- 9.204 No Schedule 9 invasive species were found on-site; however, a Schedule NNIS and a number of quick spreading species were recorded. If the removal of these species from site is not

managed there is a risk that these may spread to the local area including the Bramblefields LNR. The receptor is therefore considered to be of medium vulnerability, medium recoverability and site value. The sensitivity of the receptor is therefore, considered to be low.

Significance of Effect

- 9.205 Overall, it is predicted that the low impact on the low sensitivity receptor would result in a minor adverse effect, which is significant in EIA terms.

Further Mitigation or Enhancement

- 9.206 Measures adopted as part of the Proposed Development will include the management of invasive species on-site to include the safe removal of invasive species from the Site and also to try to prevent spread into the surrounding area. All invasive species recorded within the Station/Interchange Area or within close proximity will be removed by qualified specialists following Environment Agency guidelines.

Residual Effect

- 9.207 The residual impact following further mitigation is predicted to be beneficial, leading to a minor beneficial significance of effect, which is not significant in EIA terms.

Assessment of Effects

Operation

Bramblefields LNR

- 9.208 During the operational phase, no significant risk of noise or disturbance is anticipated for the LNR. Additional access through the reserve has been avoided in the scheme design and any new lighting on-site has been controlled, particularly towards the boundary of the Site with the LNR. Suitable drainage and structures for water have been incorporated into the Proposed Development to ensure that no additional surface run-off is created, which might otherwise impact on surrounding areas including the LNR. It is unlikely that there will be an increase in predation by pets, however any increase in dog walking and human activity within the reserve will be mitigated by introducing new signage and more dog bins.
- 9.209 Furthermore, no additional effects on ecological receptors within or in proximity to the Site are anticipated to occur during the operation phase.
- 9.210 Taking the above information into account, and on the basis that the mitigation measures set out during the construction stage continue to be implemented and adhered to, the magnitude of the impact has been assessed as negligible and the sensitivity of the receptor is considered to be medium. The effect will therefore be of minor adverse significance, which is not significant in EIA terms.

Milton Road Hedgerow CiWS

- 9.211 The operation of Proposed Development is unlikely to impact the habitats and species of the Milton Road Hedgerow CiWS, due to the distance of the Site to the CiWS. The magnitude is therefore considered to be negligible.
- 9.212 Therefore, it is predicted that the negligible impact on the medium sensitivity receptor would result in a negligible adverse effect, which is not significant in EIA terms.

Open Mosaic Habitat on Previously Developed Land

- 9.213 During the operational phase of the Proposed Development, it is not anticipated that any further habitat loss would occur. The use of vehicles across the Site has the potential for fuel spills/pollution events. However, the frequency of this is likely to be very low, and the implementation of best practice such as the incorporation of oil traps within the surface water drainage system (see Chapter 10) would result in a negligible impact on habitats during operation.
- 9.214 The creation and management of new/retained areas of open mosaic habitat would retain and enhance the overall diversity across the Site, resulting in a minor beneficial effect, which is not significant in EIA terms.

Invertebrates

- 9.215 During the operational phase, there is the potential for disturbance to invertebrates through human presence on the Site. However, due to the location of the Site within an urban area the invertebrates on site would already be habituated to any noise/vibration.
- 9.216 The creation and management of new/retained areas of invertebrate habitat would retain and enhance the overall diversity of species across the Site, resulting in a minor beneficial effect, which is not significant in EIA terms.

Reptiles

- 9.217 A remnant population of reptiles may be present on site. The provision of native tree and shrub planting, swales features, and grassland would enhance the overall suitability of the Site for reptiles by providing additional opportunities for foraging, basking and hibernating.
- 9.218 As such, it is considered likely that the magnitude of the impacts of the development on this feature of low value would be negligible to minor. This would result in a minor beneficial effect, which is not significant in EIA terms.

Breeding Birds

- 9.219 During the operational phase, there is the potential for disturbance to breeding birds through human presence and dog walking on the Site. However, due to the location of the Site within an urban area the breeding birds on-site would already be habituated to any noise/vibration and dog walkers. There is unlikely to be an increase in predation by pets due to the type of development, commercial and residential flats.
- 9.220 The provision of native tree and shrub planting, grassland and nesting boxes would enhance the overall suitability of the Site for breeding birds by providing additional opportunities for foraging and nesting.
- 9.221 As such, it is considered likely that the magnitude of the impacts of the development on this feature of low value would be negligible to minor. This would result in a minor beneficial effect, which is not significant in EIA terms.

Bats

- 9.222 During the operational phase, there is the potential for disturbance to bats through increased lighting levels. However, any new lighting on-site has been controlled (see lighting assessment in chapter 13), particularly towards features suitable for foraging and commuting bats.

- 9.223 The provision of native tree and shrub planting, swales features, grassland and bat boxes would enhance the overall suitability of the Site for bats by providing additional opportunities for foraging and roosting.
- 9.224 As such, it is considered likely that the magnitude of the impacts of the development on this feature of low value would be negligible to minor. This would result in a minor beneficial effect, which is not significant in EIA terms.

Invasive Species

- 9.225 During the operational phase, there is the potential for the spread of invasive species within the Site and surrounds. The measures adopted during construction including the management of invasive species and the safe removal of invasive species will continue throughout operation.
- 9.226 As such, it is considered likely that the magnitude of the impact on this feature of low value would be negligible to low. This would result in a negligible or minor beneficial effect, which is not significant in EIA terms.

Monitoring

- 9.227 A monitoring programme will be implemented following the completion of construction and habitat creation. These monitoring proposals tie in with the duration of the landscape management plan which covers a 5-year period. The post construction monitoring is detailed in the Ecology Design Strategy (**Appendix 9.2**) and includes habitat surveys at ground level and on the rooftop habitats to identify plant species on-site and any unwanted species encroaching on the planting areas, reptile and invertebrate surveys, bird and bat box checks.
- 9.228 Monitoring survey reports will be produced at the end of years two and five following the detailed surveys, a copy of which will be provided to the local planning authority. The results of the monitoring will be reviewed against the habitat creation objectives and the Site management will be adjusted accordingly should the surveys identify a requirement for this. Further monitoring required for BNG purposes will be extended to 30 years.

Biodiversity Net Gain

- 9.229 Biodiversity Net Gain is defined in Baker et al (2019) as: “Development that leaves biodiversity in a better state than before” The requirement for developments to seek to achieve BNG arises from the National Planning Policy Framework (NPPF, 2021), which states in Para. 174 that: “Planning policies and decisions should contribute to and enhance the natural and local environment by ... minimising impacts on and providing net gains for biodiversity.”
- 9.230 An accepted method of assessing BNG is through the use of biodiversity calculators to assess the biodiversity value of habitats pre- and post-development based on habitat type, distinctiveness and condition. A biodiversity index is derived for the baseline and for the Proposed Development, and BNG is considered to be achieved where an increase in value is delivered (on or offsite), and where habitats of a higher value are not replaced exclusively with habitats of a lower value. The methods of calculating BNG for the Proposed Development followed the guidance produced by Natural England’s Biodiversity Metric 3.1 (JP039) (Pank et al., 2022). One of the changes from version 3.0 is an increased emphasis and value on urban trees. Cambridge North is delivering a large number of trees on-site leading to a positive outcome.

- 9.231 Using the data collected from the Phase 1 Habitat Survey, habitat condition assessments were undertaken for the habitats present within the project boundary. This assessment comprised assessing the individual habitats by comparing how they scored against pre-set condition assessment criteria. The criteria describe what components are needed for the habitat to be of good, moderate or poor value. Each habitat was scored as follows: 1 – Poor; 2 – Moderate; and 3 – Good.
- 9.232 Habitats on the Site are taken from the landscape and open space proposals. The post development habitats created at the Site are detailed above and within the Ecology Design Strategy (**Appendix 9.2**).
- 9.233 The Defra calculation tool indicates that the baseline value of the Site is 48.86 units, 36.62 of which are lost.
- 9.234 Proposed habitat creation on-site will provide +66.58 units. Post development units on-site are 91.01 units. This is a net change of +42.15 habitat biodiversity units, which is a gain of 86.26%.
- 9.235 The BNG provision south of Cowley Road is sufficient now with these additional urban trees to provide more than the required 20% uplift in its own right (BNG units 68.46 units; BNG uplift 75.22%).
- 9.236 Therefore, the OMH enhancement north of Cowley Road to provide additional permanent ground level OMH is in excess of what is required for Phase 2. The over provision beyond 20% should be banked, pending further applications.
- 9.237 The BNG achieved by the development exceeds the standard biodiversity net gain target of 20%. There is also a small amount of additional off-site enhancement (1.34 BNG habitat units) planned for the Phase 1 hotel and office rooftops to bring them up to the Phase 2 specification.

Cumulative Effects

- 9.238 A review of proposed or possible developments that may have a cumulative impact with the project has been undertaken and used to inform this ES. Details of the projects are provided in Chapter 20 of this ES.
- 9.239 Schemes within 2km of the Site that have comparable effects, and which could therefore lead to cumulative effects, are listed in **Table 9.8** below.

Table 9.8: List of other Proposed Developments for Cumulative Assessment.

APPLICATION NUMBER	TYPE	DESCRIPTION	DISTANCE FROM PROJECT SITE (KM)
21/02450/REM	Reserved Matters with Planning Consent	Land North of Newmarket Road, Cambridge CB5 8AA 421 new homes with associated infrastructure, internal roads and open space	1.94

APPLICATION NUMBER	TYPE	DESCRIPTION	DISTANCE FROM PROJECT SITE (KM)
20/03524/FUL 20/03523/FUL	Planning Application – not yet determined	Land in the North West Part of St Johns Innovation Park, Cowley Road, Cambridge CB4 0WS Upgrade to existing access roads and Cowley Road The erection of five storey building and a six storey building for commercial/business and associated infrastructure, including demolition of existing building	1.36
21/04640/SCOP	Request for Formal Scoping Opinion	Cambridge Waste Water Treatment Plant Relocation, Horingsea Road, Fen Ditton	0.88
17/1616/CTY	EIA Scoping Opinion	Waterbeach New Town, Waterbeach Barracks and Airfield Site	6.36

9.240 The Proposed Developments within **Table 9.6** are within areas of low ecological value. The development sites comprised low value biodiverse habitats with limited numbers of protected and notable species identified within the them, predominantly breeding birds and foraging and commuting bats. None of the other development sites comprise Open Mosaic Habitat on Previously Developed Land or have been identified as important for their invertebrate assemblage.

9.241 The closest Proposed Development to the Site ‘Land in the North West Part of St Johns Innovation Park’ is only the erection of two buildings and associated upgrades within a previously developed site so is unlikely to significantly impact the surrounding area if the construction works run concurrently with this development.

9.242 The Land North of Newmarket Road development is a larger development however it is over 2km from the Site and is considered sufficiently distant from the Site for cumulative effects during construction.

9.243 Considering the nature of the schemes, it is possible that these would run concurrently with the Proposed development. However, the applications will include mitigation for the loss of habitat as for species present within the Site. Therefore, significant cumulative effects are not considered likely.

9.244 Documentation will be reviewed and updated throughout the construction phase if further potential risks are identified.

Conclusions and Summary of Effects

9.245 This chapter has presented the results of the EIA for the potential impacts of the Project on ecological receptors, covering all impacts during the construction and operation phases.

9.246 The Project will result in no significant residual effects on the UK BAP Priority Habitat Open Mosaic Habitat on previously developed land. There will be no significant adverse effects on any statutory or non-statutory designation.

9.247 The loss of the invertebrate habitat within the Project will be offset by the creation and management of new areas of open mosaic habitat.

9.248 No significant residual effects on other ecology features have been identified.

9.249 A summary of likely significant effects on Important Ecological Features is provided in **Table 9.7**.

Table 9.7: Summary of Impacts: Ecology

DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION				IMPACT AFTER MITIGATION (RESIDUAL)			
				ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE	ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE	ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE
Construction															
Bramblefields LNR Noise levels generated from construction traffic	-	Med	Min	Min Adv	Irrev	ST	Min Adv	The mitigation measures designed into the Project would ensure impacts are minimised; and disturbance as a result of increased noise levels will be temporary in nature and reversible.	Min Adv	Rev	ST	Min Adv	Min Adv		
Milton Hedgerows CiWS	-	Med	Neg	Neg	Irrev	ST	Neg	None required.	Neg	Rev	ST	Neg	Neg		
Open Mosaic Habitat on Previously Developed Land Temporary direct loss of habitat on-site	-	Med	Maj	Mod Adv	Irrev	MT	Mod Adv	Mitigation comprising the retention and enhancement and the creation of replacement habitat is proposed.	Min Adv	Rev	ST	Min Adv	Min Adv		
Invertebrates Temporary direct loss of habitat on-site.	-	Med	Maj	Mod Adv	Irrev	MT	Mod Adv	mitigation comprising the retention and enhancement and the creation of replacement habitat is proposed.	Min Adv	Rev	ST	Min Adv	Min Adv		
Reptiles Loss and disturbance to habitat	-	Low	Min	Min Adv	Irrev	MT	Min Adv	Mitigation measures to move reptiles from construction areas and to create new habitat would ensure no effects were significant	Min Ben	Rev	ST	Min Ben	Min Ben		
Breeding Birds Loss of nesting sites and temporary noise disturbance	-	Low	Min	Min Adv	Irrev	MT	Min Adv	There were no breeding bird species recorded in numbers of national or international significance. Mitigation measures would ensure impacts to birds are minimised.	Min Ben	Rev	ST	Min Ben	Min Ben		

DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION				IMPACT AFTER MITIGATION (RESIDUAL)			
				ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE	ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE	ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE
Bats Loss of foraging habitat	-	Low	Min	Min Adv	Irrev	MT	Min Adv	Limited suitable habitat for bats is present on-site. Mitigation measures would ensure impacts to bats are minimised.	Min Ben	Rev	ST	Min Ben			
Invasive Species Risk of spreading invasive species	-	Low	Low	Neg to Min Adv	Irrev	MT	Neg/ Min Adv	Management of invasive species on-site and adjacent on-site to be undertaken during construction to reduce the risk of spread.	Min Ben	Rev	ST	Min Ben			
Operational Phase															
Bramblefields LNR Visitor Pressure	-	Med	Low	Min Adv	Irrev	ST	Min Adv	The mitigation measures designed into the Project would ensure impacts are minimised.	Min Adv	Rev	ST	Min Adv			
Milton Hedgerows CiWS	-	Med	Neg	Neg	Irrev	ST	Neg	None required	Neg	Rev	ST	Neg			
Open Mosaic Habitat on Previously Developed Land Habitat creation	-	Med	Low	Min Ben	Rev	LT	Min Ben	Habitat creation would increase the diversity of habitat on-site.	Min Ben	Rev	ST	Min Ben			
Invertebrates Habitat creation	-	Med	Low	Min Ben	Rev	LT	Min Ben	Habitat creation would increase the amount of habitat available to invertebrates.	Min Ben	Rev	ST	Min Ben			
Reptiles Habitat creation	-	Low	Low	Min Ben	Rev	LT	Min Ben	Habitat creation would increase the amount of habitat available to reptiles.	Min Ben	Rev	ST	Min Ben			
Breeding Birds Habitat creation	-	Low	Low	Min Ben	Rev	LT	Min Ben	Habitat creation would increase the amount of habitat available to nesting birds.	Min Ben	Rev	ST	Min Ben			

DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION				IMPACT AFTER MITIGATION (RESIDUAL)			
				ADVERSE/BENEFICIAL	REVERSIBLE/ IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE	ADVERSE/BENEFICIAL	REVERSIBLE/ IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE	ADVERSE/BENEFICIAL	REVERSIBLE/ IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE
Bats Habitat creation	-	Low	Low	Min Ben	Rev	LT	Min Ben	Habitat creation would increase the amount of habitat available to nesting birds.	Min Ben	Rev	ST	Min Ben			
Invasive Species Risk of spreading invasive species	-	Low	Low	Min Ben	Rev	MT	Min Ben	Continued monitoring of invasive species on-site and adjacent on-site to be undertaken.	Min Ben	Rev	ST	Min Ben			

Key:

Med: Medium
 Rev: Reversible
 Min: Minor
 Ben: Beneficial
 Irrev: Irreversible
 Neg: Negligible
 Sig: Significant
 Adv: Adverse
 Maj: Major
 Mod: Moderate
 ST: Short Term
 MT: Medium Term

Flood Risk and Drainage

10

10.0 Flood Risk and Drainage

Introduction

10.1 This chapter addresses the Flood Risk and Drainage impacts of the Proposed Development.

10.2 This chapter should be read in conjunction with the following appendices and figures, which have been used to inform the assessment:

- Appendix 10.1 - Cambridge North Development Flood Risk Assessment and Drainage Strategy
- Figure 10.1 - Water Resources Plan

10.3 In terms of water resource availability; the impacts the development will have on water consumption; and recommended mitigation measures to offset these impacts, a separate technical note has been prepared to address this (**Appendix 10.2**).

Potential Sources of Impact

10.4 The following potential sources of impact have been identified from the Scoping Stage and as part of this ES chapter.

10.5 A desk-based assessment has been carried out in order to establish key receptors and the potential effects that the Development might have on those receptors during the construction and operational phases. The assessment comprises:

- determination of Site geology and hydrology;
- review of existing sources of data relating to the water regime (including discharge consents, abstraction licences, etc);
- review of flood risk and drainage related constraints;
- consideration of the historic uses, drainage regime and the soils and contamination status of the Site and surrounding area in order to determine the existing water quality and regime;
- consideration of environmental design and management measures to minimise flood risk, such as the use of Sustainable Drainage Systems (SuDS), water efficiency methods, and consideration of best practice guidance; and
- investigation of appropriate mitigation measures to avoid where possible, or minimise, any negative effects on water quality, drainage and flood risk during the construction and operational phases that remain following the implementation of environmental design and management measures.

10.6 The study area includes the Site itself and controlled waters that have the potential to be affected by the Development, generally within a 1km buffer. **Figure 10.1** shows the Site's relationship to local water resources.

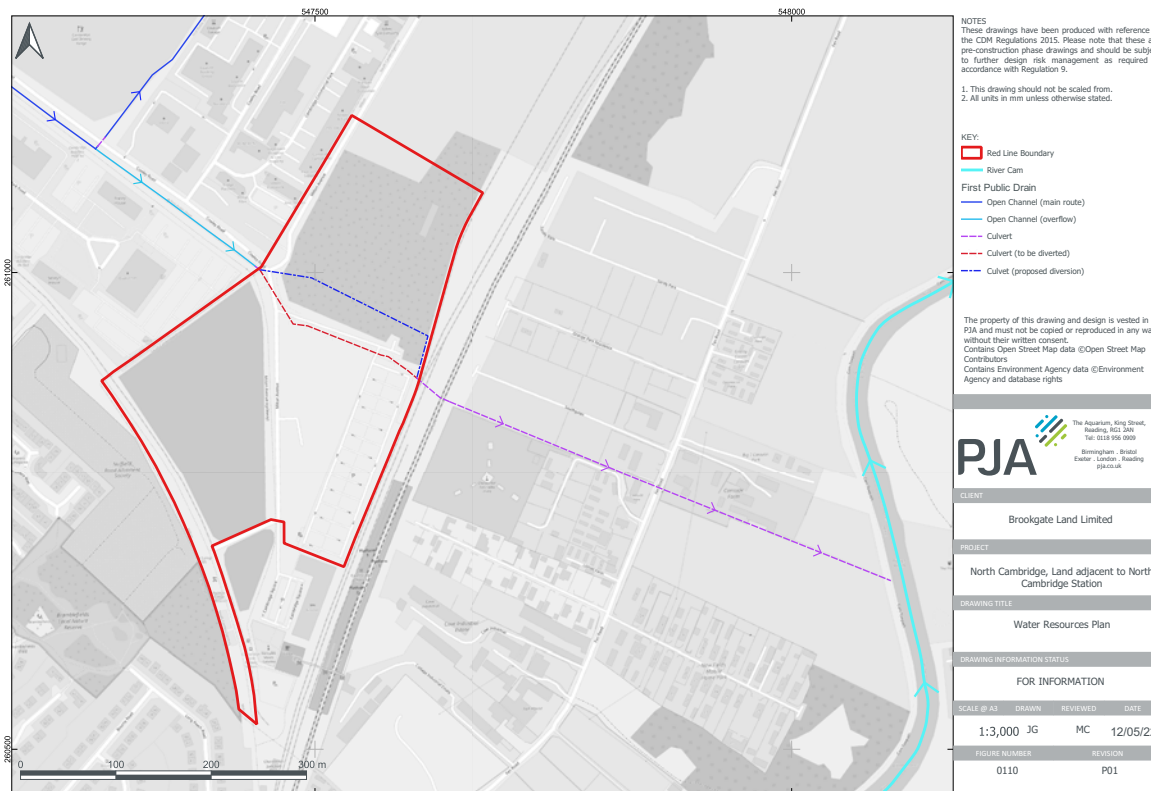


Figure 10.1: The Site's Relationship to Local Water Resources

10.7 Studies have been undertaken to inform the emerging North East Cambridge Area Action Plan (NECAAP). These documents provide a useful overview of the key local issues and have been used to identify potential sources of flood risk and drainage impacts associated with the Proposed Development. Of relevance to this chapter are:

- Topic Paper: Climate Change, Energy, Water and Sustainable Design and Construction (GCSP, 2021a);
- Draft Surface Water Drainage Core Principles: Key Parameters (GCSP, 2021b);
- Cambridge Northern Fringe East Surface Water Drainage Space Allocation for Master Planning (GCSP et al., 2019a);
- Cambridge Northern Fringe East Area Flood Risk Assessment (GCSP et al., 2019b); and
- Phase 1 Geo-Environmental Desk Study, North East Cambridge Area (Environmental Protection Strategies Ltd, 2021).

10.8 To inform the assessment set out in this Chapter, a scoping exercise was undertaken to agree the potential sources of impact which should be scoped into the assessment.

10.9 In the context of flood risk and drainage, the scoping responses noted that the assessment should consider the following:

- South Cambridgeshire Local Plan Policies CC/8 and CC/9 (SCDC, 2018);
- Water quality requirements in accordance with the SuDS Manual (CIRIA, 2015);
- Cambridgeshire County Council Surface Water Planning Guidance (CCC, 2021);
- Cambridgeshire Flood and Water SPD (CCC, 2016);

- the relevant SFRA - Greater Cambridge Strategic Flood Risk Assessment (Stantec, 2021);
- the relevant SWMP - Cambridgeshire County Council Surface Water Management Plan (Hyder Consulting (UK) Ltd, 2014);
- the scoping opinion (**Appendix 2.2**); and
- The NECAAP documents and studies listed at 1.6 above.

10.10 Following a desk-based review of publicly available information, and the recommendations from the scoping opinion (**Appendix 2.2**), the following potential sources of impact have been identified:

- Demolition and Construction Phase
 - Surface Water Run-off and Sediment Control
 - Pollutive Activities from Site Compound
 - Piling for Foundations
 - Dewatering Operations, Over-Pumping and Excavations
 - Works in or Near Water
- Operational Phase
 - Flood Risk
 - Surface Water Run-off
 - Foul Drainage

Policy Context

10.11 The following policy and guidance documents have been considered during the preparation of this Chapter:

- National
 - National Planning Policy Framework and Planning Practice Guidance (Ministry of Housing, Communities & Local Government, 2021).
 - The SuDS Manual (CIRIA, 2015).
- Local
 - South Cambridgeshire Local Plan (SCDC, 2018).
 - Emerging North East Cambridge Area Action Plan (NEC AAP).
 - Greater Cambridge Integrated Water Management Study: Level 1 Strategic Flood Risk Assessment (Stantec, 2021).
 - Local Flood Risk Management Strategy (CCC, 2022).
 - Cambridgeshire Culvert Policy (CCC, 2013).
 - Cambridgeshire County Council Surface Water Planning Guidance (CCC, 2021).
 - Cambridgeshire Flood and Water SPD (CCC, 2016).

National Planning Policy Framework and Planning Practice Guidance

10.12 The National Planning Policy Framework (NPPF) was published in March 2012 and was last updated in July 2021 (Ministry of Housing, Communities & Local Government, 2021). Chapter

14: 'Meeting the challenge of climate change, flooding and coastal change' sets out the requirements for new development to be sustainable, adaptable, and resilient to the effects of climate change. This includes the long-term implications affecting water resources such as flood risk and coastal change.

10.13 Paragraph 159 states 'inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere.'

10.14 This general approach is referred to as the 'Sequential Approach' and is designed to ensure that areas at little or no risk of flooding from any source are developed in preference to areas at higher risk. The aim should be to keep development out of medium and high flood risk areas (Flood Zones 2 and 3) and areas affected by other sources of flooding where possible for both existing and future (climate change) conditions.

10.15 Application of the Sequential Approach in the plan-making process, in particular application of the Sequential Test, helps to ensure that development can be safely and sustainably delivered and that on development proposals which are appropriate on flood risk grounds are promoted.

Sequential Test

10.16 The Sequential Test ensures that a sequential approach is followed to steer new development to areas with the lowest probability of flooding. The flood zones as refined in the Strategic Flood Risk Assessment (SFRA) for a Local Authority's area, provide the basis for applying the test. The aim is to steer new development towards Flood Zone 1 (areas with a low probability of river or sea flooding). Where there are no reasonably available sites in Flood Zone 1, local planning authorities in their decision making should take into account the flood risk vulnerability of land uses and consider reasonably available sites in Flood Zone 2 (areas with a medium probability of river or sea flooding), applying the Exception Test if required.

10.17 Only where there are no reasonably available sites in Flood Zones 1 or 2 should the suitability of sites in Flood Zone 3 (areas with a high probability of river or sea flooding) be considered, taking into account the flood risk vulnerability of land uses and applying the Exception Test if required.

Exception Test

10.18 The Exception Test, as set out in paragraph 163 of the NPPF, is a method to demonstrate and help ensure that flood risk to people and property will be managed satisfactorily, while allowing necessary development to go ahead in situations where suitable sites at lower risk of flooding are not available.

10.19 Essentially, the two parts of the test require Proposed Development to show that it will provide wider sustainability benefits to the community that outweigh flood risk, and that it will be safe for its lifetime, without increasing flood risk elsewhere and where possible reduce flood risk overall.

10.20 The need for the Exception Test depends on the potential vulnerability of the Site (according to the Flood Zones) and the vulnerability classification of the development proposed (according to the definitions in Annex 3 of the NPPF). Flood Zone definitions and the 'compatibility between flood risk vulnerability and Flood Zones are set out in the accompanying digital Planning Practice Guidance resource (Ministry of Housing, Communities & Local Government, 2022).

10.21 The NPPF also notes the importance that flood risk is not increased elsewhere as a result of development.

Local Planning Policy

Local Plan (South Cambridgeshire District Council)

10.22 The South Cambridgeshire Local Plan was adopted in 2018 and sets out the planning policies and land allocations to guide the future development of the district up to 2031 (SCDC, 2018). It includes policies on a wide range of topics such as housing, employment, services and facilities, and the natural environment.

10.23 The application site forms part of the Major Development Site allocation within the South Cambridgeshire Local Plan (2018) under Policy SS/4: Cambridge Northern Fringe East and Cambridge North railway station. Policy SS/4 confirms that the area is allocated for “*high quality mixed-use development, primarily for employment within Use Classes B1, B2 and B8 as well as a range of supporting uses, commercial, retail, leisure and residential uses (subject to acceptable environmental conditions).*”

10.24 Pertinent to this Chapter are policies CC/8 (Sustainable Drainage Systems) and CC/9 (Managing Flood Risk).

10.25 Policy CC/8 promotes current industry best practice in the provision of Sustainable Drainage Systems (SuDS), noting that schemes should comply with the non-statutory technical standards for SuDS (Defra, 2015) and the Cambridgeshire Flood and Water Supplementary Planning Document (CCC, 2016).

10.26 Policy CC/9 sets out requirements for development proposals to meet the Sequential Test and (where necessary) the Exception Test, in accordance with the NPPF. The policy sets out flood protection measures that should be incorporated into development design, such as raising of floor levels. The policy also specifies the need for development proposals to be supported by a site-specific Flood Risk Assessment (FRA); requires that proposals do not increase flood risk elsewhere; and requires the destination of surface water discharge to obey the following priority order:

- firstly, to the ground via infiltration;
- then, to a water body;
- then, to a surface water sewer; and
- discharge to a foul water or combined sewer is unacceptable.

Emerging Northeast Cambridge Area Action Plan (NECAAP)

10.27 South Cambridgeshire District Council and Cambridge City Council are jointly preparing an Area Action Plan (AAP) for North East Cambridge. Once adopted the Area Action Plan would form part of the statutory development plan for both Councils. It will set out a series of site-specific policies and the mix and quantum of development for the Area Action Plan.

10.28 The NEC AAP is still at an early stage of preparation and therefore carries negligible weight in the decision-making process.

10.29 However, the following evidence-based studies form material considerations in the determination of any planning application;

- Integrated Water Management Study – Strategic Flood Risk Assessment;
- Cambridge Northern Fringe East Surface Water Drainage Space Allocation for Master Planning;
- Cambridge Northern Fringe East Area Flood Risk Assessment;
- Surface Water Drainage Core Principles; and
- Phase 1 Geo-Environmental Desk Study.

10.30 The NECAAP Surface Water Drainage Core Principles (GCSP, 2021b) state the following:

- The Councils will require outfalls to be gravity designed unless certain site conditions apply as contained with the Sustainable Design and Construction SPD (GCSP, 2020) and Anglian Water Design and Construction Guidance (Water UK, 2020). A pumped solution will only be considered acceptable if it can be clearly demonstrated that all other options are unfeasible.
- Development proposals will be required to demonstrate that the peak rate of run-off over the lifetime of the development achieves greenfield run-off rates. If this cannot be technically achieved, then the limiting discharge should be 2l/s/ha for all events up to and including the 100-year return period event, including an allowance for climate change.
- Between 10-15% of each development parcel should be allocated towards SuDS attenuation and conveyance. Land used for SuDS will not be included in formal open space calculations. This is to ensure that the functionality of the SuDS system does not reduce the amount of useable formal open space provided on-site.

Surface Water Drainage Space Allocation for Master Planning

10.31 The Cambridge Northern Fringe East Surface Water Drainage Space Allocation for Master Planning (GCSP et al., 2019a) provides high-level estimates of the required volume and corresponding areas required for surface water drainage attenuation and water quality treatment prior to being discharged from the development site. The report was prepared for the purposes of master planning and space allocation.

10.32 The report recognises that high groundwater across the Site is likely to preclude the use of infiltration techniques, and therefore assumes that surface water run-off will be discharged to a watercourse (i.e. the First Public Drain).

10.33 The report also considers the constraints associated with the limited gradient across the Site, and suggests maximising the use of above-ground features including swales in strategic locations to minimise pumping requirements.

Area Flood Risk Assessment

10.34 The Cambridge Northern Fringe East Area Flood Risk Assessment (GCSP et al., 2019b) was prepared to inform the development of the Area Action Plan, highlight the level of flood risk and recommend suitable mitigation approaches where applicable.

10.35 The information set out in this document was used to inform the Site-specific Flood Risk Assessment (FRA) included at **Appendix 10.1**.

Phase 1 Geo-Environmental Desk Study

10.36 The Phase 1 Geo-Environmental Desk Study (Environmental Protection Strategies Ltd,

2021) presents the findings of a desk study which was carried out to identify potential key current or former land uses to inform high-level feasibility discussions regarding potential land contamination constraints within the North East Cambridge planning process.

- 10.37 The study identifies that the superficial River Terrace deposits across the Site are classified as a Secondary A Aquifer and notes that the Site does not lie within a Source Protection Zone (SPZ) for groundwater abstraction. Despite this, the study notes that *'the underlying geology does have some resource potential and therefore groundwater should be considered as a potential receptor to site derived contaminants'*.
- 10.38 The study also notes that site derived contaminants could enter the First Public Drain by migration via overland flow, through unsaturated soils or entering shallow surface drainage. Therefore, the study also considers surface waters as sensitive receptors in the conceptual site model.

Level 1 and 2 Strategic Flood Risk Assessment (SFRA)

- 10.39 A Level 1 SFRA was prepared by Stantec in July 2021 on behalf of GCSP (Stantec, 2021). The document is an update to the original SFRA published by South Cambridgeshire District Council and Cambridge City Council (CCiC and SCDC, 2010). The updated document refers to newer flood risk information and planning policy (NPPF), and forms part of the evidence base for the emerging Local Plan.
- 10.40 The main aims of the SFRA are to:
- map flood risk from all sources;
 - consider the potential effects of climate change and development on future flood risk;
 - consider current and future measures to address flooding issues, and identify land that should be safeguarded for provision of these measures;
 - to provide information to information the Sequential and Exception Tests; and
 - to provide advice for site-specific Flood Risk Assessments (FRAs).
- 10.41 Appendix D of the Level 1 SFRA contains modelled flood extent mapping, which combines multiple EA model outputs to indicate extents for the 1 in 100 year and 1 in 1,000-year flood events. The mapping shows that flooding would not encroach on the Site.
- 10.42 There is no specific mention of the Site or immediate surroundings being at risk of flooding in the Level 1 SFRA.

Local Flood Risk Management Strategy (LFRMS)

- 10.43 The Cambridgeshire Flood Risk Management Strategy 2021-2027 (CCC, 2022) was approved by the Environment and Green Infrastructure Committee in March 2022.
- 10.44 The Strategy explains the different organisations, authorities and individuals involved in flood risk management in Cambridgeshire. There is a reference guide for some of the main flood related issues that may be experienced. The principal management organisations are also discussed, setting out what their roles and responsibilities are.
- 10.45 The organisations are defined by the Flood and Water Management Act 2010 as 'risk management authorities' (RMAs) with responsibilities relating to the LFRMS. All RMAs must also act in a manner which is consistent with the National Strategy and guidance.

Cambridgeshire Culvert Policy

- 10.46 The Cambridgeshire Culvert Policy was published in 2013 (CCC, 2013). The culvert policy is written to:
- clarify CCC's approach to assessing permissions for culverts;
 - ensure a consistent approach to culverting approvals; and
 - demonstrate how CCC will take action to protect the continuity and integrity of watercourses within the county.
- 10.47 CCC is generally opposed to the culverting of watercourses due to the adverse ecological, flood risk, human safety, and aesthetic impacts. Each application to culvert a watercourse will only be approved if there is no reasonably practicable alternative or if the detrimental effects would be so minor that a more costly alternative would not be justified.

Legislative Context

- 10.48 The applicable legislative framework is summarised as follows:
- Water Resources Act 1991;
 - Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009;
 - Land Drainage Act 1991 as amended 1994;
 - Flood and Water Management Act 2010;
 - NPPF (Ministry of Housing, Communities & Local Government, 2021);
 - Water Act 2003 as amended 2014;
 - Water Supply Regulations 2016 as amended 2018;
 - The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017;
 - The Water Resources (Environmental Impact Assessment) (England and Wales) (Amendment) Regulations 2017;
 - The Groundwater (England and Wales) Regulations 2009;
 - Groundwater Daughter Directive (Directive 2006/118/EC, 2006);
 - Anti-Pollution Works Regulations 1999;
 - The Environmental Damage (Prevention and Remediation) (England) Regulations 2015;
 - Conservation of Habitats and Species Regulations 2017;
 - Environment Act 2021; and
 - The Environmental Permitting (England and Wales) (Amendment) Regulations 2018.

Methodology

- 10.49 The methodology adopted in this assessment has focused on the identification and evaluation of key sensitive receptors and then specifically on identifying the magnitude of impacts which have the potential to have a beneficial or adverse effect on a sensitive receptor.
- 10.50 The level of significance of any predicted effect has been determined using the three-stage

process outlined below. The methodology and significance criteria adopted for this assessment have been developed with reference to a variety of relevant legislative drivers and guidance/ best practice documents.

Stage 1: Value/Sensitivity of the Receptor

10.51 The sensitivity of each identified receptor is qualitatively determined using the criteria set out in **Table 10.1**.

Table 10.1: Sensitivity Matrix

GEOGRAPHICAL IMPORTANCE	VALUE	CRITERIA
International/National	Very High	<p>Potentially extremely vulnerable to change, of international importance or recognition, very limited potential for substitution.</p> <p>A waterbody which is of high or good ecological status and is extremely sensitive to change. A ground waterbody which is extremely vulnerable to pollutant discharge.</p> <p>Sites with international and European nature conservation designations with water-dependant ecosystems (e.g. Special Protection Areas, Special Areas of Conservation, Ramsar Sites and EC designated freshwater fisheries).</p>
National	High	<p>A waterbody which is of high or good ecological status and highly sensitive to change i.e. supports protected species and broad, complex biological diversity. A ground waterbody which is highly vulnerable to pollutant discharge.</p> <p>Nature conservation sites of national importance designated by statute including Sites of Special Scientific Interest (SSSI) and National Nature Reserves.</p> <p>A waterbody constituting a valuable resource because of high quality and yield, extensive exploitation for public, private domestic, agricultural and/or industrial supply, or designated sites of nature conservation that are dependent on groundwater.</p> <p>A waterbody of high amenity value, including areas of bathing and where water immersion sports are regularly practiced.</p> <p>A floodplain or flood storage area necessary to protect highly vulnerable development and valued resources from flooding.</p> <p>Sensitive human receptors.</p>

GEOGRAPHICAL IMPORTANCE	VALUE	CRITERIA
Regional/District	Moderate	<p>A waterbody of moderate ecological status and moderately sensitive to change.</p> <p>A waterbody of moderate amenity value including public parks, boating, navigable watercourses, watercourses flowing through residential developments and town centres.</p> <p>Non-statutory sites of regional importance designated for water dependent ecosystems.</p> <p>A waterbody of limited value because its quality does not allow potable or other quality sensitive uses (but which may be used for agricultural or industrial purposes) and where exploitation is not extensive, or where local areas of nature conservation are known to be sensitive to groundwater quality.</p> <p>A floodplain or flood storage area protecting development and resources which are classified to be of medium vulnerability.</p>
District/Local	Low	<p>A waterbody of poor ecological status with little sensitivity to change.</p> <p>A waterbody of low yield and quality that makes exploitation as a water resource unfeasible, or where changes to the waterbody in terms of abstraction are not expected to have an impact on local ecology.</p> <p>Non-statutory wetland or waterbody of local interest.</p> <p>A floodplain or flood storage area with limited flood protection value.</p>
Local	Very Low	A water resource of little or no interest.

Stage 2: Magnitude of Impacts

10.52 Once the sensitivity of the identified receptor has been determined, the magnitude of the potential impact is determined. The nature and characteristics of potential impacts have been described to enable their magnitude to be determined. The nature of the potential impacts has been expressed as:

- beneficial – advantageous or beneficial impact on an environmental resource or receptor;
- adverse – detrimental or adverse impact on an environmental resource or receptor; and
- neutral – an impact on a resource/receptor of insufficient magnitude to affect the use/ integrity.

10.53 Where adverse or beneficial impacts have been identified, their magnitude has been assessed using the criteria set out in **Table 10.2**.

Table 10.2: Magnitude of Impacts

	MAGNITUDE	CHARACTERISTICS OF CHANGE
	Major beneficial	<p>The Proposed Development would remove features that negatively affect the environment, prevent further degradation, and enhance and protect the environment in the long-term.</p> <p>Results in a fundamental improvement to water quality and ecology either by a relatively high amount over a long-term period or by a very high amount over an episode such that waterbody is greatly improved from the baseline situation.</p> <p>For groundwater, a major permanent or long-term improvement to groundwater quality or available yield. Changes to groundwater quality or level that provide major benefits to local ecology.</p> <p>For floodplains, a major increase in flood storage capacity or reduction in the risk of flooding.</p>
	Moderate beneficial	<p>The Proposed Development would notably reduce rate of current degradation and/or enhance existing character.</p> <p>Effects that result in a positive change in the local ecological status or productivity/commercial value of a water resource. Changes to the local groundwater regime that are predicted to have a slightly beneficial effect on resource use. Minor positive impacts on local ecology may result.</p> <p>For floodplains, a moderate increase in flood storage capacity or reduction in the risk of flooding.</p>
	Minor beneficial	<p>The Proposed Development would reduce rate of current degradation.</p> <p>Results in a localised positive impact on a waterbody.</p> <p>Changes in water quality that are likely to be relatively small or be of a minor temporary nature such that the ecology or commercial value is slightly improved. Equivalent to minor but measurable change within a class.</p> <p>Minor positive changes to groundwater quality, levels or yields that do not affect existing resource use or ecology.</p> <p>For floodplains, a minor increase in flood storage capacity or reduction in the risk of flooding.</p>
	Neutral	<p>The Proposed Development would not result in any meaningful change to the receptor/resource.</p> <p>Results in a very slight change from the baseline conditions such that no discernible effect on the receptor/resource results.</p> <p>Very slight change from groundwater baseline conditions approximately to a 'no change' situation.</p>

	MAGNITUDE	CHARACTERISTICS OF CHANGE
	Minor adverse	<p>The Proposed Development would increase the rate of current degradation or introduce some minor detractors into the environment.</p> <p>Results in a localised negative impact on a waterbody.</p> <p>Changes in water quality that are likely to be relatively small or be of a minor temporary nature such that the ecology or commercial value is slightly worsened. Equivalent to minor but measurable change within a class.</p> <p>Minor negative changes to groundwater quality, levels or yields that do not affect existing resource use or ecology.</p> <p>For floodplains, a minor decrease in flood storage capacity or increase to the risk of flooding.</p>
	Moderate adverse	<p>The Proposed Development would result in the partial loss of a resource or notably degrade a receptor environment.</p> <p>Results in an impact on integrity of attribute or loss or part of attribute possibly with/without failure to meet statutory objectives or with/without breaches in legislation.</p> <p>Effects that result in a negative change in the local ecological status or productivity/commercial value of a water resource. Changes to the local groundwater regime that are predicted to have a slightly adverse effect on resource use. Minor negative impacts on local ecology may result.</p> <p>For floodplains, a moderate decrease in flood storage capacity or increase to the risk of flooding.</p>
	Major adverse	<p>The Proposed Development would result in the complete loss of a resource or compromise the integrity of a receptor such that its long-term survival is highly unlikely.</p> <p>Results in a loss of an attribute and likely to cause failure to meet statutory objectives under and/or breaches legislation.</p> <p>Results in a fundamental degradation to water quality and ecology either by a relatively high amount over a long-term period or by a very high amount over an episode such that waterbody is greatly worsened from the baseline situation.</p> <p>For groundwater, a major permanent or long-term reduction in groundwater quality or available yield.</p> <p>For floodplains, a major loss of flood storage capacity or increase to the risk of flooding.</p>

10.54 In the context of the Development, short- to medium-term impacts are generally considered to be those associated with the construction phase. Long-term impacts are those that will have a lasting effect once the Development is completed and operational.

Stage 3: Significance of Effect

10.55 The assessment of significance is based on the nature and magnitude of the potential impact and the sensitivity/value of the receptors/resources. Having established the sensitivity/value of the receptor in Stage 1 and the magnitude of each potential impact in Stage 2, the matrix in **Table 10.3** has been used to determine the likely significance level of each potential effect.

Table 10.3: Significance Matrix

		SENSITIVITY OF RESOURCE/RECEPTOR				
		VERY HIGH	HIGH	MODERATE	LOW	VERY LOW
MAGNITUDE OF CHANGE	MAJOR BENEFICIAL	Major beneficial	Major/ Moderate beneficial	Moderate beneficial	Moderate/ Minor beneficial	Minor beneficial
	MODERATE BENEFICIAL	Major/ Moderate beneficial	Moderate beneficial	Moderate/ Minor beneficial	Minor beneficial	Minor/ Negligible beneficial
	MINOR BENEFICIAL	Moderate beneficial	Moderate/ Minor beneficial	Minor beneficial	Minor/ Negligible beneficial	Negligible
	NEUTRAL	Negligible	Negligible	Negligible	Negligible	Negligible
	MINOR ADVERSE	Moderate adverse	Moderate/ Minor adverse	Minor adverse	Minor/ Negligible adverse	Negligible
	MODERATE ADVERSE	Major/ Moderate adverse	Moderate adverse	Moderate/ Minor adverse	Minor adverse	Minor/ Negligible adverse
	MAJOR ADVERSE	Major adverse	Major/ Moderate adverse	Moderate adverse	Moderate/ Minor adverse	Minor adverse

- 10.56 The following terms describe the significance of effects:
- Major beneficial or adverse significant effect – where the development would cause a significant improvement (or deterioration) to the existing environment;
 - Moderate beneficial or adverse significant effect – where the development would cause a noticeable improvement (or deterioration) to the existing environment;
 - Minor beneficial or adverse effect – where the development would cause a small or barely perceptible improvements (or deterioration) to the existing environment; and
 - Negligible – no discernible improvement or deterioration to the existing environment.

Preventative and Mitigation Measures

10.57 Many of the long-term potential effects of the Development imposed on the water environment may be avoided or prevented through the implementation of effective and sustainable design

proposals and solutions. This embedded mitigation encompasses any mitigation measures that have been identified and adopted as part of the evolution of the project (embedded into the project design).

- 10.58 The assessment of impacts on receptors, however, assumes that these measures have not been implemented, with the initial significance of impacts assessed on the basis that these embedded measures are not yet effective.
- 10.59 The predicted impact and the significance of each potential effect relating to the short- to medium-term construction activities, and the long-term operation of the development, have been determined with an identified and appropriate level of mitigation, where required. Mitigation measures aim to prevent adverse effects from occurring and to ensure that those that do occur are within an acceptable level, governed by objectives and targets set out within relevant legislative and policy drivers.
- 10.60 If an impact giving rise to an adverse significant effect cannot be prevented or mitigated within an acceptable level, there is a potential for a residual effect on the receptor, where the receptor is altered.

Limitations and Assumptions

- 10.61 The assessment of receptors and effects is based on the latest data and information available at the time of writing. The information used to inform the baseline conditions of the Site may be partially or fully outdated subject to the time that has passed since that information was gathered, either due to natural processes or anthropogenic alterations affecting the characteristics of the Site. This has the potential to limit the assessment or render the assessment partially unreliable where obsolete data has been used for the purposes of this assessment as set out below.
- 10.62 The Phase 1 Geo-Environmental Desk Study (Environmental Protection Strategies Ltd, 2021) provides a high-level assessment of the wider North East Cambridge Area to inform the North East Cambridge Area Action Plan. This study did not include intrusive site investigation and so the findings are limited to those based on recorded information.
- 10.63 The findings of the 2021 Phase 1 Geo-Environmental Desk Study have been supplemented with the findings of ground investigation work undertaken by Socotec (2017). This ground investigation does not cover the entire Site and was undertaken around five years ago. Development work has since been undertaken to the south of the Site (Phase 1A and Phase 1B) and some parts of the Site may now be different to the conditions found in 2017. The Phase 1 Geo-Environmental Desk Study prepared by PJA in 2022 (**Appendix 16.1**) provides an interpretation of the ground investigation findings reported by Socotec (2017).
- 10.64 At the time of writing, details of the length of the First Public Drain Overflow downstream of the Site (to the east) were not available. Therefore, the Proposed Development and the supporting drainage strategy are based on details (levels, dimensions, etc.) obtained from surveys on-site and the assumption that the downstream length of First Public Drain Overflow is of similar geometry and condition. A full investigation into the route, dimensions, and condition of the downstream length of the First Public Drain Overflow should be undertaken at the detailed design stage to confirm that this infrastructure remains a suitable point of discharge for surface water run-off.

Baseline Conditions

10.65 The following baseline conditions reflect the existing situation relating to the water environment, sensitive water dependent receptors and associated infrastructure within the study area. A water resource plan highlighting key water features can be referred to in **Figure 10.1**.

Site Context and Topography

10.66 The Site is predominantly brownfield with commercial, car parking, rail infrastructure and vacant hardstanding areas. There are some green spaces with trees and dense vegetation present on the Site.

10.67 From a review of publicly available 1m Digital Terrain Model (DTM) LIDAR data and site topographic surveys, the Site's topography is shown to be relatively flat with fluctuations in elevation between 6m and 7m Above Ordnance Datum (AOD).

10.68 To the south of the Site are the recently developed Cambridge North Railway Station, Novotel, and Office buildings with associated roads and infrastructure.

10.69 A block paved surface level car park located in the south-eastern corner of the Site serves the Cambridge North Railway Station. This car park incorporates a significant depth of granular material, which provides surface water attenuation storage for the existing Railway Station, Novotel and Office (refer to the FRA included at **Appendix 10.1** for details) and therefore the finished levels are raised above the surrounding ground.

10.70 Cowley Road falls in a north to south direction as it crosses the centre of the Site (along the north-south axis). The eastern edge of the Site is bordered by the Fen Line, a railway line connecting Cambridge and King's Lynn, which runs north-east to south-west at a similar elevation to the Site (circa 6mAOD). The Cambridgeshire Guided Busway (CGB) runs along the western edge of the Site.

10.71 In the wider context, the River Cam flows around the Site to the south and east, passing within around 450m of the Site boundary at the closest point. In the vicinity of the Site, the River Cam and its floodplain lie at an elevation of around 4-5mAOD. Entering the urban area of Cambridge to the west the ground rises gradually away from the Site.

Surface Water Receptors

10.72 The River Cam flows in a north-easterly direction to the south and east of the Site, passing within around 450m of the southern Site boundary at its closest point. The River Cam originates approx. 30km south of the Site near Debden in Essex, and passes through Cambridge before continuing north-east to meet the River Great Ouse to the South of Ely. From its confluence with the River Cam, the River Great Ouse flows north to reach the North Sea at King's Lynn.

10.73 Where it passes the Site the River Cam is a navigable section of watercourse known as the Lower River, defined by two locks:

- Jesus Lock, located approx. 2.8km south-west of the Site; and
- Baits Bite Lock, located approx. 1.8km north-east of the Site.

10.74 The River Cam is classified as a Main River and is part of the Anglian River Basin District.

- 10.75 The First Public Drain (FPD) is an Awarded Watercourse originating to the north-west of the Site and is the responsibility of Cambridge City Council (CCiC). The watercourse is an open channel running adjacent to Cowley Road outside of the Site. The watercourse enters a culvert running north-east under Cowley Road, near the western corner of Cambridge Commercial Park. Emerging on the northern side of Cowley Road, the FPD continues north-east around Cambridge Commercial Park and towards Milton Country Park, passing under the A14. At the eastern edge of Milton Country Park, the FPD turns east and passes under the Fen Line before meeting the River Cam upstream of Baits Bite Lock and opposite Biggin Abbey.
- 10.76 Near the culvert under Cowley Road, a second branch of the FPD continues south-east running parallel to Cowley Road. Near the head of this branch the open channel is partially blocked off by a gabion/stone wall to create an overflow to relieve the FPD of excess flood flow. Downstream of the overflow, the flood relief channel is open and heavily vegetated before becoming culverted through the Site. On the function of the overflow branch, the 2014 Cambridge Northern Fringe East Area Flood Risk Assessment notes that 'there is a semi-redundant tributary that continues the line from the Science Park and heads directly towards the Cam under the main railway line. This is only utilised in high flows, the main flow heads north east.' (CCiC and SCDC, 2014).
- 10.77 The branch of the FPD crossing the Site is herein referred to as the 'FPD overflow'.
- 10.78 As Cowley Road turns south to enter the Site, the adjacent FPD overflow continues east beneath the road as a 750mmØ culvert, increasing to a 900mmØ culvert to the east of Cowley Road.
- 10.79 The 750mmØ and 900mmØ culverted sections are a diversion of the original route of the FPD. The diversion was carried out in 2017 when the Cambridge North Station temporary car park and associated access road were constructed at the Site. The 900mmØ culvert re-joins the route of the original FPD overflow culvert at the northern end of the Cambridge North Station temporary car park; from this point the FPD overflow continues south-east as a 1400mm x 1100mm box culvert and eventually outfalls to the River Cam to the east of the Site.
- 10.80 There are currently two surface water drainage systems at the Site which discharge to the FPD overflow:
- The 'large network' serving the existing Cambridge North Railway Station, Novotel, Office and surrounding areas of hardstanding to the south of the Site. Surface water from these areas drains by gravity to a surface water pumping station on the western side of the CGB, at which point the water is pumped to the granular sub-base storage beneath the Cambridge North Station temporary car park. A flow control chamber in the northern end of the car park controls the rate of discharge to the FPD overflow culvert downstream.
 - The 'small network' draining the access road to the Cambridge North Station car park and a small section of Cowley Road. A flow control limits the discharge rate to the FPD overflow culvert.

Flood Risk

- 10.81 The paragraphs below provide a summary of the risk of flooding to the Site. A site-specific Flood Risk Assessment (FRA) has been prepared, which assesses flood risk to and from the Site in further detail. The FRA is included at **Appendix 10.1**.

- 10.82 According to the publicly available Flood Map for Planning (Environment Agency, 2022a) the Site is located wholly within Flood Zone 1, demonstrating that there is a <0.1% Annual Exceedance Probability (AEP) of fluvial flooding at the Site. The 0.1% (1 in 1,000 year) fluvial floodplain is defined by the extent of Flood Zone 2, which does not extend from the River Cam to any areas west of the railway line, including the Site. The risk of fluvial flooding at the Site is therefore very low.
- 10.83 The same publicly available mapping produced by the Environment Agency shows the Site not to be at risk of tidal flooding.
- 10.84 Table 2 of the NPPG 'Flood Risk and Coastal Change' section summarises the flood risk vulnerability classification for different types of development. The proposed residential development at the Site is classified as More Vulnerable development; the commercial development is classified as Less Vulnerable; and the amenity open space is classified as water-compatible development. Some of the buildings include basement provisions and there are proposed to be laboratories on-site, which could at times contain hazardous substances; in these cases, the buildings would be classified as Highly Vulnerable development.
- 10.85 In accordance with Table 3 of the NPPF 'Flood Risk and Coastal Change' section, all vulnerability classifications are appropriate for development within Flood Zone 1. The Proposed Development therefore meets the requirements of the Sequential Test and there is no requirement to apply the Exception Test.
- 10.86 The EA Flood Risk from Surface Water Map (Environment Agency, 2022b) identifies the Site to be in an area of low (AEP of 0.1% to 1%) to very low (AEP of less than 0.1%) surface water flood risk. The mapping shows an increased risk of surface water flooding along the route of the FPD adjacent to Cowley Road, to the north-west of the Site. For storm events with AEPs up to 1% (i.e. up to 1 in 100-year events) the main surface water flow route follows the path of the FPD as it heads north around the Cambridge Commercial Park. The mapping indicates that in extreme storm events (i.e. 1 in 100-year and above) excess surface water would flow along the FPD overflow and enter the Site, with some water leaving the open channel at the start of the culverted section to flow overland across the Site. Depth and velocity mapping indicates that the low-risk flooding would be shallow and low velocity.
- 10.87 The risk of surface water flooding at the Site is low to very low, and the areas considered to be at low risk of surface water flooding are minor in the context of the Site.
- 10.88 However, it is understood from anecdotal evidence that the existing station car park within the Site does experience surface water drainage issues, causing localised flooding of the car parking area.
- 10.89 The Greater Cambridge Integrated Water Management Study (IWMS) 'Susceptibility to Groundwater Flooding' map (Stantec, 2021) indicates that the Site is located in an area where groundwater has the potential to emerge at the surface. Published geological mapping (British Geological Survey, 2022) suggests that the majority of the Site is underlain by River Terrace Deposits. However, superficial deposits are indicated to be absent from the northern and eastern extents of the Site. Mudstone bedrock of the Gault Formation underlies the entirety of the Site. Based on the Site's historical use, it is likely that Made Ground is present throughout the Site.

- 10.90 The presence of shallow groundwater is likely linked to rain soaking into the permeable superficial geology (River Terrace Deposits) and Made Ground before becoming perched above the impermeable Gault Formation a short distance below ground.
- 10.91 The ground investigation report (Socotec, 2017) provides results for exploratory holes and in-situ testing carried out at the Site in addition to groundwater monitoring. Groundwater depths across the Site were recorded between 2.83 to 0.82m below ground level (BGL). The groundwater depths recorded give a good representation of average groundwater levels across the Site during wetter periods (refer to the FRA at **Appendix 10.1** for further information). Groundwater flood risk is hence assessed to be medium to high.
- 10.92 The Greater Cambridge IWMS 'Historic Sewer Flooding' map (Stantec, 2021) shows that the Site is located in an area where few sewer flooding incidences have been recorded. The Historic Sewer Flooding map uses the DG5 register provided by the sewerage company, Anglian Water; it is a record of all reported sewer flooding incidents. The incidents are recorded on a postcode basis and include reports of both internal and external sewer flooding. Between two and five flooding incidents were recorded in the postcode local to the Site.
- 10.93 The publicly available EA Flood Risk for Reservoirs Mapping (Environment Agency, 2022b) identifies that the Site lies outside the maximum extent of flooding from reservoirs. Flood risk from reservoirs is therefore considered to be very low.
- 10.94 There are no canals within the vicinity of the Site. Flood risk from canals is therefore considered to be very low.

Groundwater Receptors

- 10.95 Based on a review of the MAGiC maps online resource (Defra, 2022), groundwater receptors in the vicinity of the Site include the following aquifers:
- the superficial River Terrace Deposits underlying the Site, classified as a Secondary A aquifer; and
 - the West Melbury Marly Chalk Formation, the nearest strata of which are recorded approx. 300m south-east of the Site, beyond Fen Road and near the River Cam floodplain. This bedrock formation is classified as a Principal Aquifer.
- 10.96 Secondary A aquifers typically comprise permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases form an important source of baseflow to rivers.
- 10.97 Principal aquifers are layers of rock or drift deposits that have high intergranular and/or fracture permeability, meaning that they usually provide a high level of water storage and transmission.
- 10.98 The Site lies outside of any Source Protection Zones (SPZs). The nearest SPZ (Zone II – Subsurface Activity) is located approx. 4km to the south-west of the Site near Sheep's Green, where the River Cam enters the City of Cambridge from the south.
- 10.99 The Envirocheck Report (Landmark Information Group, 2022) included within the PJA Geo-Environmental Desk Study (**Appendix 16.1**) commissioned for the Site classifies the Secondary A superficial aquifer underlying the majority of the Site as an area of high groundwater vulnerability. The Gault Formation bedrock underlying the Site is recorded as unproductive strata. The small area underlain by West Melbury Marly Chalk bedrock circa 300m south-east

of the Site is recorded as an area of medium groundwater vulnerability. Further south-east, beyond the River Cam around 600m from the Site, the large principal aquifer associated with the widespread Chalk bedrock is classified as an area of high groundwater vulnerability.

- 10.100 There are no groundwater abstraction licences on or within 500m of the Site (Landmark Information Group, 2022).
- 10.101 Intrusive Ground Investigation (GI) undertaken by Socotec (2017) found relatively consistent geology across the Site. Upper strata tend to be comprised of Made Ground up to a depth of around 1-3mBGL. Underlying geology is broadly comprised of stiff clay. The depth of clay is found immediately below Made Ground at 1-3mBGL and extends to the bottom of the exploratory holes (some in excess of 20mBGL).
- 10.102 The Phase 1 Geo-environmental Desk Study (**Appendix 16.1**) provides an interpretation of the ground investigation findings reported by Socotec (2017). The desk study identifies that the Site is contaminated within certain areas, but not recorded above human health Generic Assessment Criteria (GAC) for commercial end use in the soil samples analysed. Single exceedances were recorded of lead and dibenzo(a,h)anthracene GAC for a residential without consumption of homegrown produce end use in the proposed residential site area. Metals, phenol and PAH compounds were recorded at concentrations above the respective Environmental Quality Standard (EQS) in soil samples selected for soil leachate laboratory analysis. Metals and PAH were recorded at concentrations above the respective EQS in groundwater samples. Benzo(a) pyrene was recorded locally to be above the drinking water quality standard in soil leachate and groundwater samples.
- 10.103 As a result of the above contamination findings, the desk study has identified a number of plausible pathways for the migration of contamination to controlled waters. These include:
- Leaching and migration of contaminants from soils in the unsaturated zone into groundwater in the underlying superficial Secondary A Aquifer;
 - Migration of contaminants via preferential pathways such as piles to groundwater in the underlying aquifer Secondary A Aquifer;
 - Lateral migration of contaminants in groundwater through soils and bedrock with discharge to surface water as base flow; and
 - Migration of contaminants along preferential pathways such as installed services followed by discharge to surface watercourses.

Water Quality

- 10.104 The EA employ a method for assessing the environmental condition or 'status' of a water body according to the objectives set out in the Water Framework Directive (WFD). To achieve the purposes of the WFD of protecting all waterbodies, the EA have set out a number of Environmental Objectives. These Environmental Objectives are reported for each waterbody in a River Basin Management Plan (RBMP) which the EA operate in six-year cycles. The achievement of the Environmental Objectives is dependent on current Ecological Status, which is expressed as High, Good, Moderate, Poor, or Bad.
- 10.105 In the context of the WFD, the Site falls within the EA's Anglian River Basin District. The Anglian District is divided into 14 management catchments and the Site lies within the 'Cam and Ely Ouse' management catchment. In this management catchment there are six operational

catchments of which the Site lies within the 'Cam Lower' operational catchment. There are 11 water bodies within the Cam Lower catchment and the Site is located within the area associated with the 'Cam' water body.

- 10.106 The Cam water body was classified overall as Moderate for 2019 (Environment Agency, 2022c). The reasons it did not achieve 'Good' status include: sewage discharge; Perfluorooctane sulphonate (PFOS) and Polybrominated diphenyl ethers (PBDE); and the Mitigation Measures Assessment associated with mitigating the impact of physical modifications due to transport, recreation and agriculture/rural land management.
- 10.107 The WFD objectives for this waterbody indicate that the waterbody is likely to remain at 'Moderate' status by the target year of 2027. The reasons for this are stated as: Disproportionately expensive: disproportionate burdens; and Technically infeasible: No known technical solution is available. The EA will be seeking improvements to improve the Physico-chemical quality element Phosphate to achieve 'Moderate' status by 2027 (currently achieving 'Poor').
- 10.108 The EA will also be seeking improvements to the Mitigation Measures Assessment Surface Water supporting element to achieve 'Good' status by 2027 (currently achieving 'Moderate'). However, they have noted that this may not be achievable as the mitigation measures required would be disproportionately expensive (involving disproportionate burdens).
- 10.109 The Site lies outside of any groundwater operational catchments. The nearest groundwater operational catchment is the 'Cam and Ely Ouse Chalk' operational catchment, which is located beyond the River Cam to the south-east of the Site, extending to within around 500m of the Site boundary.
- 10.110 The Site lies within a Nitrate Vulnerable Zone (NVZ) for Surface Water and as such is affected or at risk of nitrate pollution from agricultural practices.
- 10.111 The Envirocheck Report (Landmark Information Group, 2022) identifies 10 active or revoked licensed discharge consents to surface water or groundwater within 500m of the Site, the closest of which is located on the Site, but was revoked in July 2002. Between January 1985 – February 1992 there was a discharge consent at the Site for discharge of surface water to the First Public Drain from Chesterton Junction (operated by the British Railways Board). Between February 2002 – July 2002 the discharge consent covered final/treated effluent discharge to an unnamed tributary of the River Cam.
- 10.112 There are three active discharge consents within 500m of the Site. All of these are linked to final effluent discharges from sources to the east of the Site, beyond the railway line. All three consents are for discharge to tributaries of the River Cam.

Designated Sites

- 10.113 The Site is not covered by any national or local landscape, ecological and/or heritage designations. The Bramblefields Local Nature Reserve (LNR) is located west of the CGB approx. 50m south-west of the Site.

Sensitive Receptors

- 10.114 With consideration to all the aforementioned baseline conditions, the following key receptors have been identified and the value and sensitivity of each receptor has been determined in

accordance with the criteria set out in **Table 10.1**. **Table 10.4** below provides a summary of the receptors identified.

Table 10.4: Identified Receptors

RECEPTOR	VALUE	REASON
River Cam	Moderate	A waterbody of moderate ecological status and moderately sensitive to change.
First Public Drain	Moderate	A watercourse flowing through the urban areas in the north of Cambridge.
First Public Drain Overflow	Moderate	A flood management asset protecting development and resources which are considered to be of medium vulnerability.
Principal Bedrock Aquifer	High	A waterbody constituting a valuable resource because of high quality and yield, extensive exploitation for public, private, domestic, agricultural and/or industrial supply.
Secondary A Superficial Aquifer	Moderate	Potentially capable of supporting water supplies at a local scale, and may form an important source of baseflow to the River Cam.
Human	Very High	Construction workers, site users, neighbouring users, and the public

Future Baseline Conditions

- 10.115 This section considers how the baseline conditions are likely to change in the future if the Proposed Development were not to proceed (i.e. a ‘do-nothing’ scenario).
- 10.116 In terms of flood risk, in the future the intensity of storm events and the peak flows in watercourses will increase due to climate change over the next 100 years.
- 10.117 As noted at 10.51, the Site is located wholly within Flood Zone 1, indicating that the entire Site lies outside of the extent of the current 1 in 1,000-year fluvial flood event. The Site also lies around 2m above the River Cam floodplain. Given this, it is considered very unlikely that the increased peak river flows associated with the effects of climate change would have an impact on the Site in the future.
- 10.118 Increased rainfall intensity in the future resulting from climate change will lead to increased surface water run-off on-site and potentially entering the Site from off-site sources, increasing the likelihood of surface water flooding at the Site. Without development of the Site, such surface water flooding would pose limited risk to people. However, large overland flows could wash loose ground and rubble towards Cowley Road, Cambridge North Railway Station and the nearby hotel and office.
- 10.119 In terms of water quality, it is unlikely that the WFD status of the River Cam will have improved in the future baseline, due to the Reasons for Not Achieving Good (RNAGs) given (see 10.71). However, given the ground contamination present within the Site it is anticipated that any such ground exposed to direct rainfall will continue to sustain contamination linkages to the underlying Secondary A aquifer, thereby having an adverse impact on the water quality of the underlying groundwater.

- 10.120 Future urban growth will require the expansion of the local sewage treatment works to ensure the same level of treatment is maintained. If expansion/improvements are not implemented, the quality of treated effluent discharged will be reduced, which could have an adverse impact on the receiving water bodies. It is the responsibility of Anglian Water to ensure the Cambridge Wastewater Treatment Works adheres to the consented effluent quality standard during future population growth.

Predicted Effects

- 10.121 This section reviews the potential of the Proposed Development to result in significant effects on the receptors identified above. The initial significance of impacts has been assessed on the basis that mitigation measures, whether these be embedded or additional, are not yet effective. However, the assessment is used to identify the nature and scope of proportionate measures that are required to mitigate any adverse impacts, in order to ensure that any identified adverse effect is not significant and that those that do occur are within an acceptable level, governed by objectives and targets set out within relevant legislative and policy drivers.

Assessment of Effects

- 10.122 The Proposed Development will modify the existing characteristics of the Site in two distinct phases:
- short term impacts related to the physical works and plant operations required during Site clearance and construction of the Proposed Development; and
 - long term impacts related to the operation of the Proposed Development once construction has been completed.

Construction

- 10.123 The following assessment considers the potential impacts of the Site clearance and construction phases of the Proposed Development on the key receptors identified in **Table 10.4**.
- 10.124 Planning for construction is broad at this stage and may be subject to modification, once further baseline information comes to light and the Proposed Development evolves through subsequent Reserved Matters applications. This section is based on reasonable assumptions, experience and relevant CIRIA guidance to identify the potential 'worse case' construction phase effects.
- 10.125 Construction activities on-site can be broken down into various stages, including:
- Site Preparation and Mobilisation – as a minimum establish on-site parking provision; construction staff facilities (including site compound area, offices and welfare facilities); plant and material storage area; install temporary services; erection of Site hoarding and security fencing.
 - Demolition and Enabling Works – as a minimum include the removal of the Cambridge North Station temporary car park and associated drainage infrastructure; arboricultural works (removal of trees and undergrowth); removal of sub structures and redundant underground infrastructure.
 - Earthworks – involve the preparation of ground, remedial works if any contamination is identified; removal of demolished material and the removal of excavated material such as Made Ground and any clean material that cannot be re-used on-site.
 - Construction – installation of retaining features, foundations, highway and drainage infrastructure, installation of utilities and buildings.

- Landscaping – including soil preparation, seeding, vegetation and tree planting; establishment of green species.

Surface Water Run-off and Sediment Control

- 10.126 According to the guidance contained in CIRIA (2001), the most common instance of water pollution from construction sites is from suspended solids/sediments. Possible sources of suspended solids from the construction of the Proposed Development include:
- excavations;
 - exposed ground or stockpiles;
 - plant and wheel washing;
 - build-up of dust and mud on Site roads;
 - pumping of contaminated surface water and/or groundwater accumulated on the Site; and
 - disturbance of water bodies on/adjacent to the Site.
- 10.127 Sediment pollution is the primary pollutant in rainwater run-off from construction sites, largely arising from the erosion and stockpiling of exposed soils (CIRIA, 2006, p. 129). During the earthworks phase and reprofiling of the Site, excavated material will be disturbed and relocated. Subsequently, loose material and suspended solids from construction work may adversely affect waterbodies during rainfall events.
- 10.128 Whilst earthworks are being undertaken, areas of the Site previously covered by Made Ground could be exposed and surface water run-off dispersing over this material may result in contaminants leaching into the underlying groundwater and consequently the underlying Secondary A aquifer.
- 10.129 Earthworks and construction works on the Site have the potential to result in a short-term disruption to the rate at which surface water or rainfall infiltrates through the soil. The movement of construction traffic may disturb the upper portions of the ground surface within the construction site, where subsequent compacting may further alter the degree of surface water infiltration and run-off. The compaction of soils can effectively create an impermeable surface, increasing the volume and rate of surface water run-off from a construction site, which may lead to flooding during a rainfall event if not managed properly.
- 10.130 Oil, diesel and petrol are common on construction sites. The consequences of a spillage or leakage from construction traffic or machinery could have a large impact on nearby waterbodies and groundwater. Surface water run-off from the Site compound may also mobilise silt, oil and other chemicals. In addition, oils fuels and/or other chemicals may be mobilised during vehicle wash down activities. The formation of hydrocarbons has the ability to enter nearby waterbodies and lead to a build-up of a film on surface water, which has the potential to reduce the amount of oxygen in the water, posing a significant effect on aquatic ecosystems (if present).
- 10.131 Site run-off may also adversely impact any SuDS in place at the Site if the construction of the Proposed Development is not phased appropriately or if the SuDS are not protected during the works.
- 10.132 Prior to mitigation, the potential impacts are considered to be moderate adverse on the FPD overflow and River Cam (moderate sensitivity) and major adverse on the Secondary A aquifer underlying the Site (moderate sensitivity). The FPD (moderate sensitivity) is located upstream

of the Site and so the potential impacts from construction operations are mostly limited to secondary impacts originating from the connected FPD overflow (e.g. damage/blockage); the potential impacts are therefore considered to be minor adverse. As the Principal bedrock aquifer (high sensitivity) is remote from the Site in an area not likely to be affected by construction operations, the potential impact would be neutral.

10.133 Given this, based on **Table 10.3**, the likely significance of the effects prior to any mitigation measures being implemented is:

- negligible on the Principal bedrock aquifer to the south-east of the Site;
- minor adverse on the FPD, River Cam, and the FPD overflow; and
- moderate adverse significant on the Secondary A aquifer underlying the Site.

Pollutive Activities from Site Compound

10.134 Poor security of the Site compound may lead to a potential risk of vandalism of the Site compound containing plant and materials. This could cause pollution from oil, fuel, concrete and other chemicals that may need to be stored. Poor storage of materials and fuel could lead to leaks or accidental spillages.

10.135 If this risk was to occur, prior to mitigation, the potential impacts are considered to be moderate adverse on the FPD overflow and River Cam (moderate sensitivity) and major adverse on the Secondary A aquifer underlying the Site (moderate sensitivity). The FPD (moderate sensitivity) is located upstream of the Site and so the potential impacts are considered to be minor adverse. As the Principal bedrock aquifer (high sensitivity) is remote from the Site in an area not likely to be affected by construction operations, the potential impact would be neutral.

10.136 Given this, based on **Table 10.3**, the likely significance of the effects prior to any mitigation measures being implemented is:

- negligible on the Principal bedrock aquifer to the south-east of the Site;
- minor adverse on the FPD, minor adverse on the River Cam, and the FPD overflow; and
- moderate adverse significant on the Secondary A aquifer underlying the Site.

Piling for Foundations

10.137 The piling of foundations for some buildings may be required in certain areas, depending on the depth of made ground and the final levels design. If piling is required, it has the potential to create source-receptor pathways for the migration of contaminants (already present in the ground and from construction activities) to enter the underlying secondary aquifer.

10.138 Under the WFD Groundwater Daughter Directive (Directive 2006/118/EC, 2006), all groundwater should be offered an appropriate level of protection. The Proposed Development is not located within a groundwater SPZ and there are no groundwater abstractions within 500m of the Site.

10.139 The potential impacts are considered to be minor adverse on the FPD overflow and River Cam (moderate sensitivity) and major adverse on the Secondary A aquifer underlying the Site (moderate sensitivity). The FPD (moderate sensitivity) is located upstream of the Site and so the potential impacts are considered to be minor adverse. The Gault Formation bedrock underlying the Site is classified as unproductive strata; piling into this solid geology is therefore not likely to

have any material adverse effects on the neighbouring Principal aquifer (high sensitivity) to the south-east of the Site, leading to a neutral impact.

10.140 Given this, based on **Table 10.3**, the likely significance of the effect prior to any mitigation measures being implemented is:

- negligible on the Principal bedrock aquifer to the south-east of the Site;
- minor adverse on the River Cam, FPD, and FPD overflow; and
- moderate adverse significant on the Secondary A aquifer underlying the Site.

Dewatering Operations, Over-Pumping and Excavations

10.141 Groundwater at the Site may be shallow in areas where the Gault Formation bedrock is close to the surface, which is likely to be the case over a large proportion of the Site. Subsequently, any excavations made during earthworks and construction could potentially require dewatering. Dewatering activities may cause contamination of groundwater from leaking submersible pumps, construction plant and vehicles. Shallow groundwater may also provide a potential pathway to the underlying aquifer and associated surface water features. Excavations to create the proposed basements may be prone to groundwater flooding and may require regular/ constant dewatering operations during construction.

10.142 Any deterioration in water quality and water supply may have an associated impact on aquatic ecology and human health. The potential impacts are considered to be moderate adverse on the FPD overflow and River Cam (moderate sensitivity) and major adverse on the Secondary A aquifer underlying the Site (moderate sensitivity). The FPD (moderate sensitivity) is located upstream of the Site and so the potential impacts from construction operations are mostly limited to secondary impacts originating from the connected FPD overflow (e.g. damage/ blockage); the potential impacts are therefore considered to be minor adverse. As the Principal bedrock aquifer (high sensitivity) is remote from the Site in an area not likely to be affected by construction operations, the potential impact would be neutral.

10.143 Given this, based on **Table 10.3**, the likely significance of the effects prior to any mitigation measures being implemented is:

- negligible on the Principal bedrock aquifer to the south-east of the Site;
- minor adverse on the FPD, River Cam, the FPD overflow; and
- moderate adverse significant on the Secondary A aquifer underlying the Site.

Works in or Near Water

10.144 The Site is located within Flood Zone 1 and is therefore at very low risk of fluvial flooding. The FPD overflow is a culverted watercourse as it passes through the Site and there will therefore be minimal risk of workers falling in during most of the construction phase, with the exception of the works to divert the FPD overflow on-site, which will require working in and around the watercourse.

10.145 The magnitude of this impact is considered to be major adverse on a receptor (human), which is considered to be of very high value. Given this, the likely effect of the potential impact is of major adverse significance according to **Table 10.3**. It should be noted that this effect only affects those working on-site (human receptors) during part of the construction phase (a temporary risk) and not the water receptors identified in **Table 10.4**.

Operational Effects

10.146 Long term impacts principally relate to a change in land use resulting in potential impacts on flood risk, wastewater drainage and the water quality of the key receptors identified.

Flood Risk

10.147 As previously mentioned, the Site is located entirely within Flood Zone 1 and is therefore at very low risk of fluvial flooding from the River Cam. In accordance with Table 3 of the NPPF 'Flood Risk and Coastal Change' section, all vulnerability classifications are appropriate for development within Flood Zone 1. The Proposed Development therefore meets the requirements of the Sequential Test and is considered to be an appropriate type of development for this Site.

10.148 The potential impact of developing within Flood Zone 1 is considered to be neutral on a receptor of low sensitivity (the River Cam), resulting in a negligible effect.

10.149 With the exception of groundwater, the risk of flooding from other sources at the Site (surface water, sewers; and reservoirs, canals, and other artificial sources) is low. Reference should be made to the FRA included at **Appendix 10.1** for further details of the assessment. The impact of these sources of flood risk is therefore neutral and the significance of the effect is negligible. However, there is anecdotal evidence that the existing car park within the Site does suffer from localised flooding due to the insufficient drainage system that serves the car park. The redevelopment of the Site will introduce a new surface water drainage system (refer to **Appendix 10.1**), which will be designed to ensure that the surface water drainage system does not flood for all storm events up to the 30 year event and that any exceedance flows will be managed and directed toward areas of green/blue infrastructure within the Site and away from More Vulnerable areas and users of the Proposed Development. The impact to occupants and users of the Proposed Development will be minor beneficial on receptors of very high sensitivity, which according to **Table 10.3** would lead to a moderate beneficial significant effect.

10.150 Due to the presence of shallow groundwater across the Site, groundwater flood risk is assessed to be medium to high. The Proposed Development includes the construction of below-ground structures including basements, as well as below-ground infrastructure such as drainage and attenuation storage. Groundwater flooding is much slower to occur than other forms of flooding (such as fluvial or surface water) and often lasts much longer. The impact to occupants and visitors (human receptors - very high sensitivity) is therefore minor adverse. Without mitigation measures, providing basements across the Site could interrupt the hydraulic continuity of the underlying Secondary A aquifer, potentially causing localised groundwater flooding; the impact on the Secondary A aquifer (moderate sensitivity) is therefore considered to be major adverse.

10.151 The bedrock aquifer is remote from the Site and is not likely to be affected by flooding at the Site. The impact of flooding on the Principal bedrock aquifer is therefore considered to be neutral.

10.152 Given this, based on **Table 10.3**, the likely significance of the effect of flooding prior to any mitigation measures being implemented is:

- negligible on the River Cam, FPD, FPD overflow, and the Principal bedrock aquifer to the south-east of the Site;
- moderate adverse significant on human receptors (occupants/visitors) and the Secondary A aquifer underlying the Site; and
- moderate beneficial significant on human receptors (occupants/visitors).

Surface Water Run-off

- 10.153 The Proposed Development will include areas of hardstanding and roof (i.e. impermeable surfaces). The increase in impermeable surfaces across the Site will reduce the ability for rainfall to infiltrate into the underlying strata, which will increase the rate and volume of surface water run-off from the Site. Without mitigation, this would result in greater volumes and rates of uncontrolled surface water run-off travelling overland towards lower lying ground, potentially resulting in flooding of the Site and land to the south and east, which includes Cambridge North Railway Station, the Novotel, Office, and the Fen Railway Line.
- 10.154 Run-off from paved areas such as roads and parking areas is more likely to contain pollutants from vehicles (e.g. oil, petrol, diesel). Without suitable mitigation, drainage of run-off from these areas has the potential to drain pollutants into downstream waterbodies (i.e. the FPD overflow and the River Cam).
- 10.155 If surface water run-off is not managed effectively and in line with current national and local policy, the potential magnitude of the impacts relating to surface water flood risk and pollutants associated with run-off are considered to be major adverse on humans (on- and off-site, very high sensitivity receptors).
- 10.156 The potential impact on the FPD overflow and the downstream River Cam (moderate sensitivity) is considered to be major adverse. The potential impact on the FPD (moderate sensitivity) is considered to be minor adverse.
- 10.157 Conversely, the introduction of impermeable surfaces as a result of the development will introduce a physical barrier preventing the infiltration of rainfall into the ground within developed areas of the Site, effectively disrupting pollution linkages between the contaminated ground and the underlying aquifer, retarding the pollution of the aquifer. The potential impact on the Secondary A Aquifer and the nearby River Cam (both moderate sensitivity) is considered to be minor beneficial.
- 10.158 It is unlikely that surface water run-off generated from the Proposed Development will have an impact on the Principal aquifer 300m to the south-east of the Site (high sensitivity) as this receptor is remote and potential overland flow routes are severed by the Fen Railway Line running between the Site and the aquifer; therefore the impact is neutral.
- 10.159 Given this, based on **Table 10.3**, the likely potential significance of the effects on the identified receptors is summarised below:
- FPD overflow – moderate adverse significant effect;
 - River Cam – moderate adverse significant effect (run-off water quality);
 - River Cam – minor beneficial effect (reducing pollution linkages);
 - FPD – minor adverse effect;
 - Secondary A aquifer – minor beneficial effect;
 - Principal aquifer – negligible effect; and
 - Humans (occupants, visitors and people off-site) – major adverse significant effect.

Foul Drainage

- 10.160 The introduction of new built development at the Site will increase the quantity and rate of foul flows discharged to the downstream sewer network compared to the existing situation. Anglian

Water have been consulted to determine the most suitable point of connection to the public sewer network and to assess the Proposed Development in the context of foul sewer capacity requirements. This correspondence is appended to the FRA (**Appendix 10.1**).

- 10.161 Foul water from the Proposed Development will be conveyed via a new foul drainage network to a new pumping station in the south-western corner of the Site, along the western edge of the Cambridgeshire Guided Busway (CGB). The new foul pumping station will pump foul water north through the development to connect to an existing (unused) rising main that runs beneath the cycleway running adjacent to Cowley Road. This rising main will continue to convey foul water west before discharging to a break chamber on the southern side of Cowley Road, near the western corner of the Cambridge Golf Driving Range. From here a new foul gravity connection will cross beneath the open channel FPD and Cowley Road to outfall into the existing Anglian Water trunk sewer that runs south-west to north-east towards the nearby Cambridge WRC.
- 10.162 Connection of the proposed foul drainage systems serving the Proposed Development will not be made until the details of any solution have been approved by Anglian Water. Given this, the likely effect of any impact from foul drainage is of negligible significance.

Mitigation

Construction

- 10.163 To mitigate the short-term impacts relating to the Site clearance and construction phases of the Proposed Development, a Construction Environmental Management Plan (CEMP) (**Appendix 4.2**) will be secured by a planning condition and prepared by the Principal Contractor and the Environmental Manager prior to the construction works. This will be developed in consultation with the EA, CCC as the Lead Local Flood Authority (LLFA), and SCDC for approval prior to commencement of the works. The CEMP will form an overarching planning and guidance document where the contractor must demonstrate how best environmental practice will be implemented and how adverse impacts to the surrounding environment and local community will be minimised.
- 10.164 The CEMP will include a detailed plan for monitoring. This will include, but not be limited to air, noise, dust, surface water, and groundwater; to establish the background conditions. An action plan will be established with trigger levels, and this will be agreed with the regulators. The action plan will define the monitoring requirements and works, and the results will be reviewed throughout the works to confirm that no unacceptable emissions from the Site occur. Should an exceedance occur, the action plan will define what remedial actions must be taken.
- 10.165 The contractor will be required to demonstrate that all site managers, supervisors, foremen and operatives together with security staff will be provided with the relevant training and awareness of Site procedures and best construction practice. Appropriate equipment such as booms and adsorption mats in the event of an accidental spillage or pollution incident will be made available and easily accessible. Site signage should be erected showing who to contact in the event of a spillage or emergency. The EA and/or the relevant local authority (SCDC) should be informed of pollution incidents and action taken.
- 10.166 The following sub-sections detail measures proposed to mitigate the key short-term impacts identified in this Chapter. The CEMP will provide the framework for the following mitigation measures.

Surface Water Run-off and Sediment Control

- 10.167 It is essential that run-off and sediment controls are planned well in advance of works at the Site. An erosion and sediment control plan will be prepared by the Principal Contractor as part of the CEMP and will address activities such as vehicle washing; works in or near water; storage or construction equipment and materials; waste management; and water use and disposal. Control measures need to be inspected regularly, particularly after rainfall events. It is recommended that an inspection and maintenance checklist of control measures is developed. Erosion and sediment controls need to work effectively until disturbed soils are stabilised (i.e. through vegetation and not just until the end of construction).
- 10.168 During initial set up of the Site, there should be designated wheel washing facility and all vehicles will pass through a wheel wash before exiting the Site, the arrangement of which, including the location, are to be agreed with the LLFA.
- 10.169 Since erosion of exposed soil is one of the primary sources of suspended solids, any large areas of exposed soil should be kept covered or contained where possible.
- 10.170 Due to heavy machinery being used around the Site during the construction phase, further compaction of soil may occur. This may reduce infiltration rates further and lead to excess run-off across the Site. The effects from this could be reduced by restricting movements of larger vehicles around the Site or by confining such movements to designated haul roads.
- 10.171 During the infrastructure construction period, haul roads should be kept clear of mud deposits and pedestrian routes should be set up and maintained. Haul roads should be damped down during dry and windy periods to minimise dust. A road sweeper should be employed at regular intervals to keep the public roads clear of mud.
- 10.172 Water from dewatering operations (if required) should pass through a settling basin to allow suspended solids to settle out.

Pollutive Activities from Site Compound

- 10.173 The overall design of the construction site layout, location of site offices, temporary services and other facilities, security measures and plant operational areas should be substantially completed before mobilisation. The design of the Site compound should ensure that stockpiling areas, fuel and plant stores, vehicle cleaning, waste disposal points and refuelling areas are located where they are least likely to affect the water environment and enter the surface water drainage system.
- 10.174 The Site compound should be secured as far as is reasonably practicable against illegal entry and vandalism. Fuels should be stored in dedicated bunded areas within water-tight containers to prevent leakage and away from identified sensitive receptors, where possible. All refuelling of plant and machinery at the Site should be carried out from an agreed central refuelling point. Where refuelling at a central refuelling point proves impractical, bowsers complete with spill kits should be deployed and operated by a trained person or team. Where there is a risk that plant or vehicles could collide with or damage a fuel storage area, the installation of heavy-duty barriers between the fuel storage tank and areas where plant and vehicles operate should be considered. Plant should also be regularly inspected to avoid fuel leaks and potential pollution of groundwater.

Piling for Foundations

- 10.175 If piling is required, then the proposed technique and foundation design will be carried out in consultation with the EA, taking into account the potential impact of creating source/receptor pathways to the Secondary A aquifer beneath the Site. Where technically and economically acceptable, the pile type will be selected to minimise this risk.

Dewatering Operations, Over-Pumping and Excavations

- 10.176 The first priority in controlled dewatering is to minimise the water ingress into the excavation using sheet piles, diaphragm walls and other groundwater exclusion techniques. If excavation and dewatering activities are required, then advice from the EA will be sought by the Principal Contractor as to whether an abstraction licence is required if the extraction of more than 20m³ of water per day is proposed. Consequently, advice will also be sought from the EA with regards to the discharge of extracted water and whether a bespoke permit is required.
- 10.177 Boreholes can be used to monitor and observe changes in groundwater. However, this technique is intrusive and should be appropriately designed to collect accurate information. Any site investigation will be undertaken in such a way that it protects human health and the natural and built environment and should also be carried out in accordance with the Code of Practice for Ground Investigations (BSI, 2020).
- 10.178 The disposal of silty abstracted water may require a bespoke environmental permit. Advice from the EA will be sought by the Principal Contractor at an early stage of the construction phase to establish whether this is required. Pumped water will be disposed of into grassed land, infiltration/settlement basins, "siltbuster" or similar. Pumping will be at a slow rate to allow water to infiltrate and prevent scouring. Dewatering pumps will be mounted on a tray to catch fuel, and these will be drained regularly. Drip trays will be sized to hold 110% of the plant's fuel capacity. Mats will also be available to be used in the event of a spillage in order to mop up excess diesel on the surface or groundwater.

Works in or Near Water

- 10.179 Works in or near an ordinary watercourse/awarded watercourse require approval from the LLFA in the form of a Land Drainage Consent (LDC). As part of the application process for a LDC the LLFA will review all submitted information to ensure that all environmental risks have been considered as part of each activity within or near to the watercourse. The result of this environmental risk assessment process is the identification of all appropriate mitigation measures required to be set in place (by way of temporary works method statements) to ensure the safety of staff and the environment in the event of a pollution incident or flood event.
- 10.180 Mitigation measures will include preparing emergency procedures and a Site Management Plan, so construction staff understand how to react and respond during a flood event or pollution incident.
- 10.181 The effects of construction and frequency and magnitude of impact will be significantly reduced provided the CEMP and temporary works method statements set out in the LDC are complied with.

Operational

- 10.182 The long-term impacts of the Proposed Development and appropriate mitigation measures relating to flood risk and drainage are fully detailed in the FRA and Drainage Strategy (**Appendix 10.1**) and are summarised below.

Flood Risk

- 10.183 The Site is at low risk of flooding from most sources, with the exception of groundwater, which is considered to present a medium-high flood risk. The following additional measures will be implemented to mitigate the risk of groundwater flooding at the Proposed Development.
- 10.184 To protect proposed basements from groundwater ingress an impermeable geo-membrane is prescribed to surround and coat the below ground concrete structure. The proposed basements will be waterproofed to the appropriate standard specified within the relevant Code of practice (BSI, 2022).
- 10.185 To mitigate the potential effects of below ground structures blocking established flow paths for groundwater, granular corridors will be provided underneath and around the basements to facilitate the flow of water from one side of the basement to the other.
- 10.186 The Sustainable Drainage Systems (SuDS) on-site in the form of buried tanks, the swale, and the attenuation basin (see **Appendix 10.1** for details of the proposed SuDS) will all be lined with impermeable membranes and pinned down to prevent the ingress of groundwater.
- 10.187 Further to the groundwater flood risk mitigation measures set out above, further measures will be incorporated at the detailed design stage to provide additional mitigation against surface water flooding during exceedance events (rainfall events with return periods beyond that for which the surface water drainage system was designed, or in the event of a blockage). These are summarised below.
- 10.188 The layout and landscaping of the Proposed Development will be designed to ensure that exceedance flood flow paths are routed away from vulnerable development and towards landscaped areas, areas of open attenuation or surrounding green infrastructure.
- 10.189 In line with Building Regulations, Finished Floor Levels (FFLs) of the properties will be set at least 150mm above the surrounding ground levels to prevent surface water ingress through doorways.
- 10.190 Minor modifications to topography, the profile of the roads, footpaths or kerbs and strategically placed green infrastructure will be developed to ensure that exceedance flood flows are managed and that there is little or no risk of property flooding or unacceptable ponding within the highway.

Surface Water Run-off

- 10.191 The extent of impermeable surfaces will increase as a consequence of the Proposed Development. Cambridgeshire County Council (as LLFA) will require new development to sustainably manage surface water by incorporating Sustainable Drainage Systems (SuDS) to minimise flood risk, improve water quality, and protect and enhance the amenity and biodiversity value of the Site. The flood risk mitigation measures set out in the FRA will be secured by pre-commencement planning conditions or by the LDC process.
- 10.192 As such, the Proposed Development will include the management of surface water run-off through SuDS in order to:
- address the existing surface water flood risk associated with the inadequate car park drainage;
 - control the risk of flooding on- and off-site associated with Proposed Development run-off by discharging surface water run-off at rates agreed with SCDC;

- improve the quality of run-off by removing and/or treating pollutants and provide an environmental buffer for accidental spills or unexpected high pollutant loadings from the Site; and
- provide landscaped open spaces that support a wide variety of plant and animal life, while also offering amenity benefits to future users of the Site.

- 10.193 The Drainage Strategy (included at **Appendix 10.1**) principally comprises SuDS features such as green roofs, attenuation tanks, an attenuation basin and a conveyance swale. As part of the detailed design phase further opportunities to incorporate additional SuDS will be explored (e.g. permeable paving and bioretention units) to provide further benefits to surface water run-off. The detailed design of the surface water drainage systems will be subject to approval through pre-commencement planning conditions.
- 10.194 A management and maintenance plan will be secured by planning condition and implemented prior to occupation to ensure that the SuDS remain in good condition and operable, minimising the risk of blockage and flooding.
- 10.195 The Proposed Development will divert rainfall that currently soaks into the ground (including areas of potentially contaminated Made Ground) into a dedicated drainage network. The risk of water potentially leaching contaminants into deeper strata beneath the Site will therefore be reduced.

Foul Drainage

- 10.196 The Proposed Development will not have an adverse impact on the existing sewerage network as the regulator and Applicant will ensure that sufficient capacity is provided within the network before foul flows are discharged from the Proposed Development. As such no further action in terms of mitigation is required.

Residual Effects

- 10.197 The above assessment demonstrates how impacts may persist post-mitigation and how these may be beneficial/adverse when compared to the existing situation.
- 10.198 Generally, as the construction period of a development is short when compared to the overall lifetime of a development, any impact (including pollution of a watercourse through an increase in suspended solids, fuels, cement etc. and subsequent changes to water quality) would be considered short term.
- 10.199 The operational period in its nature is long term and as such any impacts post-mitigation should be of beneficial or negligible effect, where viable. Overall, it has been concluded that any potential impacts likely to arise as part of the construction of the Proposed Development would be negligible in nature once mitigation has been incorporated. However, there may be a residual operational effect on the water quality of receiving surface waters, such as the River Cam, as the downstream receptor of surface water discharged from the Site. Due to viability reasons, there is limited opportunity for the development to offer open attenuation SuDS (e.g. ponds, basins, and wetlands). Therefore, a proportion of the Proposed Development will drain directly into attenuation tanks, which offer a nominal level of treatment before being discharged into the FPD overflow channel. This overflow channel then outfalls to the River Cam to the east of the Site. As such this long-term operational impact is considered to give rise to a minor adverse effect to the FPD overflow and the River Cam.

- 10.200 Conversely, however, by the very nature of developing the Site and introducing further mitigation measures, the Proposed Development will reduce the formation and perpetuation of pollution linkages between the existing contamination present within the Site and the underlying Secondary A aquifer, resulting in a minor beneficial effect. Overall therefore the Proposed Development will result in a minor adverse effect associated with run-off water quality on the FPD Overflow and the River Cam but a minor beneficial effect on the Secondary A Aquifer beneath the Site and the River Cam (through improvement of the quality of groundwater migrating from the Site to the River).
- 10.201 Through provision of new surface water drainage infrastructure including SuDS, the Proposed Development will address the existing surface water flooding issues associated with the car park resulting in a moderate beneficial significant effect on human receptors (occupiers and visitors) associated with mitigation of existing surface water flooding issues.
- 10.202 However, there is always the potential for a residual effect in terms of flooding and drainage where a storm and/or flood event can exceed the design standards of the development. For example, in the event of an extreme storm, where the intensity of rainfall is so great that it cannot physically enter the drainage system, surface water is generated and can potentially flood the Site and flow onto neighbouring properties. It is not reasonably practicable to mitigate against extreme events by further increasing the design specification of the proposed drainage infrastructure (i.e. the size of SuDS and pipes) above UK drainage design standards. Therefore, to mitigate this residual impact as far as reasonably practicable, the Site layout will be profiled and designed to channel excess surface water via the highway infrastructure, away from buildings and towards landscaped or undeveloped areas. By integrating exceedance flood routing into the layout and levels design, the Proposed Development will provide a proportionate level of mitigation against extreme flood events that offers a suitable balance between risk and cost; the residual effect associated with flood risk is therefore considered to be neutral on human receptors (occupiers, visitors, and others off-site) resulting in a negligible effect.
- 10.203 To summarise, following the implementation of the mitigation measures set out in this Chapter, the residual effects associated with the Proposed Development during the construction phase will be negligible and the residual effects associated with the Proposed Development during the operational phase will be moderate beneficial, minor beneficial, negligible or minor adverse. Given this, there will be no significant adverse residual effects over the life of the Proposed Development and there will be a significant beneficial effect associated with mitigation of existing surface water flooding issues.

Monitoring

- 10.204 During the construction phase, the CEMP will set out all of the mitigation measures required, including an emergency response plan and EA emergency hotline. All construction staff should be trained and debriefed on the Site-specific risks and mitigation measures required prior to any works taking place on the Site. The Site Manager should ensure that all construction workers should be familiar with the CEMP. The Principal Contractor will be responsible for implementing and monitoring the effectiveness of these measures.
- 10.205 At the operational phase, the on-site SuDS systems and associated surface water drainage infrastructure will be maintained by an appointed management company. An adoption agreement between the Site developer and the maintenance company can be largely based upon the CIRIA ICoP MA2 SuDS Maintenance Framework Agreement.

- 10.206 Drainage serving new roads to be offered for adoption by the Local Highway Authority (LHA) will become highway drains, adopted as part of Section 38 agreements (Highways Act 1980).
- 10.207 It is anticipated that the proposed foul sewer network will be offered to Anglian Water for adoption under Section 104 of the Water Industry Act 1991. To meet the requirements for adoption, the proposed infrastructure must be designed and constructed according to Sewerage Sector Guidance – Design & Construction Guidance v2 (Water UK, 2020). Maintenance of the adopted foul sewer network will be the responsibility of Anglian Water.

Cumulative Effects

- 10.208 A schedule of projects for consideration within the assessment of cumulative effects has been agreed during the scoping stage. This includes the following developments:

21/02450/REM

- 10.209 This is a Reserved Matters application for 421 new homes with associated infrastructure, internal roads and open space at Land North of Newmarket Road, Cambridge, CB5 8AA. The development is located approx. 1.9km from the Site.
- 10.210 The construction of this development is likely to coincide with the construction of the Proposed Development.

20/03523/FUL and 20/03524/FUL

- 10.211 These applications are linked to development of Land in the North West Part of the St Johns Innovation Park, Cowley Road, Cambridge, CB4 0WS. The development is located approx. 1.3km north-west of the Site.

- 10.212 The development comprises construction of two commercial buildings (5- and 6-storeys), a transport hub, gymnasium, surface parking, landscaping and associated infrastructure including upgrades to the existing access road and Cowley Road. The existing building on-site (St John's House) and associated structures will be demolished.

21/04640/SCOP

- 10.213 This application is a request for a scoping opinion for an order granting development consent for the relocation of the Cambridge Waste-Water Treatment Plant, currently located approx. 0.9km north of the Site.

- 10.214 The Proposed Development will discharge foul water to Anglian Water sewers that flow to the existing Cambridge Waste-Water Treatment Plant. Management of the sewer network (including strategic planning for additional flows from new development and the associated treatment requirements) is the responsibility of Anglian Water as the statutory sewerage undertaker for the area.

- 10.215 Treatment of wastewater will continue at the existing Waste-Water Treatment Plant until the construction of the new plant is complete. Once the new plant is operational, flows from sewers draining to the existing plant will need to be diverted to the new plant site. Anglian Water will be responsible for planning and implementing the transition.

17/1616/CTY

- 10.216 This application is for an EIA scoping opinion for the proposed Waterbeach New Town development at Waterbeach Barracks and Airfield Site, Waterbeach, Cambridgeshire. The Proposed Development is located approx. 6.3km north-east of the Site.

Assessment of Cumulative Effects

- 10.217 The cumulation of these developments will have an impact on foul water discharged to the public sewer network. However, as with all planned growth, statutory undertakers are obliged to programme reinforcement works to water supply and wastewater infrastructure to ensure there is capacity for future growth. As such the cumulative impact on water resources and drainage infrastructure is considered to be negligible, resulting in no significant effect.
- 10.218 Flood risk and drainage impacts associated with the Site affect the land occupied by the Site itself and the nearby water bodies (the River Cam, the FPD and overflow, and the aquifers). In accordance with local and national policy requirements, all new development must ensure that there is no adverse impact on flood risk on- or off-site. As such the cumulative impact on flood risk and drainage is considered to be negligible, resulting in no significant effect.
- 10.219 It is considered that there would not be any cumulative impacts associated with any new developments within the area from a flood risk and drainage perspective, as all developments would adhere to the same principles as outlined in the NPPF and local planning policy with regard to reducing flood risk and limited surface water run-off to greenfield or agreed run-off rates.
- 10.220 Regarding the relocation of the Cambridge Waste-Water Treatment Plant, it is assumed that the objective of relocating the works is to improve its sewage treatment capacity and improve the water quality output to the River Cam, providing a beneficial effect.

Conclusions and Summary of Effects

- 10.221 This assessment of the Site in relation to Flood Risk and Drainage has been undertaken in consultation with statutory consultees and in line with current legislation, policy, and best practice guidance.
- 10.222 Baseline conditions have been established using readily available information, including web-based information, topographical surveys, previous planning reports and other material submitted with this planning application.
- 10.223 This information has been used to identify five key water receptors and the associated sensitivity/value of each of these receptors, which include:
- The River Cam (Moderate Sensitivity);
 - The First Public Drain (Moderate Sensitivity);
 - The First Public Drain Overflow (Moderate Sensitivity);
 - Principal bedrock aquifer (High Sensitivity); and
 - Secondary A superficial aquifer (Moderate Sensitivity).
- 10.224 Construction workers, as well as site occupiers, visitors, and other members of the public have also been identified as receptors. These are collectively identified throughout this assessment as human receptors (very high sensitivity).
- 10.225 Potential impacts with respect to the Site clearance, construction and operational phases of the Proposed Development on these key receptors and their effects have been identified as part of this assessment. The key likely significant effects of these activities potentially result in:

- increasing local flood risk; and
- the mobilisation of silt and other contaminants resulting in the pollution of surface and groundwater bodies.

10.226 However, in terms of flood risk the assessment has demonstrated that providing the mitigation measures identified in this assessment and supporting FRA and Drainage Strategy (**Appendix 10.1**) are adhered to, the Proposed Development will sustainably manage the drainage of the Site and flood risk (both on- and off-site) for its lifetime, accounting for the effects of climate change.

10.227 The assessment has concluded that in the long term there will be a minor adverse significant effect on the quality of the receiving surface waters such as the FPD Overflow and the River Cam. However, the development of the Site will impede the perpetuation of pollution linkages between existing contaminated ground and the underlying Secondary A aquifer and nearby River Cam, resulting in a minor beneficial effect. In addition, surface water flood risk associated with the poor drainage of the existing car park on-site will be removed, resulting in a moderate beneficial significant effect on human receptors (occupiers and visitors).

10.228 **Table 10.5** contains a summary of the likely significant effects of the Proposed Development.

Table 10.5: Summary of Impacts: Flood Risk and Drainage

DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION	IMPACT AFTER MITIGATION (RESIDUAL)			
				ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/ LONG TERM	SIGNIFICANCE		ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/ LONG TERM	SIGNIFICANCE
Surface Water Run-off and Sediment Control	Nat	High (Principal Bedrock Aquifer)	Neu	Neu	Irrev	ST	Neg	CEMP to be secured by planning conditions/ necessary permitting and consents required from the EA/LLFA. Design and management of the Proposed Development in accordance with industry standard practice, guidance and regulation. Construction of development should be phased appropriately to protect permanent drainage system and SuDS.	Neu	Irrev	ST	Neg
	Dist	Moderate (FPD)	Min	Adv	Rev	ST	Min		Neu	Rev	ST	Neg
	Reg	Moderate (R. Cam)	Mod	Adv	Rev	ST	Min		Neu	Rev	ST	Neg
	Dist	Moderate (FPD Overflow)	Mod	Adv	Rev	ST	Min		Neu	Rev	ST	Neg
	Reg	Moderate (Secondary A Aquifer)	Maj	Adv	Irrev	ST	Mod		Neu	Irrev	ST	Neg
				Neu	Neu	Irrev	ST		Neg	Neu	Irrev	ST
Pollutive Activities from the Site Compound	Nat	High (Principal Bedrock Aquifer)	Neu	Neu	Irrev	ST	Neg	CEMP to be secured by planning condition.	Neu	Irrev	ST	Neg
	Dist	Moderate (FPD)	Min	Adv	Rev	ST	Min		Neu	Rev	ST	Neg
	Reg	Moderate (R. Cam)	Mod	Adv	Rev	ST	Min		Neu	Rev	ST	Neg
	Dist	Moderate (FPD Overflow)	Mod	Adv	Rev	ST	Min		Neu	Rev	ST	Neg
	Reg	Moderate (Secondary A Aquifer)	Maj	Adv	Irrev	ST	Mod		Neu	Irrev	ST	Neg

DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION	IMPACT AFTER MITIGATION (RESIDUAL)			
				ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/ LONG TERM	SIGNIFICANCE		ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/ LONG TERM	SIGNIFICANCE
Piling for Foundations	Nat	High (Principal Bedrock Aquifer)	Neu	Neu	Irrev	ST	Neg	CEMP to be secured by planning condition. Foundation type to be designed in agreement with the EA.	Neu	Irrev	ST	Neg
	Dist	Moderate (FPD)	Min	Adv	Rev	ST	Min		Neu	Rev	ST	Neg
	Reg	Moderate (R. Cam)	Min	Adv	Rev	ST	Min		Neu	Rev	ST	Neg
	Dist	Moderate (FPD Overflow)	Min	Adv	Rev	ST	Min		Neu	Rev	ST	Neg
	Reg	Moderate (Secondary A Aquifer)	Maj	Adv	Irrev	ST	Mod		Neu	Irrev	ST	Neg
Dewatering Operations, Over-Pumping and Excavations	Nat	High (Principal Bedrock Aquifer)	Neu	Neu	Irrev	ST	Neg	CEMP to be secured by planning condition. Any site investigation will be undertaken in such a way that protects human health and the natural environment and should also be carried out in accordance with BS 5930:2015+A1:2020 Code of practice for ground investigations. Permit to work and relevant consents for the abstraction and disposal of water will be sought from the EA prior to construction as required. Diversion of the FPD overflow culvert will be managed through Land Drainage Consent (LDC) to be obtained from the LLFA.	Neu	Irrev	ST	Neg
	Dist	Moderate (FPD)	Min	Adv	Rev	ST	Min		Neu	Rev	ST	Neg
	Reg	Moderate (R. Cam)	Mod	Adv	Rev	ST	Min		Neu	Rev	ST	Neg
	Dist	Moderate (FPD Overflow)	Mod	Adv	Rev	ST	Min		Neu	Rev	ST	Neg
	Reg	Moderate (Secondary A Aquifer)	Maj	Adv	Irrev	ST	Mod		Neu	Irrev	ST	Neg

DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION	IMPACT AFTER MITIGATION (RESIDUAL)			
				ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE		ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE
Work on or Near Water	Nat	Very High (Human)	Maj	Adv	Irrev	ST	Maj	CEMP to be secured by planning condition. Permit to work and relevant consents will be sought from the EA and LLFA prior to construction.	Neu	Irrev	ST	Neg
Flood Risk	Nat	High (Principal Bedrock Aquifer)	Neu	Neu	Rev	LT	Neg	Surface water run-off attenuated to suitable maximum rates (agreed through consultation with SCDC) through use of SuDS, to manage flood risk on- and off-site. Design to incorporate suitable groundwater flood risk mitigation measures including: waterproofing basements in accordance with BS 8102:2022; providing granular corridors underneath and around basement structures; setting FFLs 150mm above surrounding ground levels; and design of external levels to manage exceedance flows safely.	Neu	Rev	LT	Neg
	Dist	Moderate (FPD)	Neu	Neu	Rev	LT	Neg		Neu	Rev	LT	Neg
	Reg	Moderate (R. Cam)	Neu	Neu	Rev	LT	Neg		Neu	Rev	LT	Neg
	Dist	Moderate (FPD Overflow)	Neu	Neu	Rev	LT	Neg		Neu	Rev	LT	Neg
	Reg	Moderate (Secondary A Aquifer)	Maj	Adv	Rev	LT	Mod		Neu	Rev	LT	Neg
	Nat	Very High (Human) – groundwater	Min	Adv	Rev	LT	Mod		Neu	Rev	LT	Neg
	Nat	Very High (Human) – surface water	Min	Ben	Rev	LT	Mod		Ben	Rev	LT	Mod
	Nat	Very High (Human) – surface water	Min	Ben	Rev	LT	Mod		Ben	Rev	LT	Mod

DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION	IMPACT AFTER MITIGATION (RESIDUAL)			
				ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE		ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE
Surface Water Run-off	Nat	High (Principal Bedrock Aquifer)	Neu	Neu	Irrev	LT	Neg	<p>The culverted FPD overflow passing through the Site will be diverted to support the proposed arrangement of new structures throughout the Proposed Development. The diversion will be controlled through the LDC process.</p> <p>Surface water run-off will be discharged into the diverted FPD overflow culvert to avoid mobilising any contaminants present within the underlying ground. The FPD overflow culvert outfalls to the River Cam to the east of the Site.</p> <p>Throughout the Site, a multi-functional SuDS network will be specified as part of the surface water drainage strategy design, to provide the necessary water quality improvements to surface water run-off before being discharged. SuDS will include green roofs, rain gardens, swales, tree pits, and attenuation tanks.</p>	Neu	Irrev	LT	Neg
	Reg	Moderate (Secondary A Aquifer)	Min	Ben	Rev	LT	Min		Ben	Rev	LT	Min
	Reg	Moderate (R. Cam) – run-off water quality	Maj	Adv	Irrev	LT	Mod		Adv	Irrev	LT	Min
	Reg	Moderate (R. Cam) – reducing pollution linkages	Min	Ben	Rev	LT	Min		Ben	Rev	LT	Min
	Dist	Moderate (FPD)	Min	Adv	Irrev	LT	Min		Neu	Irrev	LT	Neg
	Dist	Moderate (FPD Overflow)	Maj	Adv	Irrev	LT	Mod		Adv	Irrev	LT	Min
	Nat	Very High (Human)	Maj	Adv	Irrev	LT	Maj		Neu	Rev	LT	Neg

DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION				IMPACT AFTER MITIGATION (RESIDUAL)			
				ADVERSE/BENEFICIAL	IRREVERSIBLE/REVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE	ADVERSE/BENEFICIAL	IRREVERSIBLE/REVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE	ADVERSE/BENEFICIAL	IRREVERSIBLE/REVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE
Foul Drainage	Reg	Moderate (R. Cam)	Neu	Neu	Irrev	LT	Neg	Foul water from the Proposed Development to drain by gravity to a new foul pumping station in the southern corner of the Site. Development foul flows to be pumped north from the new pumping station, along Cowley Road, to discharge into the existing Anglian Water sewer network to the north-west of the Site. Foul water discharge to public sewer system subject to Anglian Water approval.	Neu	Irrev	LT	Neg			

Key:

Nat: National Reg: Regional Min: Minor Maj: Major Irrev: Irreversible LT: Long Term Adv: Adverse
 Dist: District Neu: Neutral Mod: Moderate Ben: Beneficial Rev: Reversible ST: Short Term Neg: Negligible

Human Health



11.0 Human Health

Introduction

11.1 This chapter addresses the effects of the Proposed Development relating to health. It has been prepared by Stantec on behalf of the Applicant with respect to a hybrid planning application at Cambridge North. It should be read in conjunction with:

- Appendix 11.1: Health scoping HUDU matrix
- Appendix 11.2: Health policy and guidance
- Appendix 11.3: Study area health profiles

Potential Impacts

11.2 The World Health Organisation (WHO) defines health as *“a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity.”* Implicit in the definition is the notion that there are both positive and negative elements of health.

11.3 It is widely accepted that there are direct impacts on health, such as illness, but that health and wellbeing are also influenced by a package of determinants relating to the wider environments in which we live, work and play, as shown in **Figure 11.1**. This assessment looks at factors in each of these environments and assesses how they work individually or together to generate health and wellbeing.



Figure 11.1: Wider Determinants of Health (Source: Dahlgren and Whitehead 1991)

11.4 The Proposed Development will provide 425 new homes, of which 270 will be Built to Rent (BtR).

- 11.5 The Proposed Development will also provide 109,867 sqm of commercial space, including office space, Research & Development space, and flexible Class E and Class F e.g. retail, restaurants/café and/or community use etc.
- 11.6 There will be a mobility hub (multi storey car park with 618 spaces), as well as 418 parking spaces within the basements of the commercial buildings. The residential element will be car free, with the exception of some Blue Badge parking. There will be a 2,191 cycle parking spaces associated with the commercial element, provided through a combination of ground floor and basement parking within commercial buildings. For the residential element, there will be one cycle parking space per bedroom. As the residential element is in outline, the final number and mix will be determined through reserved matters, but the application is for a maximum of 425 units.
- 11.7 A total of 2.05 ha of open space will be provided, including formal and informal children's play space, informal open space, and community growing facilities.
- 11.8 The predicted impacts were identified during scoping by undertaking a Rapid HIA based on the HUDU model (**Appendix 11.1**). It was completed with input from technical consultants (on transport, planning, design, sustainability, drainage, open space and green infrastructure) and discussions with the SCDC Health Officer and Community Development Officer. This approach was agreed by SCDC as set out in the Scoping Report (**Appendix 2.1**). The following wider determinants of health that directly relate to the construction and operation of the Proposed Development have been considered in this chapter:
- Impacts on construction workers with regards to access to active travel, access to work and training, air quality, noise, soil contamination and general construction health and safety.
 - Operational impacts including:
 - Access to open space and nature;
 - Accessibility and active travel;
 - Access to work and training;
 - Access to work in high quality healthy buildings and environment;
 - Access to healthy food;
 - Opportunity to grow social capital; and
 - Crime reduction and community safety.
- 11.9 Since publication of the scoping opinion (**Appendix 2.2**), the proposals now include a residential element of 425 dwellings. As a result, the following wider determinants of health have also been included within the operational assessment:
- Access to healthy housing, including affordability, accessibility and design;
 - Access to social infrastructure;
 - Access to healthcare; and
 - Access to education.
- 11.10 The full scope of this assessment is presented in **Table 11.2** below within the Methodology section.

- 11.11 Construction workers will be impacted only during the construction process, principally in relation to access to active travel options, access to work and training, air quality, noise, soil contamination and general construction health and safety.
- 11.12 The baseline conditions for social infrastructure, climate change, contaminated land, air quality, noise and sustainability have been covered in their respective EIA chapters, but are considered collectively within the assessment of human health below.

Legislation, Policy and Guidance

- 11.13 A review of relevant national and local policy and guidance has been undertaken and set out in **Appendix 11.2**. A summary of key policy and guidance documents is provided below.
- 11.14 There is no legislation that specifically relates to health assessment in EIA.

National Planning Policy

- 11.15 The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and is therefore central to this assessment. The NPPF recognises that supporting community health is part of the social objective of sustainable development and seeks to ensure planning policies and decision support healthy, inclusive and safe places.
- 11.16 A range of other policies support wider determinants of health and wellbeing in development, including provision of social recreation and cultural facilities, access to a network of high-quality open space, promoting accessible transport, supporting high quality communications, achieving well designed spaces, ensuring that patterns of growth help to improve air quality, and avoiding adverse noise impacts.
- 11.17 In addition, the national Planning Policy Guidance (PPG) identifies how positive planning can contribute to healthier communities. Further detail is provided in **Appendix 11.2**.

Local Planning Policy

The South Cambridgeshire Local Plan

- 11.18 The development plan for the Site comprises the South Cambridgeshire Local Plan (adopted September 2018). The Site forms part of a Major Development Site allocation within the adopted Local Plan, under Policy SS/4: Cambridge Northern Fringe East and Cambridge North railway station, for high-quality mixed-use development, primarily for employment within Use Classes B1, B2 and B8 as well as a range of supporting uses, commercial, retail, leisure and residential uses.
- 11.19 **Policy SC/2 Health Impact Assessment** requires HIA of developments that meet specified thresholds, which applies to the Proposed Development:
- 11.20 New development will have a positive impact on the health and wellbeing of new and existing residents. Planning applications for developments of 20 or more dwellings or 1,000m² or more floorspace will be accompanied by a Health Impact Assessment to demonstrate this.
- a) *For developments of 100 or more dwellings or 5,000m² or more floorspace a full Health Impact Assessment will be required;*
 - b) *For developments between 20 to 100 dwellings or 1,000 to 5,000m² or more floorspace the Health Impact Assessment will take the form of an extended screening or rapid Health Impact Assessment.*

11.21 This chapter has been prepared in response to this policy.

11.22 Consideration has also been given to the South Cambridgeshire Health Impact Assessment Supplementary Planning Document (SPD) (2011), which provides guidance on undertaking an HIA. The SPD was adopted by South Cambridgeshire District Council in 2011 to provide guidance to support previously adopted Development Plan Documents that have now been superseded by the South Cambridgeshire Local Plan 2018. However, the SPD still remains a material consideration when making planning decisions, with the weight in decision-making to be determined on a case-by-case basis having regard to consistency with national planning guidance and the adopted South Cambridgeshire Local Plan 2018.

11.23 Many of the adopted Local Plan policies relate to the determinants of health of interest to this Health Assessment. They are listed in **Appendix 11.2** and referred to as appropriate in the assessment section of this chapter.

Emerging North East Cambridge Area Action Plan (NEC AAP)

11.24 The NEC AAP acknowledges that there are health inequalities within Greater Cambridge. Its vision for NEC is:

We want North East Cambridge to be a healthy, inclusive, walkable, low-carbon new city district with a vibrant mix of high quality homes, workplaces, services and social spaces, fully integrated with surrounding neighbourhoods.

11.25 The requirement for a Health Impact Assessment is set out in **Policy 23: Comprehensive and Coordinated Development** which states:

e. The proposal demonstrates health and wellbeing impacts have been fully considered and accommodated for through design of the development and evidenced through the submission of a Health Impact Assessment;

Emerging Greater Cambridge Local Plan

11.26 The Emerging Greater Cambridge Local Plan, when adopted, will replace the South Cambridgeshire Local Plan and Cambridge Local Plan. However, given the early stage of preparation it carries little weight in the decision-making process.

11.27 The proposed policy **WS/HD Creating healthy new developments** would seek to require health principles to be applied to new developments. This policy acknowledges that the ability of individuals to lead healthy lifestyles is deeply influenced by the environment in which they live, and seeks to address the growth in obesity of local residents, particularly in childhood, which is an area of concern in both Cambridge and South Cambridgeshire.

11.28 Other proposed relevant policies are listed in **Appendix 11.2**.

National Guidance on HIA and EIA

11.29 There is a plethora of national and international-level literature regarding the process of Health Impact Assessment (e.g. from the Wales Health Impact Assessment Support Unit, WHIASU) and the links between determinants of health and spatial planning / the built environment. More recently, guidance on health in EIA has been published which has been taken into account in this assessment and in developing the methodology, including the following:

- Health in Environmental Impact Assessment – A Primer for a Proportionate Approach (Institute of Environmental Management and Assessment, 2017);

- Addressing Human Health in Environmental Impact Assessment – Consultation Draft (International Association for Impact Assessment, 2019); and
- Health Impact Assessment in Spatial Planning (Public Health England, 2020).

11.30 Two key documents are considered in more detail in **Appendix 11.2**: The Marmot Review was a study into health inequalities in England, which provides important context; and Healthy Urban Development Unit (HUDU) guidance which has been used to provide a structure for the consideration of determinants.

Guidance Relating to the Determinants of Health

11.31 Health and wellbeing is a central tenet of a broad array of national, sub-regional and local strategies reflecting the inter-relationships between all types of land use, activities, and wellbeing. These are summarised in **Appendix 11.2** and have been used to inform assessment of the significance of health impacts.

11.32 In summary, SCDC current health policy priorities include:

- Tackling Obesity (including increasing physical activity and healthy eating);
- Improving mental health (including relation to obesity and social inclusion / new growth);
- Better health in old age (increasing independence and reducing falls); and
- Protecting child health (including support for disadvantaged and vulnerable families).

Methodology

Study Area

11.33 The geography of health impacts varies according to the type of impact. For example, noise nuisance may be localised, whereas opportunities for growing social capital could extend to an entire neighbourhood. All impacts will be assessed at site level and wider geographies as appropriate.

11.34 The study area for local health profiles includes looking at a district level (i.e. South Cambridgeshire and Greater Cambridgeshire), and at a local level using Lower Super Output Areas (LSOAs). This is shown on **Figure 11.2**.

11.35 As set out in the Scoping Report (**Appendix 2.1**), the study area was identified as they are within 1.5 km of the Proposed Development (actual walking distance from the Site) and 5 km (reasonable actual cycle distance from the Site):

- Cambridge City LSOAs:
 - E01017971
 - E01017972
 - E01017974
 - E01032802
- For the purposes of air quality and noise, the Study Area is based on that used in the relevant topic chapter, with particular reference to the Study Area.
- Wider geographies have also been referred to as appropriate for the determinant under consideration e.g. employment.

11.36 In addition to the Study Area agreed during scoping, the human health baseline has taken account of data at the Middle Super Output Area (MSOA) level. MSOAs have been used because health data is aggregated at this level, enabling direct comparisons between other geographical areas and data sets.

11.37 The local study area equals the MSOA E02003721. In addition, the neighbouring MSOAs E02003721 and E02003724 are where the residential settlements closest to the Site area are located and have therefore been included. Therefore, the following MSOAs will be used to aggregate health data to inform the baseline:

- South Cambridgeshire 007: E02003781
- Cambridge 003: E02003721
- Cambridge 006: E02003724

11.38 The health profiles for these MSOAs can be found in **Appendix 11.3**.

Consultation

11.39 A section on human health was included within the EIA Scoping Report (**Appendix 2.1**) submitted to SCDC on 25th November 2021, which confirmed that a chapter on human health would be prepared for the Environmental Statement. SCDC provided their Scoping Opinion (**Appendix 2.2**) on 9th February 2022, which welcomed the inclusion of human health within the EIA.

11.40 SCDC agreed with the scope and methodology and set out recommendations for topics to be included in the assessment. **Table 11.1** summarises the consultation undertaken and response within this chapter.

11.41 The Statement of Community Involvement (SCI) (Marengo, 2022) submitted with this application outlines the public engagement that has been undertaken. Stakeholders included members of SCDC and CCC, as well as local community groups, between November 2020 and March 2022. Although human health was not explicitly raised, there were comments made on many determinants of human health, including provision of public space and facilities, pollution concerns, improving transport links, and the need for affordable housing. The SCI sets out how the Proposed Development responded to these comments.

11.42 Contact has been sought with NHS Strategic Estates, but no response has been forthcoming.

Table 11.1: Consultation on Human Health ES

CONSULTEE COMMENT	RESPONSE
SCDC SCOPING OPINION	
<i>Para 11.5 of the Scoping Opinion Report includes, at bullet point 3, a number of wider health determinants, but the following NEC AAP evidence documents relating to them have not been referenced in para 11.7 including: Health and Wellbeing Topic Paper; Open Space and Recreation Topic Paper; Environmental Health Topic Paper, Anti-Poverty and Inequality Topic Paper; Skills, Training and Local Employment Opportunities Topic Paper; Community Safety Topic Paper and Transport Topic Paper.</i>	The relevant NEC AAP topic papers have been reviewed and incorporated into the baseline section below.

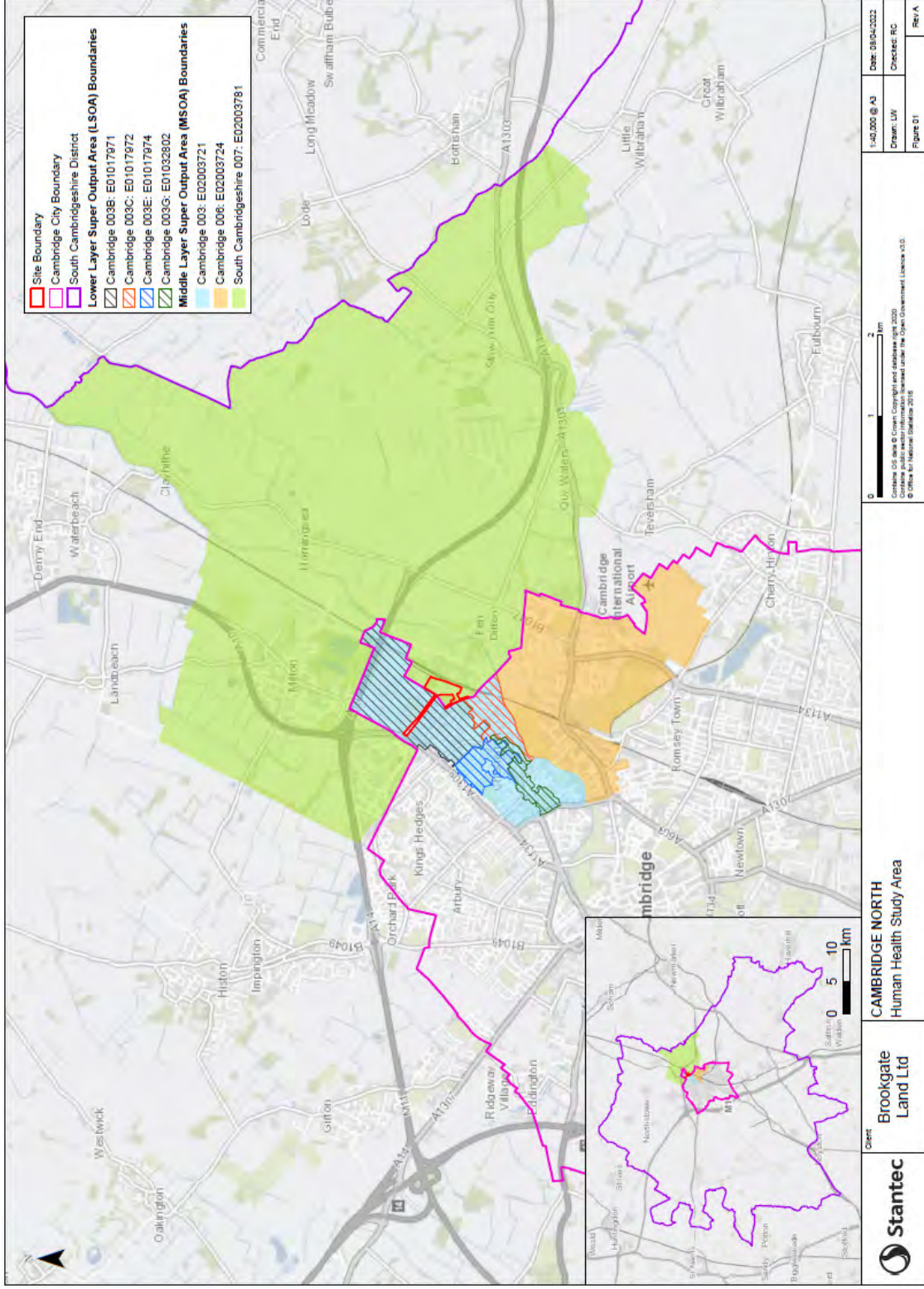


Figure 11.2: Human Health Study Area

CONSULTEE COMMENT	RESPONSE
SCDC SCOPING OPINION	
<i>It is noted at para 11.34 efforts were made to try to contact the Cambridgeshire and Peterborough Clinical Care Group. It is recommended that contact is made with the NEC AAP Health Sub-Group</i>	No suitable contact available. It is recommended that contact made with the NEC AAP group during the detailed design stages, and that the Health Sub-Group is contacted regarding S106 discussions.

Approach to Assessment

11.43 The approach to this assessment involves a desk-top investigation of health and wellbeing impacts. The assessment identifies likely significant effects on relevant receptors in relation to each health determinant. It draws upon other assessments undertaken within the ES of relevance to health and well-being factors, and the approaches used therein, including; Chapter 6 Air Quality, Chapter 7 Climate Change, Chapter 10 Flood Risk and Drainage, Chapter 12 Landscape and Visual, Chapter 14 Noise and Vibration, Chapter 15 Socio-Economics, Chapter 16 Soils and Groundwater, Chapter 17 Transport and Chapter 18 Wind.

11.44 **Table 11.2** indicates the determinants of health that have been considered in this assessment and the associated pathways to specific health and wellbeing outcomes based upon the relevant themes in the HUDU planning checklist. By assessing the Proposed Development against these themes, it is possible to identify the beneficial or adverse effect of the Proposed Development on the health and wellbeing of the receptors and to provide a basis for setting actions for further mitigation and enhancement. Assessment conclusions have also been informed by outcomes expected from successful sustainable new communities (set out in the New Housing Development and the Built Environment Joint Strategic Needs Assessment (JSNA) (2015):

- All people, regardless of their needs, live well independently;
- People are and feel safe;
- People lead a healthy lifestyle;
- Local economy prospers for all; and
- All people have a voice and control in decisions that affect their community.

11.45 The determinants considered are presented within the structure from the NHS London HUDU checklist (see **Table 11.2**) adapted to reflect local priorities, national and local policy and guidance strategies.

Table 11.2: HUDU Checklist – Assessment Framework and Health Issues

THEME	PLANNING ISSUE/ DETERMINANTS OF HEALTH	HEALTH AND WELLBEING ISSUE
Healthy Housing	<ul style="list-style-type: none"> • Accessible housing • Housing mix and affordability • Housing design, including homes to age well • Healthy living 	<ul style="list-style-type: none"> • Lack of living space - overcrowding • Injuries in the home • Economic deprivation

THEME	PLANNING ISSUE/ DETERMINANTS OF HEALTH	HEALTH AND WELLBEING ISSUE
Active Travel	<ul style="list-style-type: none"> • Promote walking and cycling • Safety • Connectivity • Minimising car use 	<ul style="list-style-type: none"> • Physical inactivity, cardiovascular disease, and obesity • Road and traffic injuries • Mental illness from social isolation • Noise and air pollution from traffic
Healthy Environment	<ul style="list-style-type: none"> • Construction • Air quality • Noise • Contaminated land • Access to green space and play space • Biodiversity • Local food growing • Flood risk • Overheating • Climate Change 	<ul style="list-style-type: none"> • Disturbance and stress caused by construction activity • Poor air quality - lung and heart disease • Disturbance from noisy activities and uses • Health risks from toxicity of contaminated land • Physical inactivity, cardiovascular disease and obesity • Mental health benefits from access to nature and green space and water • Opportunities for food growing – active lifestyles, healthy diet and tackling food poverty • Excess summer deaths due to overheating
Vibrant Neighbourhoods	<ul style="list-style-type: none"> • Access to: • Healthcare services • Education • Other social infrastructure • Local employment and healthy workplaces • Local food shops • Public buildings and spaces 	<ul style="list-style-type: none"> • Access to services and health inequalities • Mental illness and poor self-esteem associated with unemployment and poverty • Limited access to healthy food linked to obesity and related diseases • Poor environment leading to physical inactivity • Ill health exacerbated through isolation, lack of social contact and fear of crime

11.46 The likely significant effects within each health determinant, taking embedded mitigation into account, are considered for both construction / demolition and operational phases, where appropriate, and presented within the impact **Tables 11.6 – 11.13**.

Assessment of Significance

11.47 One of the challenges for the assessment of human health in EIA is the absence of guidance or widely adopted terminology for assessing the significance of impacts (Cave et al, 2017). Industry standard approaches entail revising EIA methodology to define significance on a project-by-project basis. The framework EIA methodology for this EIA, as set out in the EIA Scoping Report (**Appendix 2.1**), has been considered and the following bespoke methodology is provided for additional clarity.

11.48 An effect is deemed to be possible where there is a relevant source (aspect of the Proposed Development), pathway (route by which the source affects the receptor - causation) and receptor (recipient that can be affected by the source).

- 11.49 Whilst very localised issues may arise and warrant consideration within the application response, the key consideration with regard to significance is whether it is likely that receptors will experience a change in health outcome and whether this is likely to affect 'population health', as population-based conclusions are the appropriate level at which to consider effects for the purposes of EIA on human health (International Association for Impact Assessment, 'IAIA', 2019).
- 11.50 Qualitative judgement is needed to establish whether a significant effect is likely to occur. This is related to the strength of the evidence base regarding causation, the magnitude of impact and the sensitivity of the receptors. The following questions are considered within the assessment:
- Strength of Evidence
 - What is the strength of the evidence base linking the aspect of the Proposed Development to health outcomes? (e.g. through use of Healthy people healthy places evidence tool (Bird *et al.*, 2018).
 - Have significant effects been identified in other assessments in the ES which are linked to human health? (i.e. are environmental standards threatened).
 - Magnitude of Impact
 - Is the effect at an individual or population level?
 - Is the impact linked to local public health priority objectives? (as identified through review of baseline sources).
 - Is the impact reversible or irreversible?
 - Does the impact occur over the short (less than one year), medium (one to five years) or long (over five years) term?
 - Is the impact permanent or temporary?
 - Does the impact increase or decrease with time?
 - Sensitivity of Receptors
 - Are vulnerable groups (as identified for this assessment) likely to be affected?

Significance

- 11.51 The IAIA guidance (2019) states that the determination of significance should draw from a wider range of relevant information to support professional judgment, including:
- scientific literature;
 - baseline conditions for the population;
 - consultation for the project;
 - health priorities in the jurisdiction;
 - regulatory standards in the jurisdiction; and
 - policy context in the jurisdiction.
- 11.52 With consideration of the above, the assessment has determined significance in accordance with **Table 11.3**.

Table 11.3: Definitions of Significance

SIGNIFICANCE OF EFFECT	DEFINITION	INTENSITY	DURATION
Major Adverse	Substantive pathways to increases in acute or chronic physical and mental diseases or death; on evidenced health or wellbeing issues.	The exposures tend to be of high intensity. Impacts over a large geographical area (e.g. regional/national) or affect a large number of people (e.g. over 500 people) or impact substantial numbers of individuals within vulnerable social groups.	Long term duration, permanent or intermittent of notable intensity.
Major Beneficial	Substantive pathways to preventing deaths or enhancing wellbeing; addressing evidenced health or wellbeing issues		
Moderate Adverse	Creating poor physical or mental health or wellbeing. May be nuisance / quality of life impacts which may affect physical and mental health either directly or through the wider determinants of health.	The exposures tend to be of moderate intensity and/ or over a relatively localised area and/or likely to affect a moderate to large number of people e.g. between 100-500 individuals or impact notable numbers of individuals within vulnerable social groups.	Medium term duration; or intermittent and temporary of notable intensity, or permanent.
Moderate Beneficial	Enhancing mental wellbeing and/or reduce exacerbations to existing illness and reduce the occurrence of acute or chronic diseases.		
Minor Adverse	Likely to have impacts (adverse or beneficial) but unlikely to be material to evidenced health or wellbeing issues.	The exposures tend to be of low intensity and/or over a small area and/or affect a small number of people e.g. less than 100. Few individuals within vulnerable social groups impacted.	Short term duration or permanent.
Minor Beneficial			
Neutral	None or barely perceptible changes.	n/a	n/a

11.53 Effects that are described as ‘minor’ or ‘negligible’ are determined to be ‘Not Significant’ and effects that are described as ‘moderate’ or ‘major’ are determined to be ‘Significant’.

Baseline

11.54 The baseline study involved a desk-based review of:

- Determinants of health and health indicators; and
- Population profiles: the health of the local population of South Cambridgeshire and Cambridge City.

11.55 The health baseline conditions were informed by the Census 2011, NHS data, Cambridgeshire, Cambridge and South Cambridgeshire District JSNAs, Cambridgeshire Insight, Public Health England, GP and Clinical Commissioning Group (CCG) data, the ONS Indices of Deprivation and other chapters of this ES.

Sensitive Receptors

- 11.56 There are three receptor groups whose health may be impacted during construction of the proposed Development:
- Construction workers;
 - Neighbouring residents; and
 - New residents in Phase 3 of the Proposed Development.
- 11.57 There are four receptor groups whose health may be impacted during the operation of the Proposed Development.
- Neighbouring residents;
 - Residents occupying the new homes;
 - People employed by the businesses and services on-site; and
 - Visitors to the development.
- 11.58 Within this population there are subsets of people whose health is particularly vulnerable to the impacts of development. These vulnerable groups are identified from an assessment of local health, and research into local land uses. Further details are provided in the Baseline section.

Approach to Cumulative Assessment

- 11.59 Inter-project cumulative effects (e.g. air quality impacts etc.) have been considered within the assessment in **Tables 11.6-11.13** where relevant.
- 11.60 The following cumulative developments have been reviewed and an assessment is provided in Section 11.134 below:
- 21/02450/REM Reserved matters application 421 new homes with associated infrastructure, internal roads and open space.
 - 20/03524/FUL Upgrade to existing access roads and Cowley Road (as part of a wider proposal 20/03523/FUL for the erection of a 5-storey building and a 6 storey building for commercial/business purposes, erection of a transport hub, gymnasium, surface parking, landscaping and associated infrastructure including demolition of the existing building (St John's House) and associated structures).
 - 21/04640/SCOP Request for a Formal Scoping Opinion for an Order granting Development Consent for the Cambridge Wastewater Treatment Plant Relocation Horningsea Road Fen Ditton Cambridgeshire.
 - 17/1616/CTY EIA Scoping Opinion for Waterbeach New Town at Waterbeach Barracks and Airfield Site, for e approximately 5,000 residential units, retail, leisure, primary schools, secondary schools, access, and hard and soft landscaping.

Approach to Future Baseline Conditions

- 11.61 As required by Schedule 4 of the 2017 EIA Regulations, the ES must contain an outline of the likely evolution of the baseline conditions without implementation of the development. This needs to be *“as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge”*.

- 11.62 Whilst it is not possible to accurately characterise the health of the receptor groups at a defined point in time in the future, the following considerations are relevant when assessing the evolution of the baseline:
- Projected trends in health outcomes;
 - Success of the strategic programmes for health improvement; and
 - Projected changes in demographics including new communities being built.

Limitations and Assumptions

- 11.63 The following limitations and assumptions should be noted:
- As illustrated in **Figure 11.1** there are many determinants that can have an impact on an individual's health, and there are other factors determining health that cannot be managed by the Proposed Development (e.g. performance of the wider economy and genetic factors).
 - Available census data is from 2011, which is likely to have evolved in the last 11 years. The most recent data has been used where relevant.
- 11.64 There is a significant amount of literature regarding the evidence base for pathways between aspects of development and health outcomes. In order to provide a proportional assessment, a full literature review is not provided and the aspects considered in HUDU have provided the starting point for scoping of relevant determinants of health to be considered.
- 11.65 The focus of this assessment is public or population level health - individual occupational health and safety issues are not within the remit of this assessment.
- 11.66 Ambient air quality in the UK is assessed against national Air Quality Objectives, which take into account human health, as well as the technical and economic feasibility of achieving them, and are therefore not as stringent as the World Health Organisation (WHO) Guideline Values for Particulate Matter (PM)₁₀ and PM_{2.5}. The air quality assessment in **Chapter 6 Air Quality** has been based on the relevant Air Quality Objectives because these are a legal requirement. The conclusions of the air quality assessment have been incorporated into the assessment below.
- 11.67 Where relevant, limitations regarding the COVID-19 pandemic on the assessments undertaken for transport, air quality, noise and socio-economic have been set out in their respective chapters.
- 11.68 Uncertain impacts have been noted within the assessment where the Applicant has sought to create opportunity for positive health outcomes, but it cannot be confirmed whether this will actually result in behaviour change by sensitive receptors (e.g. preparing a Travel Plan does not guarantee that future residents will start cycling to work).

Existing Baseline Conditions

Site Description

- 11.69 The Site is previously developed land, and comprises the existing surface-level Cambridge North railway station car park of 428 spaces, further areas of hardstanding and areas of scrub land. The Site has been partially cleared as part of the Site preparation works for Cambridge North Station to the south.
- 11.70 Existing vehicular access is from Cowley Road, which links Milton Road to Cambridge North Station. There are footways on both sides of Cowley Road and a segregated cycleway on the

western side of the road. There is a bus link road which runs north-east to south-west and connects to the Cambridgeshire Guided Busway (CGB) and a bus turnaround to the south. There is also pedestrian and cycle access to the Site from the CGB to the west and from Moss Bank to the south.

Health of the Population

General Health Characteristics and Distribution of Vulnerable Groups

11.71 Chapter 15 Socio-Economics summarises the population of Greater Cambridge. Within the human health study area, the populations have a greater proportion of people of working age (16 to 64 years old) compared to the national average overall, as shown on **Figure 11.3** below. South Cambridgeshire 007 has a lower percentage of people aged 16 to 24, but a significantly higher percentage of people aged 25 to 64. Conversely, Cambridge 003 has a significantly higher percentage of 16 to 25-year olds, but the lowest percentage of 25 to 64-year olds within the Study Area. Cambridge 005 has the lowest percentage of people aged 65 and over, and the highest percentage of under 5-year olds.

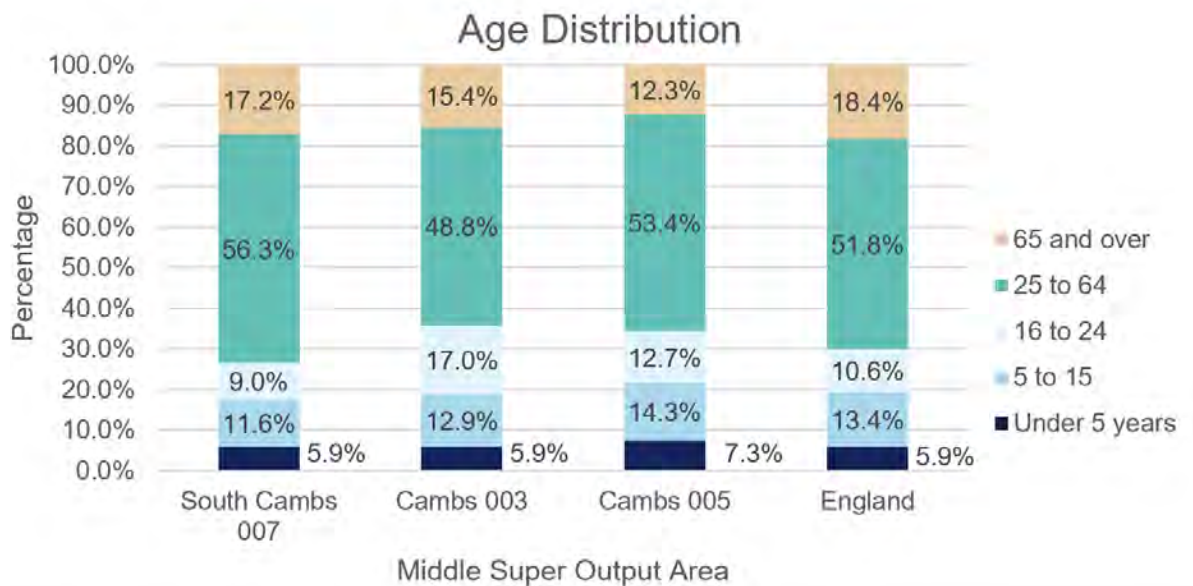


Figure 11.3: Age distribution within the Study Area (Source: ONS small area population estimates, mid-2019)

11.72 The Local Health Profiles (**Appendix 11.3**) indicate that there is broadly an even distribution of males and females within each age bracket in each of the MSOAs.

11.73 In terms of diversity within the Study Area, there is a lower percentage of Black and Minority Ethnic populations within South Cambridgeshire 007 than the national average, but similar in both Cambridge MSOAs. There is a higher percentage of people whose ethnicity is ‘not White’ within the study area compared to the national average, and similar levels of the population who cannot speak English well or at all.

Existing Health Outcomes

11.74 The JSNA summary for South Cambridgeshire (Cambridgeshire Insight, 2019) notes that the life expectancy (at birth) in South Cambridgeshire is 82.3 years for males and 85.4 years for females, statistically higher than the England average of 79.6 years for males and 83.1 years for

females. Within Cambridge, the life expectancy for males is better than the England average at 80.8 years, but similar to the national average for females at 83.5 years.

- 11.75 The gap in life expectancy between least and most deprived areas within South Cambridgeshire is the lowest in the county (4.3 years for males and 1.8 for females). By comparison, the gap in life expectancy between the least and most deprived areas in Cambridge is 10.4 years for males and 9.4 years for females, worse than the national average (9.4 for males and 7.4 for females).
- 11.76 The South Cambridgeshire JSNA (2019) notes that, overall, the health of people living in South Cambridgeshire is very good and, on most measures, is statistically significantly better than the UK national average. However, in comparison to the national average, the key areas of concern for South Cambridgeshire are:
- The percentage of diabetes diagnoses (aged 17 years and over) is statistically significantly lower (worse);
 - The estimated dementia diagnosis rate (aged 65+ years) is statistically significantly lower (worse);
 - Levels of Sickness absence are statistically similar;
 - Smoking prevalence in adults is statistically similar, and the rate of deaths from oral cancer are statistically similar;
 - The STI diagnoses rate is statistically significantly better than the England average, but the testing and positivity rates are statistically significantly worse. A decline in positivity rates may indicate inappropriate targeting or a general decrease in prevalence of infection in the population;
 - Prevalence of asthma is statistically significantly higher;
 - South Cambridgeshire has statistically significantly higher levels of emergency hospital stays for male self-harm; and
 - One in eight (12.8%) 5 to 19-year olds had at least one mental disorder when assessed, with emotional disorders the most prevalent of the disorders (8.1%).
- 11.77 There are other health issues, shown in **Figure 11.4**, which despite Greater Cambridge's relative good health, need to be reduced.

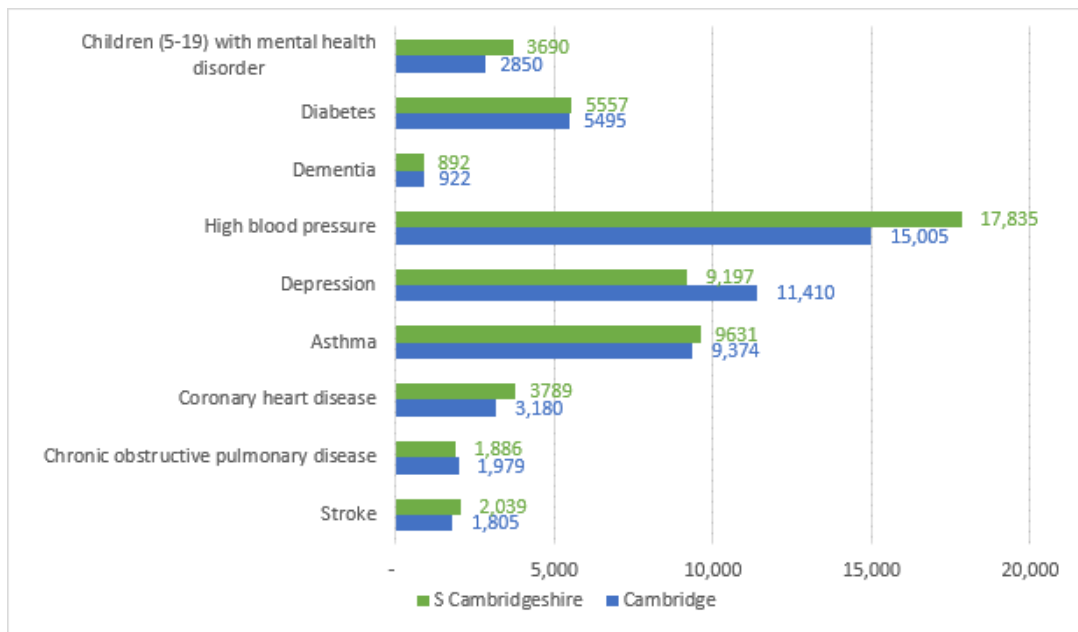


Figure 11.4: Illness in the South Cambridgeshire and Cambridge Populations

11.78

The overall good health of those within South Cambridgeshire is reflected within the Cambridgeshire 007 MSOA, although there are areas where it performs similar to the national average on several indicators. Neither Cambridge 003 nor 005 MSOAs perform significantly better on any of the health indicators. This is illustrated in **Table 11.4** below, where red is significantly worse than the national average, orange is similar, and green is better. This information further reinforces that these MSOA areas are among the most deprived in Cambridge.

Table 11.4: Existing health outcomes within the Study Area compared to national average (source: PHE local health profile). Red: significantly worse; orange: similar; green: significantly better.

INDICATOR	SOUTH CAMBS 007	CAMBS 003	CAMBS 005
Life expectancy			
Life expectancy at birth for males	Green	Orange	Orange
Life expectancy at birth for females	Green	Red	Orange
Long term health conditions and morbidity			
Limiting long term illness or disability	Green	Green	Green
Back pain prevalence	Orange	Orange	Orange
Severe ack pain prevalence	Orange	Orange	Orange
Hospital admissions			
Emergency hospital admissions for all causes	Green	Red	Red
Emergency hospital admissions for coronary heart disease	Orange	Orange	Red
Emergency hospital admissions for stroke	Orange	Orange	Orange
Emergency hospital admissions for (heart attack)	Orange	Orange	Orange
Emergency hospital admissions for Chronic Obstructive Pulmonary Disease (COPD)	Orange	Red	Red

INDICATOR	SOUTH CAMBS 007	CAMBS 003	CAMBS 005
Hospital stays for self-harm	Yellow	Red	Red
Hospital stays for alcohol related harm (Broad definition)	Green	Red	Red
Hospital stays for alcohol related harm (Narrow definition)	Yellow	Red	Red
Emergency hospital admissions for hip fracture in 65+	Yellow	Red	Yellow
Mortality and Causes of Death			
Deaths from all causes < 75 years	Green	Yellow	Yellow
Deaths from all cancer	Yellow	Yellow	Yellow
Deaths from circulatory disease, < 75 years	Yellow	Yellow	Yellow
Deaths from causes considered preventable, < 75 years	Green	Red	Yellow
Deaths from all causes, all ages	Green	Red	Yellow
Deaths from all cancer, all ages	Yellow	Red	Yellow
Deaths from circulatory disease, all ages	Green	Red	Yellow
Deaths from coronary heart disease, all ages	Green	Yellow	Yellow
Deaths from stroke, all ages	Yellow	Yellow	Yellow
Deaths from respiratory diseases, all ages	Green	Green	Yellow
Children's Health			
Reception: Prevalence of overweight (including obesity)	Green	Green	Yellow
Reception: Prevalence of obesity (including severe obesity)	n/a	Yellow	Yellow
Year 6: Prevalence of overweight (including obesity)	Yellow	Green	Green
Year 6: Prevalence of obesity (including severe obesity)	Yellow	Yellow	Green
A&E attendances in under 5 years old, three-year average	Red	Red	Red
Emergency admissions in under 5s	Red	Red	Red
Emergency admissions for injuries in under 5s	Red	Red	Red
Emergency hospital admissions for injuries in < 15 yrs old	Red	Red	Red
Emergency hospital admissions for injuries in 15 - 24 yrs old	Yellow	Green	Green
General fertility rate	Red	Yellow	Red

11.79 Construction workers generally have high incidences of poor mental health. A recent survey of 200 professionals in 2019 by the Chartered Institute of Building (CIOB)² found:

- 26% of construction industry professional have thought about taking their own life;
- 70% of respondents experienced depression; and
- 87% experienced anxiety in the past year.

11.80 Construction workers are at risk of several work-related illnesses. The Health and Safety Executive³ identifies that construction workers have a high risk of developing diseases such as:

- Cancer – construction accounts for over 40% of occupational cancer deaths and registration;

2 CIOB (2019) Understanding Mental Health in the Built Environment. Available at [Understanding Mental Health in the Built Environment | CIOB](#)

3 <https://www.hse.gov.uk/construction/healthrisks/key-points.htm>

- Hazardous substances – dust and chemicals can cause breathing problems and lung diseases, as well as high rates of dermatitis from skin exposure; and
- Physical health risks – construction and building trades have the highest occupational prevalence of back injuries and upper limb disorders. Construction also has one of the highest rates of ill health caused by noise and vibration.

Summary

11.81 Overall, whilst there are good health outcomes within South Cambridgeshire and within the Study Area, the following key health issues have been identified:

- There is significant health inequality in Cambridge, reflected in the large gap in life expectancy between the least and most deprived areas;
- South Cambridgeshire has high prevalence of asthma and high blood pressure, low rates of diabetes diagnosis, dementia diagnosis, and STI diagnosis, high levels of emergency hospital stays for male self-harm;
- There are high rates of child mental health disorders within South Cambridgeshire and in the study area;
- The Cambridge MSOAs show similar or significantly worse health outcomes on several indicators compared to the national average, including hospital admissions, hospital stays for self-harm, alcohol related stays and hip fractures, deaths from all causes, and a range of children's health indicators including hospital admissions for injuries;
- By comparison, the South Cambridgeshire MSOA performs better on several indicators, although there are still health issues regarding children's health and hospital admissions;
- Life expectancy is worse for those in Cambridge compared to those in South Cambridgeshire; and
- Back pain prevalence is similar to the national average in both South Cambridgeshire and Cambridge.

Future Population of the Proposed Development

Housing

11.82 Chapter 15 Socio-Economics estimates the likely population groups to be generated as a result of the proposed housing onsite, totalling 732 new residents. This includes 71 children (0-18), and 64 people aged 65 and over.

11.83 Private Rented Sector (PRS) accommodation BtR investors are particularly focused on those households that are generally within the 25-34 age bracket, that are not students, are in employment and predominantly in higher-earning occupations. These are households that generally are not yet in a position to buy a home, but are unlikely to qualify for affordable housing or some other housing support.

Employment

11.84 The types of employment proposed on-site include Research & Development, office working, and retail and community uses. This will provide employment opportunities to locals, as well as people from overseas and from outside the region. Health sensitivities associated with the new workforce are likely to include social connections and social inclusion.

Vulnerable Groups

11.85 Based on the baseline information presented above, the following vulnerable groups have been identified:

- Older people (65 and over);
- Carers of older people;
- Children (0-17);
- Families with pre-school children;
- Single person households;
- Those with a high level of deprivation, low income or unemployment;
- Those with pre-existing health conditions, such as mental health conditions;
- New parents or pregnant women;
- Construction workers; and
- Ethnic minorities and workers from overseas.

Determinants of Health

11.86 This section presents the baseline regarding the determinants of health outlined in **Table 11.2** above.

Healthy Housing

Table 11.5: Health Impacts and Pathways – Healthy Housing

HEALTH IMPACTS AND PATHWAYS – HEALTHY HOUSING
<p>Links between housing and health are well documented. Good design and attention to materials coupled with the relative ease of heating and lighting new properties can deliver direct health benefits, particularly for those on low incomes, the very young and the elderly. The National Housing Federation highlights that poor housing conditions increase the risk of severe ill-health or disability by up to 25% during childhood and early adulthood⁴. Modern buildings are better able to deal with climate change and potentially reduce excess winter death and illness.</p> <p>The provision of new housing in a range of tenures and price points offers opportunities for a wide spectrum of local residents to have access to quality housing and its associated health benefits. Affordable provision provides families with properties where financial burdens are lowered and access to quality properties is made available, thereby reducing stress and promoting mental well-being.</p> <p>Research shows that high quality housing delivers improved social outcomes among older adults, reduced injury among older adults and children and improved general physical and mental health. Among vulnerable groups (e.g., substance users, homeless, disabled), provision of affordable housing is associated with improved quality of life, mental health and clinical health-related outcomes. Generally, health outcomes include reduced risk of cardiovascular disease (CVD), cancer, obesity and type 2 diabetes, keeping the musculoskeletal system healthy, promoting mental well-being⁵.</p>

4 Good housing leads to good health, Building Research Establishment, 2008
 5 HUDU 2017 Healthy Urban Planning Checklist

- 11.87 **Housing mix and affordability:** Cambridge and South Cambridgeshire have been identified as areas of high affordability pressure^{6[1]}. The Greater Cambridge Housing Strategy 2019-2023 reiterates the need for 33,500 new homes across Greater Cambridge, as identified through the two councils recently adopted Local Plans. It also acknowledges that Greater Cambridge is an expensive place to buy or rent a home, as a result of the strength of the local economy and immigration of highly skilled workers, and that there is a growing ‘affordability gap’, where middle income households are being squeezed out of the market with limited housing options for low-cost home ownership or the private rented sector. The demand for housing for these groups far outstrips the current supply.
- 11.88 **Accessibility:** Chapter 15 Socio-Economics identifies that, in the local study area, dwellings are semi-detached or terraced with two or three bedrooms. While owner occupation dominates, there are high proportions of social and privately rented dwellings compared to Greater Cambridge as a whole. There is no suggestion of significant overcrowding.

Active Travel

Table 11.6: Health Impacts and Pathways – Active Travel and Access to Transport

HEALTH IMPACTS AND PATHWAYS – ACTIVE TRAVEL AND ACCESS TO TRANSPORT
<p>Transport related health impacts stem from air pollution (see below), active travel, access to transport, mental health and wellbeing and social connectedness.</p> <p><u>Active travel:</u> Moderate-to-high quality evidence suggests that provision of active travel infrastructure for walking and cycling is associated with higher or increased mobility and physical activity. Provision of public transport is associated with higher physical activity, better cardiovascular outcomes in the general population, and a lower fear of social isolation and improved mental health. Initiatives to prioritise active travel and road safety, such as traffic calming measures, are associated with a range of positive physical activity behaviours, a lower or reduced risk of road traffic collisions and pedestrian injury, and a lower fear of crime⁷.</p> <p><u>Access to Transport:</u> The Department for Transport’s Transport, health and wellbeing research⁸ identifies the following health impacts. Quality of transport provision affects stress and wellbeing because it affects the quality of the travelling experience. Public transport interventions can positively impact mental health in two ways: alleviating traffic and reducing commuting times. There is also a relationship between physical and mental health, and so interventions to improve physical health may also be beneficial for mental health, for example interventions that reduce road noise can improve sleeplessness and lower blood pressure but might also have an effect on stress and mental wellbeing.</p> <p>Transport availability, particularly public transport, affects wellbeing because it facilitates social connectedness. A lack of access to transport or a withdrawal of public transport services has been found to reduce social networks and social relationships. By contrast, effective transport provision, such as reliable bus links, can help facilitate social interactions, promote social inclusion and enable access to important services such as health care, work and education.</p>

- 11.89 **Cycling:** The Transport Assessment (TA) (**Appendix 17.1**) sets out the baseline transport conditions for the Site. With regards to cycling, there are a number of high-quality cycle links in the immediate vicinity, including

6 ^[1] [List areas of high affordability pressure - GOV.UK \(www.gov.uk\)](https://www.gov.uk)

7 Bird et al, 2018. Built and natural environment planning principles for promoting health: an umbrella review. <https://doi.org/10.1186/s12889-018-5870-2>

8 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/847884/Transport_health_and_wellbeing.pdf

- a cycleway on the western side of Cowley Road, connecting to Cambridge North Station;
- a shared-use route linking to Moss Bank street, with onward links to Cambridge city centre;
- a shared-use footway/ cycleway connecting with the CGB; and
- a 5.0m wide shared-use footway/cycleway following the alignment of Cowley Road between the Proposed Development and Milton Road.

- 11.90 There is existing cycle parking provided at Cambridge North Station, which has 1,000 parking spaces. The facility is a covered unit with open sides, with CCTV in operation.
- 11.91 **Walking:** the TA notes that the Site is situated within an existing high-quality pedestrian environment, with a series of footways and shared routes within the immediate vicinity, as well as wider walking routes to and from Cambridge North. The Proposed Development is connected to Cambridge North Station and the CGB by footways on both sides of Cowley Road. There are also the shared routes with cyclists as described above.
- 11.92 **Buses:** the TA outlines the bus services that are within close proximity to the Site. The Site is adjacent to the CGB, with the nearest bus stop located adjacent to the Cambridge North Station cycle parking immediately south of the Site. This provides connections between Huntingdon and villages on route, Cambridge Central train station and Addenbrookes Hospital. The Site is also serviced by the Citi 2, which terminates at Cambridge North Station and runs through to the Cambridge Biomedical Campus. The Site is approximately 650 m from Milton Road, which is served by the Milton Park & Ride service that runs between Milton Park & Ride and Cambridge City Centre.
- 11.93 **Rail:** Cambridge North Station, immediately south of the Site, provides services to Cambridge Central, London Kings Cross (via Stevenage), London Liverpool St (via Bishops Stortford), Stanstead Airport, Thameslink services to Brighton and various other stops. There is a taxi rank combined with pick-up/ drop-off and designated Blue Badge parking.
- 11.94 **Safety:** Chapter 17 Transport includes a detailed analysis of collision data over the latest available five-year period, which indicates that there is no evidence of a collision cluster. Two collisions were recorded on separate parts of Cowley Road, neither involving a cyclist or pedestrian.
- 11.95 **Activity levels:** Table 11.7 presents the data from the Sports England Active Lives Survey 2021 (Sports England, 2021). Although South Cambridgeshire and Cambridge perform better than the national average, there is still over one fifth of the population in both areas who are physically inactive.

Table 11.7: Activity Levels

GEOGRAPHY	'ACTIVE' (150+ MINUTES OF ACTIVITY A WEEK)	'FAIRLY ACTIVE' (30-149 MINUTES A WEEK)	'INACTIVE' (<30 MINUTES A WEEK)
England	60.9%	11.6%	27.5%
South Cambridgeshire	65.8%	11.9%	22.3%
Cambridge	70.4%	8.5%	21.1%

Healthy Environment

Table 11.8: Health Impacts and Pathways – Air Quality, Noise and Neighbourhood Amenity

HEALTH IMPACTS AND PATHWAYS – AIR QUALITY, NOISE AND NEIGHBOURHOOD AMENITY	
	<p>The quality of the local environment can have a significant impact on physical and mental health. Pollution caused by construction, traffic and commercial activity can result in poor air quality, noise nuisance, vibration and water quality issues.</p> <p>Poor air quality is linked to incidents of chronic lung disease (chronic bronchitis or emphysema) and heart conditions, cancer and asthma and death. It is estimated that, in 2010, over 5% of Cambridgeshire mortality is attributed to air pollution. Air pollution particularly affects the most vulnerable, including older people, children, and those with heart and lung conditions. Children in their early years are particularly at risk from asthma and poor lung development as a result of air pollution.</p> <p>Noise pollution can have a detrimental impact on health resulting in sleep disturbance, cardiovascular and psycho-physiological effects. Good design and the separation of land uses can lessen noise impacts⁹. Noise emissions impact on the internal work environment, external work environment and neighbouring areas are commonly generated by traffic, plant and machinery associated with operation of the building and during the construction process.</p> <p>Tackling air pollution in Cambridgeshire is targeted through a need for a lower emission transport fleet, modal shift from cars to walking and cycling and measures for reducing person specific exposure such as monitoring air quality in offices.</p>

- 11.96 **Construction:** within the identified cumulative schemes, there are currently two under construction: 21/02450/REM Reserved matters application 421 new homes with associated infrastructure, internal roads and open space; and 20/03524/FUL Upgrade to existing access roads and Cowley Road. These have been considered within the cumulative assessment.
- 11.97 **Air quality:** Chapter 6 Air Quality notes that the A14 is approximately 750 m north of the development. It is the busiest road in the area and will therefore be likely to be the biggest influence on background air quality. Monitoring indicates that Air Quality Objectives have not been exceeded at any of the monitoring sites within 2.5 km of the Site, with one exception in of nitrogen dioxide (NO₂) in 2016 on Parker Street. Since then, monitored concentrations at that site have reduced substantially.
- 11.98 There is one Air Quality Management Area (AQMA) nearby to the development site - the Cambridge AQMA approximately 1.4 km to the southwest covering the city centre, declared in 2005 for exceedances of the NO₂ annual mean objective.
- 11.99 **Noise:** Chapter 14 Noise identifies that the main sources of noise include train noise, road traffic noise, and minor construction noise from One Cambridge Square, which lies immediately south of the Site.
- 11.100 **Contaminated land:** Chapter 16 Soils and Groundwater identifies that on-site potential sources of contamination are associated with its historic uses as a materials depot and railway sidings. There is Made Ground associated with the railway sidings and historic ballast pits in the north-

east of the Site, and potential contamination from mechanical plant and equipment. The former electricity substation at the centre of the Site may potentially be a source of transformer oils. There is also potential contamination from surface runoff from the surrounding highways, CGB, and car parking. There may also be asbestos if it was used in structures formerly located on the Site. There are also several offsite potential sources of contamination from a range of previous and current industrial facilities surrounding the Site.

11.101 **Flood risk:** the nearest watercourse to the Site is the River Cam, which is located approximately 500m to the south and 500m to the east. The Environment Agency (EA) flood maps indicate that the Site is in Flood Zone 1 and therefore not at risk of flooding from rivers and seas.

Table 11.9: Health Impacts and Pathways – Access to Open Space and Nature

HEALTH IMPACTS AND PATHWAYS – ACCESS TO OPEN SPACE AND NATURE
<p>Benefits have been broadly categorised by the three pathways by which they are gained:</p> <ul style="list-style-type: none"> • Induced feelings of relaxation and reduced stress • Facilitation of social interaction and social capital • Stimulation of physical activity <p>Benefits accrue to individuals using the space, but there is also evidence that greener and more natural environments are beneficial to the human health of a wider population, as open space (and allotments) offer a ‘therapeutic landscape’¹⁰. Interaction and visual connection with nature has been proven to benefit people by:</p> <ul style="list-style-type: none"> • Lowering blood pressure and heart rate reducing the hormones linked to stress • Positively impacting perceptual and physiological sense of wellbeing and tranquillity, enabling positive thinking. • Impacting the Circadian system, the clock in the body, that enables good sleep, digestion and healthy hormone production <p>Open space provision has been identified as a pathway for reducing income-associated health inequality. People living in deprived areas often have less access to natural spaces and have to endure poorer environments, including high levels of congestion, poor air quality and noise pollution.</p>

11.102 **Open space and biodiversity:** The Site is in private use and is secure, and not currently in use for recreation or as a travel cut-through. There are currently areas of green space on the Site, particularly to the east of Cowley Road and the north of the existing Cambridge North Station Car Park. These areas of open mosaic habitat and areas of dense scrub and trees provide suitable habitat for a number of protected and notable species, including reptiles, breeding birds, foraging and commuting bats, and invertebrates.

11.103 There are several areas of public open space surrounding the Site, including Bramblefields Local Nature Reserve (LNR) immediately west of the CGB, Stourbridge Common approximately 550 m to the south, and Milton Country Park approximately 950 m to the north. There are also various playing fields and children’s play areas, as shown in Chapter 15 Socio-Economics.

10 Global Urban Research Unit (2012) Electronic Working Paper No 47, The Social Health and Wellbeing benefits of Allotments

Table 11.10: Health Impacts and Pathways – Access to Healthy Food

HEALTH IMPACTS AND PATHWAYS – ACCESS TO HEALTHY FOOD
<p>Access to healthy food in respect of the Proposed Development relates to opportunities to grow your own food, local convenience retail outlets and the offer from local café and restaurants. All such facilities offer opportunities for social contact and the development of social capital. The health benefits of allotment gardening are both physical and mental, including: lower levels of fatigue, depression, anger, tension, higher levels of self-esteem, better general health and lower body mass index¹¹.</p> <p>Community Orchards can also help to build communities, facilitating connections, raising the social capital of an area, while also offering free fresh fruit to local people.</p> <p>The range of retail opportunities in proximity to the Proposed Development will have an impact on the type of food consumed by the residents, operational and construction workforce. The evidence base linking proximity of fast-food outlets with obesity is growing, and it indicates that proximity to supermarkets is associated with fewer visits to fast-food outlets, while the presence of fast-food outlets generates more visits to them¹². While not all fast-food is unhealthy, some is high in saturated fat, calories and salt, which are significant contributors to obesity.</p>

11.104 **Local food growing:** whilst there are no food growing facilities currently on the Site, the Nuffield Road allotments lie immediately west of the CGB adjacent to the Site.

Table 11.11: Health Impacts and Pathways – Climate Change

HEALTH IMPACTS AND PATHWAYS – CLIMATE CHANGE
<p>The impact of climate change and its impact on human health in the context of the UK relates to food production and social and economic disruption as a result of extreme weather.</p> <p>Evidence shows that periods of high temperatures increases mortality and hospital admissions. Extreme weather events (floods, high winds, drought) contribute to deaths, hospital admissions, infectious disease, and mental health. Susceptibility to these events depends on modifying factors such as age, economic status, underlying health, environmental conditions (air quality, housing or employment conditions), quality of health care and specific control measures¹³.</p> <p>In respect of the Proposed Development, the relevant pathways to health impacts are thermal protection measures in the buildings and surrounding landscaping, use of renewable energy, encouragement of biodiversity and flood risk.</p>

11.105 **Climate change:** Chapter 7 Climate Change identifies the projected climatic changes that may impact the Site. These will include hotter, drier conditions during summer, and milder, wetter winters. There will also be an increase in the frequency of extreme weather events, such as drought, flooding and heatwaves.

11 Wood, Pretty and Griffin (2015) A Case-control study of the health and well-being benefits of allotment gardening published in the Journal of Public Health Oct 2015
 12 Athens, Duncan, Elbel (Aug 2016) Proximity to fast food outlets and supermarkets as predictors of fast food dining frequency
 13 WHO Climate change and human health – risks and responses

Vibrant Neighbourhoods

Table 11.12: Health Impacts and Pathways – Access to Community Infrastructure

HEALTH IMPACTS AND PATHWAYS – ACCESS TO COMMUNITY INFRASTRUCTURE	
<p>Employment and living opportunities which are well located with respect to services and amenities bring opportunities for social interaction, community development and development of social capital (defined later in the chapter). Research reviewed by the King’s Fund shows:</p> <ul style="list-style-type: none"> • A person’s social networks can have a significant impact on their health, affecting survival rates and have been shown to be as powerful in predicting mortality as common lifestyle and clinical risks such as moderate smoking, excessive alcohol consumption, obesity and high cholesterol and blood pressure. • Social support is particularly important in increasing resilience and promoting recovery from illness. Strong social capital can also improve the chances of avoiding lifestyle risks such as smoking. However, in the most deprived communities, almost half of people report severe lack of support, making people who are at greater risk less resilient to the health effects of social and economic disadvantage. • Lack of social networks and support, and chronic loneliness, produces long-term damage to physiological health via raised stress hormones, poorer immune function and cardiovascular health. Loneliness also makes it harder to self-regulate behaviour and build willpower and resilience over time, leading to engagement in unhealthy behaviours. 	

11.106 Healthcare The closest GP and pharmacy to the Site is Nuffield Road Medical Centre approximately 250 m west of the Site.

11.107 Overall, the practices within 2 miles of the Proposed Development have a good patient to GP ratio compared to the CCG average, as shown in **Figure 11.5** below.

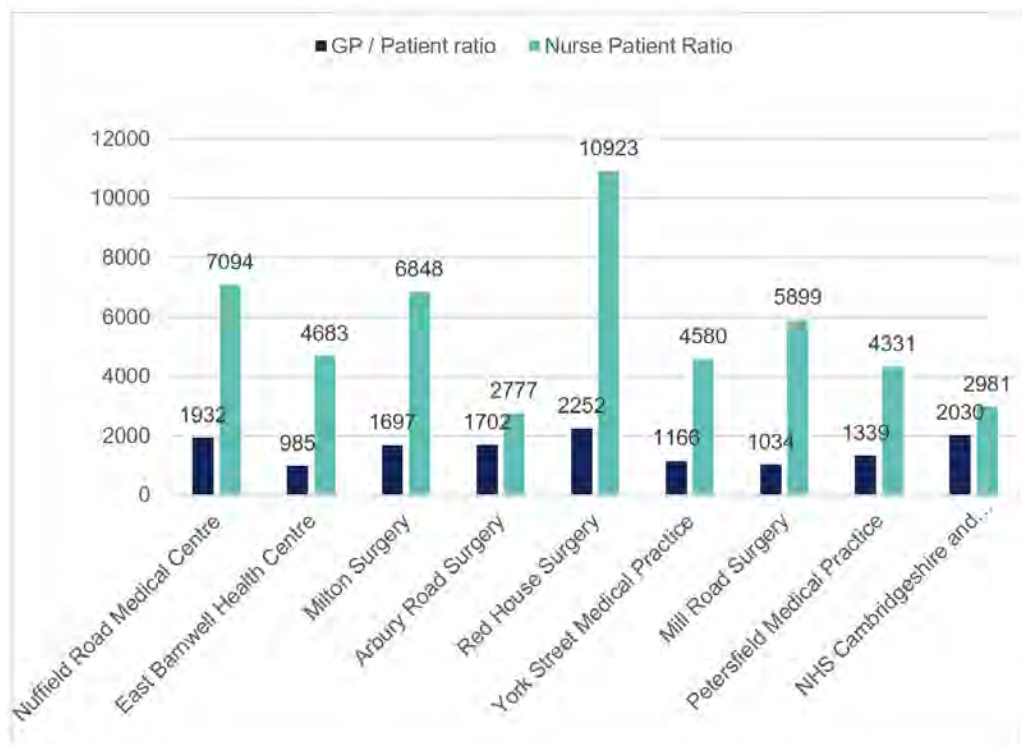


Figure 11.5: GP Patient and Nurse Patient Ratio within 2 miles of the Study Area

- 11.108 There are no dentists within 1 km of the Site. The closest dentist, St Marks Dental Surgery and Orthodontics, lies approximately 1.4 km from the Site. It is currently not accepting new patients. The closest dentist that is accepting referrals from a dentist is NA Burnett approximately 2.4 km from the Site. There are 17 dentists in total within 5 km from the Site.
- 11.109 The closest opticians, D W Murphy, lies approximately 2.4 km from the Site.
- 11.110 The closest hospital is Brookfields Hospital, which lies approximately 2.9 km from the Site. It is a community hospital with a Patient Advice and Liaison Service, run by Cambridgeshire and Peterborough Foundation Trust.
- 11.111 **Schools:** there is a primary school within walking distance. The Shirley Community primary school lies approximately 300 m west of the Site. Chapter 15 Socio-Economics identifies that the Proposed Development is close to several educational facilities, including three nurseries, another primary school, and three secondary schools. Overall there is good provision within the nursery and primary schools, although there are currently fewer spaces available within the secondary schools.
- 11.112 **Community facilities:** the TA (**Appendix 17.1**) notes that there is a good range of facilities and services within 1 km of the Site. There are two convenience shops within 1km of the Site, two food outlets and a postal service.
- 11.113 There are several leisure centres/ sports facilities within walking distance, including a gym and a golf range north of the Site. Chapter 15 Socio-Economics identifies a wide range of public open space close to the Site, which includes sports pitches and playing fields, provisions for football, cricket and rugby, and children’s play areas. The Chapter considers the public open space baseline to be of Low sensitivity.

Table 11.13: Health Impacts and Pathways – Employment

HEALTH IMPACTS AND PATHWAYS – EMPLOYMENT
<p>Employment and income are a key determinant of health and wellbeing. Unemployment generally leads to poverty, illness and a reduction in personal and social esteem. Work aids recovery from physical and mental illnesses.</p> <p>The susceptibility of a population accessing these health benefits relates directly to their suitability for the job. This is influenced by an array of factors, but includes knowledge of opportunity, adequate skills for the job, ease of travel as well as personal attributes.</p>

- 11.114 **Local employment:** Chapter 15 Socio-Economics sets out the economic and employment baseline. According to ONS job density data, the number of jobs in South Cambridgeshire increased from 80,000 in 2011 to 94,000 in 2018, an increase of 14,000 over seven years, or an average of 2,000 net additional jobs per year. The number of jobs in Cambridge increased from 98,000 jobs in 2011 to 122,000 jobs in 2018, which equates to approximately 3,500 net additional jobs per year.
- 11.115 With regards to unemployment, the PHE health profiles (2020) (**Appendix 11.3**) identify that South Cambridgeshire 007 has lower levels of unemployment, significantly better than the national average. Cambridge 006 has similar levels of long-term unemployment to the national average, and Cambridge 003 has similar levels of unemployment and long-term unemployment.

- 11.116 The Indices of Multiple Deprivation (IMD) are a measure of deprivation experienced by people living in an area and are presented in the local health profiles within **Appendix 11.3**. South Cambridgeshire 007 performs significantly better than the national average in terms of income deprivation, child poverty, older people in deprivation, older people living alone, and overcrowded houses. However, both Cambridge MSOAs perform similar or significantly worse than the national average with regards to these indicators.
- 11.117 South Cambridgeshire 007 has an IMD score of 12.0, which is significantly better than the national average of 21.7. However, Cambridge 003 has a score of 20.3, and Cambridge 006 has a score of 27.7: one of the most deprived within Cambridge.

Table 11.14: Health Impacts and Pathways – Crime Reduction and Community Safety

HEALTH IMPACTS AND PATHWAYS – CRIME REDUCTION AND COMMUNITY SAFETY
<p>Thoughtful planning and urban design that promotes natural surveillance and social interaction can help to reduce crime and the ‘fear of crime’, both of which impact on mental wellbeing. As well as the immediate physical and psychological impact of being a victim of crime, people can also suffer indirect long-term health consequences including disability, victimisation and isolation because of fear. Community engagement in development proposals can lessen fears and concerns¹⁴.</p> <p>Safety on roads has a direct impact on health for both drivers, other road users and pedestrians. Every year in Britain, around 23,000 pedestrians are killed or injured each year in police-reported road accidents, of which 5,000 are killed or seriously injured. Some groups are particularly vulnerable, such as children, and young people from the most deprived backgrounds and older people¹⁵. An unsafe walking environment will inhibit walking and the consequent health benefits of increased levels of physical activity.</p> <p>The Royal Society for the Prevention of Accidents (RoSPA) identify safe on and off-road environments as a key factor in increasing cycling¹⁶. Safer cycling environments can be achieved through creation of a safe on and off-road cycle environment that minimises the risk of crashes occurring and ensuring that when they do, they are unlikely to result in death or serious injury. Other pathways through which safer environments and health can be achieved are improving cyclists and driver attitudes and behaviours to each other, producing safer vehicles that reduce risks to cyclists, education and enforcement programmes.</p>

- 11.118 The pathways through which streets can be made safer and negative health impacts reduced include: street lighting, reduced vehicle speed, shared spaces, walking environments designed for people with special needs, vehicle technology, improving driver behaviour, improving pedestrian behaviour.
- 11.119 **Crime reduction and safety:** Cambridgeshire County Council’s Cambridgeshire Research Group has prepared Strategic Assessments for Cambridge City¹⁷ and South Cambridgeshire¹⁸ for 2020/21. Within both assessments, it is acknowledged that the impacts of COVID-19 have not yet been fully understood.

14 JSNA Transport and Health p2

15 RoSPA Policy Paper: Pedestrian Safety

16 RoSPA (September 2017) Cycling Policy Paper

17 <http://cambridgeshire.wpengine.com/communitysafety/community-safety-partnerships/cambridge-city/>

18 <https://cambridgeshireinsight.org.uk/communitysafety/community-safety-partnerships/south-cambridgeshire/>

11.120 Within Cambridge City, the likelihood of being a victim of crime has increased since 2020. Cycle theft accounts for over a third of total theft. This crime type, as with other theft, have started to return to the pre-lockdown 1 levels. Dwelling burglary and vehicle crime have not yet returned to their pre-lockdown 1 levels. Modern slavery remains a significant risk in Cambridge. Some key features of anti-social behaviour (ASB) remain the same despite the pandemic. Criminal damage was slightly lower compared to the previous year, and environmental ASB accounted for a higher proportion of the total police recorded ASB in 2019/20 compared to the previous year. January 2020 was the month with the lowest volume of incidents.

11.121 In South Cambridgeshire, the key concerns for Milton & Waterbeach ward (the ward within which the Site lies) are crime, ASB, deliberate fires and financial need¹⁷. The Strategic Assessment reports an increase in Violence Against the Person offences, driven by an increase in Stalking and Harassment offences. The number of modern slavery offences in Cambridgeshire & Peterborough has more than tripled in the past three years. Police data showed a slight upward trend in hate crimes, although numbers remain low and increases are below those seen nationally. Acquisitive crimes saw some of the largest falls during the first national lockdown due to reduced opportunities for offending.

Evolution of the Baseline Conditions without the Proposed Development

11.122 The Housing topic paper prepared to support the emerging Greater Cambridge Local Plan identified the following forecasts for changes in South Cambridgeshire by 2040:

- Older person households (aged 65 and over) – one person households projected to increase by 39.2% and couple households projected to increase by 65.6%;
- Households with no dependent children (aged under 65) – one person households projected to increase by 29.6% and couple households projected to decrease by 4.7%;
- Couple households living with one or more other adults and no dependent children – projected to increase by 35.2%;
- Households with dependent children – all households with dependent children projected to increase by 26.6%; and
- ‘Other households’, such as Homes in Multiple Occupation (HMOs) – projected to increase by 55.0%.

11.123 The Housing topic paper prepared for the NEC AAP identifies that there will be provision for at least 8,000 homes within the North East Cambridge area. This topic paper identifies the need for Purpose Built Private Rented Housing, older people, local workers, and specialist housing for people with disabilities.

11.124 The study forecasts the following changes in Cambridge by 2040:

- Older person households (aged 65 and over) – one person households projected to increase by 39.1% and couple households projected to increase by 55.1%;
- Households with no dependent children (aged under 65) – one person households projected to increase by 15.8% and couple households projected to decrease by 2.9%;
- Couple households living with one or more other adults and no dependent children – projected to increase by 52.0%;
- Households with dependent children – all households with dependent children projected to increase by 16.3%; and

- 'Other households', such as Homes in Multiple Occupation (HMOs) – projected to increase by 38.3%.
- 11.125 The JSNA South Cambridgeshire summary (Cambridge Insight, 2019) identified the predicted increases 2017-2035 in those experiencing certain conditions as:
- Moderate physical disability: 19.4%;
 - Serious physical disability: 20.6%;
 - Mod/Serious personal care disability: 19.8%;
 - Common mental disorder: 17.8%;
 - A fall: 65.4%; and
 - Dementia: 93.4%.
- 11.126 It identified that this will add additional demand on service provision.
- 11.127 Chapter 15 Socio-Economics notes that, without the Proposed Development, it would be difficult for South Cambridgeshire to achieve its job target, which may have long-term implications for businesses with regards to growth and investment.

Predicted Impacts

- 11.128 This section sets out the predicted impacts arising from the demolition/ construction and operation of the Proposed Development on human health. The assessment considers embedded mitigation measures that will be adopted to avoid, offset or reduce potential adverse effects and enhance potential beneficial effects.
- 11.129 The predicted impacts are set out within **Tables 11.15-11.20** of the assessment below. These are based on the HUDU Checklist (**Table 11.2**) as a framework for presenting the assessment. Construction impacts are presented first, followed by operational impacts.

Table 11.15: Active Travel during Construction

HEALTH DETERMINANT	POTENTIAL IMPACTS AND BUILT IN MITIGATION	EVALUATION OF IMPACT	FURTHER MITIGATION	RESIDUAL EFFECTS
<p>Promote walking and cycling / Reduce car use</p>	<p>The Proposed Development will generate 202 FTE temporary jobs over the construction phase. The Site is well connected with opportunity for workers to travel by public transport or walk. Some workers will need to bring equipment onto site, and therefore travel in vehicles. However, where possible workers should be encouraged to use active modes of travel to reduce air pollution, thereby supporting key policies in the Local Plan relating to mitigation of climate change, air quality, active travel objectives and address the Climate emergency declared by the Combined Authority.</p> <p>There is secure cycle parking facilities at Cambridge North station which could be used by construction workers, however there is currently no additional cycle parking proposed.</p> <p>Vulnerable groups: construction workers, local residents with air pollution related conditions (e.g. asthma)</p>	<p>Strength of Evidence: there is strong strength of evidence linking movement and exercise to positive health outcomes.</p> <p>Baseline sensitivity: Cambridge has high levels of active travel and surrounding infrastructure provides high quality cycle and walking routes to the Site. Construction workers have high rates of mental health issues. Therefore, the baseline sensitivity is medium.</p> <p>Health priorities: active travel considered key part of delivering healthy behaviours and lifestyles within South Cambridgeshire Health and Wellbeing Strategy.</p> <p>Regulatory and policy requirements: no specific policy or regulatory requirements to promote active travel/ reduce car use during construction, however travel plans are promoted in National PPG guidance (does not specifically mention construction) and in Cambridgeshire’s regional requirements (see TA, Appendix 17.1).</p> <p>Magnitude of impact: A reversible, short to medium term, temporary impact.</p> <p>Therefore, there is judged to be a minor beneficial health impact.</p>	<p>Condition: Construction Travel Plans, to be secured by condition, to include measures to promote/ encourage active travel among workers.</p> <p>Condition: CCTV to be monitored to secure cycle parking.</p> <p>Recommendation: The Construction Traffic Management Plan (CTMP) to consider inclusion of secure cycle parking on-site.</p>	<p>Minor Beneficial</p>

HEALTH DETERMINANT	POTENTIAL IMPACTS AND BUILT IN MITIGATION	EVALUATION OF IMPACT	FURTHER MITIGATION	RESIDUAL EFFECTS
<p>Safety</p>	<p>Chapter 17 Transport identifies that the baseline collision data does not highlight any prevailing highway safety issues within the study area, and therefore should not be exacerbated by the temporary increase in construction-related HGV movements. In addition, the HGV trip generation does not meet IEMA Guidelines threshold for pedestrian and cycle delay, and therefore result in a negligible impact.</p> <p>Vulnerable groups: older people (65 and over) children (0-17)</p>	<p>Strength of Evidence: there is strong strength of evidence linking movement and exercise to positive health outcomes.</p> <p>Baseline sensitivity: The Transport Chapter does not identify any collision hot spots within the study area.</p> <p>Health priorities: as above</p> <p>Regulatory and policy requirements: the NPPF identifies that attributes of healthy places should be safe, such as including clear and legible pedestrian and cycle routes.</p> <p>Magnitude of impact: A reversible, short to medium term, temporary impact.</p> <p>Therefore, there is judged to be a Neutral effect.</p>	<p>Condition: a CTMP should be prepared to ensure best practice safety measures are implemented during construction.</p> <p>Condition: Public site notice to provide contact details (accessible to all protected characteristics in the Equalities Act 2010) for raising concerns over safety</p>	<p>Neutral</p>
<p>Connectivity</p>	<p>Chapter 17 Transport identifies that the increase in HGV movements during construction do not meet the threshold to produce significant changes in severance, and therefore identify a negligible impact. In addition, the chapter identifies negligible effects on pedestrian and cyclist amenity.</p> <p>Vulnerable groups: older people (65 and over) children (0-17)</p>	<p>Strength of Evidence: there is strong strength of evidence linking movement and exercise to positive health outcomes.</p> <p>Baseline sensitivity: there is good connectivity within the immediate vicinity with several foot and cycle ways connecting the Site to Cambridge North Station, Cambridge city centre and the wider surrounds.</p> <p>Health priorities: as above.</p> <p>Regulatory and policy requirements: as above.</p> <p>Magnitude of impact: a reversible, short to medium term, temporary impact.</p> <p>Therefore, there is judged to be a Neutral effect.</p>	<p>Condition: The Construction Environmental Management Plan (CEMP) (Appendix 4.2) sets out measures that will seek to mitigate any disruption to surrounding routes and ensure the safety of all road and route users, during the construction / demolition phase.</p>	<p>Neutral.</p>

Table 11.16: Healthy Environment during Construction

HEALTH DETERMINANT	POTENTIAL IMPACTS AND BUILT IN MITIGATION	EVALUATION OF IMPACT	FURTHER MITIGATION	RESIDUAL EFFECTS
Air Quality	<p>With regards to construction traffic, the predicted HGV movements during construction do not meet the threshold for a detailed air quality assessment of construction traffic. This is because HGV movements are expected to use the A14, bypassing the Cambridge AQMA.</p> <p>The CEMP (Appendix 4.2) includes standard good practice measures to mitigate dust.</p> <p>Vulnerable groups: all vulnerable groups identified.</p>	<p>Strength of Evidence: poor air quality is linked to incidents of chronic lung disease (chronic bronchitis or emphysema) and heart conditions, cancer and asthma and death.</p> <p>Baseline sensitivity: Chapter 6 Air Quality identifies that there are human receptors within 350m of the Site Boundary who may be impacted by construction dust, with overall low to negligible risk to human health from dust.</p> <p>Health priorities: SCDC's Health and Wellbeing Strategy (HWS) 2020-24 identifies an Air Quality Strategy should be agreed for the area as a means of addressing healthy behaviours and lifestyles.</p> <p>Regulatory and policy requirements: Legislative requirements such as the Environmental Protection Act 1990.</p> <p>Air quality is identified as a key national priority, as demonstrated within the UK Government's Clean Air Strategy (2019), as well as local requirements within SCDC local plan (Policy SC/12 Air Quality). SCDC have a district wide Air Quality Strategy in place (2021-2025) and acknowledge that air pollution is associated with adverse health impacts, particularly affecting the most vulnerable in society.</p> <p>Magnitude of impact: a reversible, short-medium term, temporary impact. Therefore, there is judged to be a Neutral effect.</p>	As set out in Chapter 6 Air Quality	Neutral

HEALTH DETERMINANT	POTENTIAL IMPACTS AND BUILT IN MITIGATION	EVALUATION OF IMPACT	FURTHER MITIGATION	RESIDUAL EFFECTS
<p>Noise and Vibration</p>	<p>There are residential receptors surrounding the Site, the closest being residents at the Sunningdale caravan Park 60 m to the east. There are also commercial receptors nearby, including Novotel Hotel, Cambridge Commercial Park, and One Cambridge Square, all of which are 20m from the boundary.</p> <p>There is potential for construction noise and impacts to result in annoyance, disturbance, and stress, which can degrade the health and quality of life of nearby residents and lead to conflict with developers.</p> <p>The CEMP will help to reduce construction noise levels where possible through Best Practicable Means. This includes general construction mitigation measures such as switching off equipment when not in use, minimising drop heights, and enclosing noise where possible. The Construction Logistics Plan will help to manage construction traffic and coordinate vehicle movements.</p> <p>Chapter 14 identifies that, once all mitigation is taken into consideration, there will be moderate adverse impacts will be experienced by future residents of the Proposed Development within the residential quarter. All other receptors are anticipated to experience minor adverse effects.</p> <p>Vulnerable groups: all vulnerable groups identified.</p>	<p>Strength of Evidence: there is increasing evidence that noise pollution is a growing problem with adverse impacts for human health, and can result in sleep disturbance, negative effects on the cardiovascular and metabolic system, as well as cognitive impairment in children.</p> <p>Baseline sensitivity: there are residents in close proximity to the east and west of the Site.</p> <p>Health priorities: SCDC's HWS does not specifically mention noise, however it does identify mental health as a priority, which can be affected by noise and other nuisance.</p> <p>Regulatory and policy requirements: Legislative requirements such as the Environmental Protection Act 1990, requirements within SCDC local plan (Policy SC/10 Noise Pollution).</p> <p>Magnitude of impact: a reversible, short-medium, temporary impact. Therefore, there is judged to be a moderate adverse effect.</p>	<p>Chapter 14 notes that engagement and prior warning will be given to local receptors.</p>	<p>Moderate adverse (as per noise assessment)</p>

HEALTH DETERMINANT	POTENTIAL IMPACTS AND BUILT IN MITIGATION	EVALUATION OF IMPACT	FURTHER MITIGATION	RESIDUAL EFFECTS
Contaminated Land	<p>There is potential for construction workers and residents in the surrounding area to be exposed to contaminants including metals, sulphates, fuels, oils, and grease (Total Petroleum Hydrocarbons [TPH]), PAH, phenols, and polychlorinated biphenyls (PCB) and asbestos, if uncontrolled releases occur.</p> <p>The Framework CEMP will provide a template for plot specific CEMPs which will include geo-environmental specific mitigation, which will include protocol for contamination that is encountered during construction, and good practice measures to avoid contamination events.</p> <p>Vulnerable groups: those with pre-existing health conditions (e.g. respiratory issues).</p>	<p>Strength of Evidence: there is strong evidence that failing to deal adequately with contamination can cause harm to human health. The health impacts associated with soil contamination vary according to the type and level of contamination and can range from skin irritation to breathing difficulties.</p> <p>Baseline sensitivity: Chapter 16 Soils and Groundwater identifies that construction workers are moderately sensitive to ground contamination. Off-site residential properties are considered to have high sensitivity. There is potential for creation of new pathways between contamination and receptors, disturbance of existing/ residual contamination, and introduction of new contaminants.</p> <p>Health priorities: SCDC's HWS does not specifically mention land contamination but does identify 'Health Behaviours and Lifestyle' as a priority, which would be negatively impacted by a contaminated land incident</p> <p>Regulatory and policy requirements: Legislative requirements such as the Environmental Protection Act 1990, Contaminated Land (England) (Amended) Regulations 2012 and Environmental Damage (Prevention and Remediation) (England) Regulations 2015. Local requirements include SCDC Local Plan (Policy SC/11 Contaminated Land)</p> <p>Magnitude of impact: a permanent, long term impact. Therefore, there is judged to be a Neutral effect.</p>	Chapter 16 outlines a series of ground investigations, monitoring and sampling that will be undertaken, if required, to support planning condition discharge. This will inform a quantitative risk assessment for human health.	Neutral

HEALTH DETERMINANT	POTENTIAL IMPACTS AND BUILT IN MITIGATION	EVALUATION OF IMPACT	FURTHER MITIGATION	RESIDUAL EFFECTS
<p>Access to Open Space</p>	<p>There is currently no open space for recreational purposes on the Site. There is nearby open space that construction workers can benefit from includes Bramblefields, immediately west of the CBG, to use on breaks.</p> <p>Phase 1 of the Proposed Development will include the creation of informal open space and wildlife habitat to the north of the Site, which may be used by construction workers of subsequent phases.</p> <p>Vulnerable groups: construction workers.</p>	<p>Strength of Evidence: there is evidence to suggest that access to open space has a positive impact on health and wellbeing. Having access to areas of green space during breaks can improve physical and mental health for construction workers</p> <p>Baseline sensitivity: currently low levels of accessible, open space/ attractive public realm within walking distance of the Site, however there is high quality open space within the surrounding area and within walking distance of the Site.</p> <p>Health priorities: SDCD HWS identifies 'Health Behaviours and Lifestyle' as a priority, which includes promoting regular physical activity. This can be facilitated through provision of accessible, safe open space.</p> <p>Regulatory and policy requirements: There is no policy requirement for open space provision for construction workers</p> <p>Magnitude of impact: a short-medium term, temporary impact. Therefore, there is judged to be a minor beneficial effect.</p>	<p>None proposed.</p>	<p>Minor beneficial</p>
<p>Flood Risk</p>	<p>Chapter 10 Flood Risk and Drainage identifies that the Site is located within Flood Zone 1 (very low risk of fluvial flooding). The CEMP will include plans for managing and monitoring surface water and flood risk, which should be developed in consultation with the Lead Local Flood Authority.</p> <p>Vulnerable groups: all vulnerable groups identified</p>	<p>Strength of Evidence: Flooding can result in risks to physical and mental health. The stress of being flooded and cleaning up can have a significant impact on mental health and wellbeing.</p> <p>Baseline sensitivity: construction workers will be working on-site, however low risk of flooding incidents.</p> <p>Health priorities: SDCD's HWS does not specifically mention flood risk but does identify 'Health Behaviours and Lifestyle' as a priority which would be negatively impacted by a flood incident.</p> <p>Regulatory and policy requirements: The Construction (Design and Management) Regulations 2015 (CDM Regulations) will apply, which requires "Suitable and sufficient steps must be taken to prevent, so far as is reasonably practicable, the risk of injury to a person during the carrying out of construction work arising from flooding." Local requirements through SDCD Local Plan (Policy CC/9 Managing Flood Risk).</p> <p>Magnitude of impact: a reversible, short-medium term, temporary impact. Therefore, there is judged to be a Neutral effect.</p>	<p>As per Chapter 10 Flood Risk.</p>	<p>Neutral</p>

Table 11.17: Vibrant Neighbourhood during Construction

HEALTH DETERMINANT	POTENTIAL IMPACTS	EVALUATION OF IMPACT	FURTHER MITIGATION	RESIDUAL EFFECTS
Local Employment	<p>Chapter 15 Socio-Economics estimates that the Proposed Development will create approximately 202 full time construction jobs. This will provide a range of skilled and unskilled opportunities.</p> <p>As contractors are not appointed, it is not possible to assess their health and wellbeing policies to tackle the mental health issues that pervade the industry.</p> <p>Vulnerable groups: those with a high level of deprivation, low income or unemployment.</p>	<p>Strength of Evidence. Well paid employment can provide significant health benefits, but poor working conditions in construction industry can lead to poor mental health.</p> <p>Baseline sensitivity: Low - given high employment rates within Cambridgeshire.</p> <p>Health priorities: no specific priority. SCDC HWS acknowledges employment rates in South Cambridgeshire are significantly better than England average.</p> <p>Regulatory and policy requirements: None</p> <p>Magnitude of impact: a reversible, short-medium term, temporary impact.</p> <p>Therefore, there is judged to be a Minor beneficial effect.</p>	<p>Planning Condition: preparation of an Employment Skills Plan to encourage local uptake of training and apprenticeships</p> <p>Recommend CEMP include requirement for contractors and construction companies to prepare and Implement a Mental Health Plan.</p>	<p>Minor Beneficial (as per Socio-Economics Assessment)</p>
Access to Amenities and Local Food	<p>Construction workers may require access to food and amenities during lunch breaks. There is a café within Cambridge North railway station which is within walking distance of the Site, offering some choice of eating options and opportunity for social interaction.</p> <p>Comfort facilities designed for women are often excluded from site services, an issue that can create anxiety and discrimination from the workplace. The CEMP notes the welfare arrangements will conform to the CDM 2015 regulations and have a separate toilet, washing and changing facilities for male and female personnel.</p> <p>Vulnerable groups: construction workers, particularly women.</p>	<p>Strength of Evidence: there is limited evidence regarding construction workers and access to healthy food choices. There are also many factors that can influence food choice, including education, economic, social and cultural factors.</p> <p>Baseline sensitivity: local amenities and healthy food is accessible from local shops.</p> <p>Health priorities: SCDC's HWS does identifies obesity as a key priority within the 'Health Behaviours and Lifestyle' priority.</p> <p>Regulatory and policy requirements: CDM Regulation 2015 for construction site welfare. NPPF identifies healthy lifestyles are enabled and supported through provision of access to healthier food.</p> <p>Magnitude of impact: a permanent, short-medium term, temporary impact. Therefore, there is judged to be a Neutral effect.</p>	<p>None proposed.</p>	<p>Neutral</p>

Table 11.16: Healthy Housing during Operation

HEALTH DETERMINANT	POTENTIAL IMPACTS	EVALUATION OF IMPACT	FURTHER MITIGATION	RESIDUAL EFFECTS
<p>Accessible Housing</p>	<p>The Proposed Development will provide 425 residential dwellings. Homes will comply with national described space standards, and all homes will meet M4(2) standards. In addition, 5% of the affordable homes will be built to M4 (3) standards.</p> <p>Vulnerable groups: older people (65 and over); and those with pre-existing health conditions, such as mobility issues.</p>	<p>Strength of Evidence: there is strong evidence to link healthy housing and positive health outcomes, particularly on vulnerable groups.</p> <p>Baseline sensitivity: according to the Homes topic paper prepared to support the emerging Greater Cambridge Local Plan, the Councils are currently looking the location of where accessible homes will be needed, and the future demand in Greater Cambridge. This will inform the next phase of the draft Local Plan.</p> <p>Health priorities: housing is a key priority in SCDC, and is identified in the HWS with regards to the 'mental health' and 'aging well' priorities.</p> <p>Regulatory and policy requirements: The Proposed Development is meeting SCDC Local Plan Policy H/12 residential space standards. Policy H/9 Housing Mix sets out requirements for accessible homes, which will be met.</p> <p>Magnitude of impact: a permanent, long term impact.</p> <p>Therefore, there is judged to be a moderate beneficial effect.</p>	<p>None proposed.</p>	<p>Moderate Beneficial</p>
<p>Housing Mix and Affordability</p>	<p>The Proposed Development will provide private rented, shared ownership and other affordable housing tenures. 40% will be affordable, and 20% of the BTR homes will be affordable private rent. The exact mix of tenure and size is to be determined at detailed design stage. This will provide choice of housing and address local housing need.</p> <p>Vulnerable groups: those with a high level of deprivation, low income or unemployment; and new parents.</p>	<p>Strength of Evidence: Evidence on healthy housing affecting a good start in life for children is well documented, along with adverse effects of cold homes and homes that overheat on elderly vulnerable groups. High house prices and rents create financial pressure and impact on mental health.</p> <p>There is some evidence to suggest tenure has a differential impact on wellbeing, and people living in social and privately rented housing have poorer wellbeing outcomes than homeowners. However, the PRS population in Cambridge is different from that seen nationally.</p> <p>Baseline sensitivity: There are affordability issues within Cambridge, with a high need for housing and a particular requirement for older people, less able people, and those on lower incomes. Access to housing is also problematic for the Cambridge PRS demographic: 20-35 years old, with high levels of employment and work in higher occupations, but despite comparatively good earning are not yet able to buy their own home.</p>	<p>Design and Access: tenure and size mix to be determined through reserved matters to meet local needs.</p> <p>Design and Access to confirm the management and maintenance plan of the residential properties.</p>	<p>Moderate Beneficial</p>

HEALTH DETERMINANT	POTENTIAL IMPACTS	EVALUATION OF IMPACT	FURTHER MITIGATION	RESIDUAL EFFECTS
<p>Homes to Age Well</p>	<p>Chapter 15 Socio-Economics estimates that the Proposed Development would generate 732 residents, of which approximately 64 would be over 65.</p> <p>No specialist older person accommodation is provided; however, a policy compliant proportion of homes will be wheelchair adaptable and accessible.</p> <p>The residential element is in outline, therefore there is limited information with regards to maintenance and energy efficiency.</p> <p>All blocks will have two passenger lifts that service all floors.</p> <p>Vulnerable groups: older people (65 and over)</p>	<p>Health priorities: as above.</p> <p>Regulatory and policy requirements: The Proposed Development is meeting SCDC Local Plan H/10 Affordable Housing. Compliance to Policy H/9 Housing Mix will be determined at reserved matters.</p> <p>Magnitude of impact: permanent, long term impact</p> <p>Therefore, there is judged to be a moderate beneficial effect.</p> <p>Strength of Evidence: Research shows that high quality housing delivers improved social outcomes among older adults, reduced injury among older adults and improved general physical and mental health. Generally, health outcomes include reduced risk of CVD, cancer, obesity and type 2 diabetes, keeping the musculoskeletal system healthy, promoting mental well-being.</p> <p>There is evidence to suggest that people living in high rise flats suffer from greater mental health problems, higher fear of crime, and fewer positive social interactions.</p> <p>Baseline sensitivity: there is an aging population within Greater Cambridge.</p> <p>Health priorities: aging well has been identified as a key priority within SCDC HWS.</p> <p>Regulatory and policy requirements: no specific local policy requirement for housing for the elderly.</p> <p>Magnitude of impact: permanent, long term impact</p> <p>Therefore, there is judged to be a minor beneficial effect.</p>	<p>RMA: a high-quality maintenance plan is prepared to maintaining lifts in the residential buildings.</p> <p>Condition: RMA to provide inclusive accessibility through design of buildings, landscaping and access.</p>	<p>Minor Beneficial</p>

Table 11.18: Active Travel during Operation

HEALTH DETERMINANT	POTENTIAL IMPACTS	EVALUATION OF IMPACT	FURTHER MITIGATION	RESIDUAL EFFECTS
<p>Walking and Cycling</p>	<p>The provision of high-quality walking and cycling infrastructure, and good connection to amenities, other routes and work destinations can enhance mental and physical wellbeing for a localised area over the long term.</p> <p>The TA (Appendix 17.1) sets out the proposed walking and cycling arrangements on-site. Additional pedestrian and cycle routes are provided within the Site to provide a greater permeability through the Site and encourage travel on foot. The Framework Travel Plan (Appendix 17.2) sets out measures to encourage walking and cycling, including:</p> <ul style="list-style-type: none"> • providing walking maps and cycling maps for staff and residents as part of Welcome Packs; • signpost secure cycle parking access; • signpost cycle hire options; • advertise cycle training; and • appoint travel plan coordinators who will liaise with Travel Plan Plus, the local advice body. <p>The masterplan has been designed to facilitate future pedestrian and cyclist permeability of the Site by providing a number of opportunities to connect into future phases of the NECAAP development to the north of the Site.</p> <p>Cycle parking will be provided for the commercial and residential elements of the Proposed Development. Cycle parking will be provided with secure, dedicated stores.</p> <p>A Framework Travel Plan has been prepared (Appendix 17.2) which will help to facilitate modal shifts towards encouraging walking and walking, as well as public transport and car sharing.</p> <p>The residential element has been designed to be car free, with only disabled parking available. There is a clear road hierarchy with dedicated cycle lanes along primary streets.</p> <p>Vulnerable groups: older people (65 and over); children (0-17); those with a high level of deprivation, low income or unemployment; and those with pre-existing health conditions, such as obesity.</p>	<p>Strength of Evidence: as per Table 11.6.</p> <p>Baseline sensitivity: High take up rate of walking and cycling for leisure and work commuting and culture of active travel in Cambridge suggest strong likelihood of high level of active travel.</p> <p>Health priorities: Include obesity and mental health both of which can be addressed through active travel.</p> <p>Regulatory and policy requirements: cycle parking meets SCDC Local Plan requirements for 1 space per 30sqm for the commercial development, and 1 space per bedroom for the residential development. Policy HQ/1 Design Principles, Policy TI/2 Planning for Sustainable Travel.</p> <p>Magnitude of impact: permanent, long term.</p> <p>Therefore, there is judged to be a major beneficial effect.</p>	<p>Condition: Travel Plan to be prepared in accordance with Framework Travel Plan setting out measures to encourage active travel.</p>	<p>Major Beneficial</p>

HEALTH DETERMINANT	POTENTIAL IMPACTS	EVALUATION OF IMPACT	FURTHER MITIGATION	RESIDUAL EFFECTS
Safety	<p>Chapter 17 Transport identifies that there will be minor to negligible impacts with regards to fear and intimidation of pedestrians and cyclists onsite, as there will be dedicated infrastructure to separate pedestrians and cyclists from the carriageway.</p> <p>Chapter 17 outlines measures to address road safety within the Site, including a package of traffic calming measures along Chesterton Way, and utilize Automatic Number Plate Recognition (ANPR) to deter driving offences.</p> <p>Vulnerable groups: older people (65 and over); and children (0-17).</p>	<p>Strength of Evidence, Baseline sensitivity, Health priorities, Regulatory and policy requirements: as per Table 11.6.</p> <p>Magnitude of impact: permanent, long term Therefore, there is judged to be a Neutral effect.</p>	None proposed.	Neutral
Connectivity	<p>Connecting the public realm and internal routes to local and strategic cycle and walking networks and public transport helps to ensure the safety of future residents on-site and encourages them to prioritise active and greener modes of travel.</p> <p>The pedestrian and cycle links to local shops, employment and amenities ensure a high level of connectivity within the Site. These routes will link to Cambridge's existing cycle, pedestrian and public transport networks. They ensure the Site is open and permeable to residents in the surrounding areas and visitors to the Site.</p> <p>Vulnerable groups: no specific group identified.</p>	<p>Strength of Evidence, Baseline sensitivity, Health priorities, Regulatory and policy requirements: as per Table 11.6.</p> <p>Magnitude of impact: permanent, long term Therefore, there is judged to be a Neutral effect.</p>	None proposed.	Neutral
Minimising Car Use	<p>The residential element of the development is proposed to operate effectively as a car-free zone, with the exception of an appropriate quantum of disabled and short stay car parking spaces. This minimal car use could contribute to reduced emissions and better air quality on-site enhancing wellbeing and reducing the occurrence of chronic or acute disease. This will affect a localised area and impact vulnerable groups over the long term.</p> <p>The Proposed Development provides a total of 418 parking space for the commercial element. These are provided within the building basement or mobility hub to help manage car parking on site. These will be controlled by building security and may adopt an internal booking system.</p> <p>There will also be up to 618 car parking spaces associated with the Cambridge North Station and rail industry related uses.</p> <p>The Framework Travel Plan (Appendix 17.2) sets out measures to discourage single car use, including promotion of local car share schemes, and promotion of on-site car club vehicles so employees do not use their own private vehicle for travel to/from the Site.</p> <p>Vulnerable groups: children (0-17); those with a high level of deprivation, low income or unemployment; and those with pre-existing health conditions, such as obesity.</p>	<p>Strength of Evidence, Baseline sensitivity, Health priorities, as per Table 11.6</p> <p>Regulatory and policy requirements: The Proposed Development provides below the current residential car parking standards but follows the approach of the emerging NECAAP which suggests that new development take a restrictive approach to car parking.</p> <p>Magnitude of impact: permanent, long term Therefore, there is judged to be a Minor Beneficial effect.</p>	None proposed.	Minor Beneficial

Table 11.19: Healthy Environmental during Operation

HEALTH DETERMINANT	POTENTIAL IMPACTS	EVALUATION OF IMPACT	FURTHER MITIGATION	RESIDUAL
Air Quality	<p>With regards to road traffic emissions, Chapter 6 Air Quality identified that annual mean NO₂, PM₁₀ and PM_{2.5} concentrations are predicted to meet the Air Quality Objectives at all modelled receptors, and the impact of the Proposed Development on air quality has been assessed as negligible.</p> <p>The Framework Travel Plan (Appendix 17.2) aims to discourage the use of driving, which, when implemented, may help to reduce emissions associated with road traffic.</p> <p>Vulnerable groups: all vulnerable groups identified.</p>	<p>Strength of Evidence, Baseline sensitivity, Health priorities, Regulatory and policy requirements: as per Table 11.7.</p> <p>Magnitude of impact: permanent, long term.</p> <p>Therefore, there is judged to be a Neutral effect.</p>	<p>RMA: consideration to be given to internal air quality.</p>	Neutral
Noise	<p>Chapter 14 Noise and Vibration identifies that operational noise impacts will include mechanical plant and equipment associated with residential and commercial buildings and servicing movement noise. These could result in annoyance and disturbance at the local scale.</p> <p>Although the plant specification is currently unknown, Chapter 14 has outlined measures to help reduce noise, including locating plant as far as possible away from or not overlooking any residential premises, selecting low noise items, and fitting screens or enclosures. Chapter 14 concludes a negligible impact. Initial modelling indicates that it is feasible to meet internal noise level criteria set by BS8322 for residential rooms.</p> <p>In addition, there will be a change in the road traffic which could have impacts on the local scale, but potentially on the wider road network as well. Chapter 14 concludes a minor adverse impact.</p> <p>Vulnerable groups: all vulnerable groups identified.</p>	<p>Strength of Evidence, Baseline sensitivity, Health priorities, Regulatory and policy requirements: as per Table 11.7.</p> <p>Magnitude of impact: permanent, long term.</p> <p>Therefore, there is judged to be a minor adverse effect.</p>	<p>Reserved Matters: A further assessment of the proposed mechanical services plant should be undertaken during the detailed design stage.</p>	Minor Adverse

HEALTH DETERMINANT	POTENTIAL IMPACTS	EVALUATION OF IMPACT	FURTHER MITIGATION	RESIDUAL
Contaminated Land	<p>Chapter 16 Soils and Groundwater notes that the completed development will bring new human receptors not currently present on the Site, who are considered to have moderate to high sensitivity. However, the completion of the Proposed Development will result in a reduced potential for surface water infiltration and mobilisation of residual contamination compared to current baseline conditions.</p> <p>All necessary mitigation will be implemented prior to operational phase.</p> <p>Vulnerable groups: all vulnerable groups identified.</p>	<p>Strength of Evidence, Baseline sensitivity, Health priorities, Regulatory and policy requirements: as per Table 11.7.</p> <p>Magnitude of impact: permanent, long term.</p> <p>Therefore, there is judged to be a Neutral effect.</p>	None proposed.	Neutral
Open space, play space and access to nature	<p>Chapter 15 Socio-Economics notes that the Proposed Development provides considerable open space broadly consistent with council's standards. This includes the Wild Park on an area of land that is currently not accessible to the public, which will act as informal open space with areas for natural play. Chesterton Gardens, within the residential area, will include various informal open space areas, and formal and informal children's play space. Chesterton Square, within the employment element of the Proposed Development. And the Piazza at the southern end of the Proposed Development site, which provides a connection through to the Cambridge North railway station.</p> <p>There will be a total of 2.056 ha provided. Based on an indicative housing mix, SCDC policy requires 0.880 ha to be provided.</p> <p>Accessibility measures of these open spaces includes:</p> <ul style="list-style-type: none"> • even, firm and smooth walking surfaces; • footpaths will have continuous detectable physical edges; • provision of resting areas will not be more than 50 m apart; • a range of seating options including armrests and backrests; and those that allow wheelchair users to transfer to a bench. <p>Vulnerable groups: children (0-17); new parents; people working from home.</p>	<p>Strength of Evidence: Plentiful research linking blue and green infrastructure with health and wellbeing.</p> <p>Baseline sensitivity: There are large areas of open space in the local area, as well as playing fields and children's playing areas. However, there are high rates of obesity in the local area and known mental health issues. The baseline sensitivity is therefore considered to be medium.</p> <p>Health priorities; SCDC HWS identifies 'Health Behaviours and Lifestyle' as a key priority, and notes over half of all adults across the district are classified as overweight or obese. Mental health is another priority, in particular for young people.</p> <p>Regulatory and policy requirements: The Proposed Development provides 1.17 ha less open space than policy requirements, and does not meet council standards on provision of allotments and community orchards.</p> <p>Magnitude of impact: Permanent, long term.</p> <p>Therefore, there is judged to be a moderate beneficial effect.</p>	<p>Condition: Landscape management and maintenance strategy should include consideration of space design to meet the needs of all age groups, residents and employees on-site, including those protected characteristics in the Equalities Act.</p>	Moderate Beneficial

HEALTH DETERMINANT	POTENTIAL IMPACTS	EVALUATION OF IMPACT	FURTHER MITIGATION	RESIDUAL
Local food growing	<p>The Proposed Development does not provide any permanent allotments or community orchards. There will be community growing in Chesterton Gardens and a rooftop community growing area on top of a residential block.</p> <p>As set out in the Landscape and Open Space Strategy, a 'pop up park' will be available as a meanwhile use during construction. This will include raised beds (335 sqm) and community growing space.</p> <p>Vulnerable groups: Children (0-17); those with a high level of deprivation, low income or unemployment; those with pre-existing health conditions, such as obesity</p>	<p>Strength of Evidence: Strong evidence on the mental and physical health benefits of enjoyment in grow your own opportunities, as evidenced in green prescribing of engagement in such activity. There is a lack of evidence relating to health outcomes associated with consumption of home-grown food.</p> <p>Baseline sensitivity: as noted above, there are significant levels of obesity (especially childhood) within Cambridgeshire and high level of mental health issues.</p> <p>Health priorities: mental health.</p> <p>Regulatory and policy requirements: below policy requirements</p> <p>Magnitude of impact: None.</p> <p>Therefore, there is judged to be a minor beneficial effect.</p>	<p>A s106 will secure community growing on-site of 1 Milton Avenue and triangle site and then to be relocated north of Cowley Road at later phases.</p>	<p>Minor Beneficial</p>
Overheating	<p>The Proposed Development will include provision of open space throughout the Site, including landscape and tree planting, which will help to mitigate against the urban heat island effect and provide cooling and shading.</p> <p>The ventilation and cooling strategy will be confirmed at the detailed design stage. The Sustainability Statement (Hoare Lea, 2022) submitted with this application notes that an overheating risk analysis will be undertaken at detailed design. The Proposed Development will be built to meet CIBSE's latest overheating standards.</p> <p>Vulnerable groups: older people (65 and older); those with a high level of deprivation, low income or unemployment</p>	<p>Strength of Evidence: According to the NHS, more than 2,500 people were killed by heatwaves across the UK in 2020.</p> <p>Baseline sensitivity: there is an aging population who are vulnerable to overheating. Chapter 15 Socio-Economics estimates that the Proposed Development will generate a population of 732, of which 64 people will be over 65.</p> <p>Health priorities: Aging well</p> <p>Regulatory and policy requirements: Building Regulations Part O must be complied with.</p> <p>Magnitude of impact: permanent, long term</p> <p>Therefore, there is judged to be a minor beneficial effect.</p>	<p>Planning condition: overheating risk assessment to be prepared at reserved matters.</p>	<p>Minor Beneficial</p>

HEALTH DETERMINANT	POTENTIAL IMPACTS	EVALUATION OF IMPACT	FURTHER MITIGATION	RESIDUAL
Flood Risk	<p>The Site is at low risk of flooding from most sources, with the exception of groundwater, which is considered to present a medium-high flood risk.</p> <p>Built-in mitigation includes coating the below ground concrete structure and waterproofing proposed basements, setting finished floor levels at least 150mm above the surrounding ground levels, and minor modifications to topography. SuDS will be onsite in the form of buried tanks, a swale and attenuation basin.</p> <p>Vulnerable groups: all vulnerable groups identified.</p>	<p>Strength of Evidence, Baseline sensitivity, Health priorities, Regulatory and policy requirements: as per Table 11.7.</p> <p>Magnitude of impact: permanent, long term.</p> <p>Therefore, there is judged to be a neutral effect.</p>	<p>Condition: Regular maintenance of SUDS features as set out in the Drainage Strategy.</p>	Neutral

Table 11.20: Vibrant Neighbourhood during Operation

HEALTH DETERMINANT	POTENTIAL IMPACTS	EVALUATION OF IMPACT	FURTHER MITIGATION	RESIDUAL
Healthcare services	<p>Existing local GP services and new health centres in neighbouring developments can support good health in the Proposed Development.</p> <p>No healthcare facilities will be provided on-site; however, the development proposes for flexible class E uses and healthcare facilities could be included at ground floor level should demand arise.</p> <p>The Proposed Development is estimated to generate 732 new residents. Industry practice assumes 0.4 GP is required per 1,800 patients.</p> <p>Vulnerable groups: those with pre-existing health conditions; pregnant women; older people.</p>	<p>Strength of Evidence: provision of accessible healthcare facilities helps to improve health.</p> <p>Baseline sensitivity: Younger people tend to have lower chronic and co-morbidity issues. There is currently good capacity at local GPs to meet the needs of the incoming population.</p> <p>Health priorities: all are relevant.</p> <p>Regulatory and policy requirements: Policy SC/5 community healthcare facilities are supported but not required. NECAAP requires health provision to be made, subject to further engagement with health providers).</p> <p>Magnitude of impact: permanent.</p> <p>Therefore, there is judged to be a Minor adverse effect.</p>	<p>The S106 to provide contribution to local services.</p>	Neutral

HEALTH DETERMINANT	POTENTIAL IMPACTS	EVALUATION OF IMPACT	FURTHER MITIGATION	RESIDUAL
<p>Education</p>	<p>Chapter 15 Socio-Economics identifies that, as the child yield is considerably smaller than that expected for larger houses. It is anticipated that there is existing capacity within the Local Study Area for to accommodate nursery and pre-school age children, primary age children, and secondary school children.</p> <p>Vulnerable groups: children; new parents</p>	<p>Strength of Evidence: education is a fundamental social determinant of health.</p> <p>Baseline sensitivity: there is good existing provision within the local area. The Proposed Development is estimated to generate 81 children (0-18).</p> <p>Health priorities: SCDC HWS identifies children and young people's health as a priority.</p> <p>Regulatory and policy requirements: SCDC Local Plan Policy SC/4: Meeting Community Needs requires major developments to make provision appropriate to the level of need generated.</p> <p>Magnitude of impact: permanent.</p> <p>Therefore, there is judged to be a Neutral effect.</p>	<p>None proposed</p>	<p>Neutral</p>
<p>Access to social infrastructure, public buildings, and spaces.</p>	<p>Provision of social infrastructure and shared spaces will offer places for planned and incidental social engagement. These measures facilitate early community creation which helps avoid isolation, and associate adverse mental health effects.</p> <p>The Proposed Development includes flexible Class E and Class F space which can be used for small retail, restaurants/ cafes and community uses.</p> <p>Vulnerable groups: all vulnerable groups identified.</p>	<p>Strength of Evidence: Clear evidence that access to community infrastructure provides opportunity for social interaction and development of social capital which brings mental health benefits.</p> <p>Baseline sensitivity: there is a range of community infrastructure close to the Site, including schools and indoor and outdoor leisure facilities.</p> <p>Health priorities: Mental health.</p> <p>Regulatory and policy requirements: Proposed development meets SCDC Local Plan Policy S/2 Development objectives identifying the importance of providing access to community infrastructure that supports healthy lifestyles and wellbeing for everyone.</p> <p>Magnitude of impact: permanent, long term.</p> <p>Therefore, there is judged to be a minor beneficial effect.</p>	<p>None proposed</p>	<p>Minor Beneficial</p>

HEALTH DETERMINANT	POTENTIAL IMPACTS	EVALUATION OF IMPACT	FURTHER MITIGATION	RESIDUAL
<p>Local Employment</p>	<p>Unemployment generally leads to poverty, illness, and a reduction in personal and social esteem. Work aids recovery from physical and mental illnesses. The susceptibility of population to accessing these health benefits relates directly to their suitability for the job. This is influenced by an array of factors, but includes knowledge of opportunity, adequate skills for the job, ease of travel as well as personal attributes.</p> <p>Chapter 15 Socio-Economics calculates that approximately 4,300 employees will be supported by the Proposed Development, comprised of Research & Development and office employment, as well as within the mixed-use areas such as within the retail elements.</p> <p>Vulnerable groups: those with a high level of deprivation, low income or unemployment.</p>	<p>Strength of Evidence: Employment and income is a key determinant of health and wellbeing.</p> <p>Baseline sensitivity: Cambridge is a hub for R&D.</p> <p>Health priorities: none.</p> <p>Regulatory and policy requirements: emerging Greater Cambridge Local Plan Policy WS/IO Creating inclusive employment opportunities through new developments.</p> <p>Magnitude of impact: long term, local.</p> <p>Therefore, there is judged to be a major beneficial effect.</p>	<p>Planning condition: preparation of an Employment Skills Plan to prioritise local recruitment.</p>	<p>Major Beneficial</p>

Evaluation of Predicted Impacts

11.130 The evaluation of impact is provided in the assessment tables above.

Mitigation

11.131 All relevant mitigation is provided in the assessment tables above.

Residual Effects

11.132 Residual effects are provided in the assessment tables above.

Cumulative Effects

Construction

11.133 During construction, there is potential for cumulative effects between the Proposed Development and the cumulative schemes below:

- 21/02450/REM Reserved matters application 421 new homes with associated infrastructure, internal roads and open space
- 20/03524/FUL Upgrade to existing access roads and Cowley Road (as part of a wider proposal 20/03523/FUL for the erection of a 5-storey building and a 6 storey building for commercial/business purposes, erection of a transport hub, gymnasium, surface parking, landscaping and associated infrastructure including demolition of the existing building (St John's House) and associated structures).
- 21/04640/SCOP Request for a Formal Scoping Opinion for an Order granting Development Consent for the Cambridge Wastewater Treatment Plant Relocation Horningsea Road Fen Ditton Cambridgeshire
- 17/1616/CTY EIA Scoping Opinion for Waterbeach New Town at Waterbeach Barracks and Airfield Site, for e approximately 5,000 residential units, retail, leisure, primary schools, secondary schools, access, and hard and soft landscaping.

11.134 From an environmental health perspective, the key concern during construction is in regard to air quality and noise. Chapter 6 Air Quality and Chapter 14 Noise do not identify any likely adverse cumulative impacts.

Operation

11.135 Regarding environmental health, there have been no identified adverse cumulative effects with regards to air quality, flood risk and ground conditions. Chapter 14 noise identifies that there is potential for minor adverse impacts with regards to road traffic noise, however noise from mechanical plant is likely to be negligible.

11.136 Chapter 15 Socio-Economics notes that the cumulative effects outside of the NECAAP area are unlikely to result in significant cumulative effects, as they are at a sufficient distance and unlikely to share social infrastructure.

Monitoring

11.137 No specific monitoring is required in relation to health. Monitoring requirements are outlined in the relevant topic chapters with regards to air quality, vibration, noise, ground conditions and transport.

Summary of Impacts

11.138 All impacts are listed in **Tables 11.15 - 11.20** above.

Landscape and Visual

12

12.0 Landscape and Visual

Introduction

- 12.1 This chapter addresses the landscape and visual impacts of the Proposed Development.
- 12.2 This ES chapter should to be read in conjunction with ES Chapter 8 Built Heritage in order to gain a comprehensive understanding of the townscape impact of the Proposed Development.
- 12.3 This chapter is supported by the following appendices:
- Appendix 12.1 – Methodology
 - Appendix 12.2 – Mapping
 - Appendix 12.3 – Visual assessment
 - Appendix 12.4 – Technical visualisations by VuCity
 - Appendix 12.5 - Correspondence

Potential Sources of Impact

- 12.4 The Proposed Development consists of a large scale built form that introduces a new urban character onto a brownfield site that lacks tall structures. As identified during the Scoping Stage (see Scoping Request at **Appendix 2.1** and Scoping Opinion at **Appendix 2.2**), the proposals would have some landscape/townscape and visual impact associated with the mass and height of the proposed buildings and the change of local townscape character.

Methodology

- 12.5 This section outlines the proposed methodology for undertaking the landscape and visual impact assessment (LVIA) in accordance with best practice and guidance, namely:
- 'Guidelines for Landscape and Visual Impact Assessment', (GLVIA3) produced by the Landscape Institute with the Institute of Environmental Management and Assessment (Third Edition, 2013);
 - 'Assessing Landscape Value Outside National Designations' Technical Guidance Note 02/21, by the Landscape Institute;
 - 'An Approach to Landscape Character Assessment' Christine Tudor and Natural England, October 2014;
 - 'Townscape Character Assessment', Technical Information Note 05/2017, by the Landscape Institute (5 December 2017); and
 - Cambridge Local Plan, Policy 60 and **Appendix F** (October 2018).
- 12.6 In response to the particular urban nature of the Site and its context, this LVIA also considers townscape impacts where appropriate.
- 12.7 GLVIA3 defines the term 'townscape' as:
- 'the landscape within the built-up area, including the buildings and the relationship between them, the different type of urban spaces, including green spaces, and the relationship between buildings and open spaces.'*

- 12.8 In accordance with the GLVIA3 approach to assessment, there are two key effects to be considered in the eventual preparation of the full LVIA report:
- 12.9 *Landscape/Townscape Effects* relate to changes in the fabric, character and quality of the study area's landscape and townscape. These include direct impacts such as loss of vegetation and additional built form or indirect impacts such as changes to tranquillity. Landscape/townscape effects do not need to be solely visible, but they are often associated with visual changes.
- 12.10 *Visual Effects* relate to specific changes in views and the effects on visual receptors (e.g. users of public rights of way or recreational facilities). Changes to the visual setting of protected cultural heritage features are also considered (e.g. Scheduled Monuments, Listed Buildings and Conservation Areas), although the impact on the significance of the heritage assets is considered in Chapter 8.
- 12.11 The assessment methodology can be found in **Appendix 12.1**. Generally, the thresholds that generate significant landscape/townscape and visual impact are:
- The result of a major change over an extensive area, and/or a valuable feature, and/or a sensitive receptor; or
 - The result of a change of such scale and nature causing a major mutation of the distinctive characteristics and value of the receptor.

Study Area

- 12.12 The Site is located at the edge of a highly urbanised area and in proximity to the commercial and business area to the north of Cambridge, which, although less dense on plan, includes a range of large-scale buildings. This context constrains the Site's visibility from the south-west and north-west, whilst the open countryside, which extends to the north-east and south-east, allows for more distant views.
- 12.13 This, and the relationship with the local character, as well as the designated landscape and townscape features (see Map 4 and 5 in **Appendix 12.2**), suggests that a study area of 1.5km radius from the Site boundary is appropriate for the assessment of landscape and townscape effects. However, the visual impact will be considered for a wider context based on the extent of the Zone of Theoretical Visibility (see par. 12.112), with an extended study area of 7km radius from the Site for the assessment of visual effects.

Field Study

- 12.14 A field survey was undertaken in July 2019, March 2021 and March 2022 to:
- Review and understand the landscape/townscape characteristics of the Site, its surroundings and its context; and to
 - Define the location of key visual receptors and representative viewpoints.
- 12.15 The survey was undertaken from roads, bridleways, tracks, footpaths and publicly accessible viewpoints.

Limitations and Assumptions

- 12.16 The scope of the LVIA was agreed with the Local Planning Authority (LPA) through the EIA scoping and pre-application process. Desk-based and on-site analysis are limited to the agreed documents and viewpoints.

- 12.17 The LVIA does not include a review of the methodologies and conclusion of the considered documents listed in the References. Instead, it analyses the Proposed Development against the conclusion of the available landscape/townscape evidence and policies.
- 12.18 To inform the assessment of visual effects, technical visualisations have been produced. The baseline and visualisation photography has largely been carried out during the winter months, which represents the worst-case scenario. However, visual assessment is also aided by on-site experience and reasonable assumptions are made to consider seasonal effects.
- 12.19 To inform the assessment of construction effects, assumptions are made on the likely activities and plant required.

Consultation

- 12.20 Consultation with the LPA has been carried out through the EIA scoping and pre-application engagement processes, which included workshops focused on the townscape and landscape impacts. The former confirmed the LVIA methodology and list of projects to be considered in the cumulative effects. The latter included agreement of the proposed landscape/townscape and visual receptors.
- 12.21 The following receptors were added following discussion with the local authority post submission of the EIA scoping report (**Appendix 2.1**):
- Townscape Area: The residential area to the south-east and south-west of the Proposed Development.
 - Visual receptors: The residents on Fen Road and Discovery Way (Viewpoints E5 and E6).
- 12.22 Relevant correspondence with the Landscape Officer is attached in **Appendix 12.5**.
- 12.23 **Table 12.1** summarises the agreement reached in discussion with the LPA, through the utilisation of VuCity and a variety of initial technical visualisations, on the selection of viewpoints to be considered in the LVIA and heritage assessment, and the approach to technical visualisations. It should be noted that views to inform the heritage assessment (HER in **Table 12.1**) are considered in ES Chapter 8.
- 12.24 Viewpoints that are excluded from the LVIA were tested with VuCity following the Site survey. Photography and Type 2 Technical Visualisations are provided in **Appendix 12.4** to support the reason for exclusion.

Table 12.1: Viewpoints

VIEWPOINT	TYPE/AVR	COMMENT
1 - LVIA - Footbridge over A14	NEC LCVIA ¹ VP5	Excluded as the proposal is not visible
2 - LVIA - Bramblefields LNR	4/0	-
3 – HER - Castle Mound	4/0	Appendix F / Excluded in the LVIA as the proposal is not visible
4 - LVIA - Cowley Road	4/3	-
5 – LVIA/HER Ditton Meadow – Footpath 85/2	4/0	NEC LCVIA VP2
6 – HER - Green End	4/2	-

1 North East Cambridge Landscape Character and Visual Impact Appraisal (NEC LCVIA): Development scenario (The Environmental Landscape Partnership, December 2019)

VIEWPOINT	TYPE/AVR	COMMENT
7a - LVIA/HER - Footpath 162/1 at Fen Road		Excluded as the proposal is not visible
7b - LVIA/HER - Footpath 162/1 at Baits Bite Lock		Appendix F / Excluded as the proposal is not visible
7c - HER - Harmcamlow Way at Biggin Abbey	4/0	NEC LCVIA VP4
8 - LVIA/HER - Footpath 85/6 Fen Ditton	4/3	NEC LCVIA VP3
9 - LVIA/HER - Field Lane byway	4/3	-
10 - LVIA/HER - Low Fen Drove way - west	4/0	-
11 - HER - Low Fen Drove way - east	4/0	Excluded in the LVIA as the proposal is not visible
12 - HER - Low Fen Drove way - south	4/0	Excluded in the LVIA as the proposal is not visible
13 - LVIA - Byway 162/3		NEC LCVIA VP6 / Excluded as the proposal is not visible
14 - LVIA - Guided busway	4/3	-
15 - LVIA/HER - Ditton Meadows	4/3	NEC LCVIA VP1
16 - LVIA/HER - Stourbridge Common	4/3	-
17- HER - East of Milton Conservation Area	2/1	-
18 - HER - St Peter's Church, Horningsea	2/0	-
19 - HER - Horningsea Conservation Area, Priory Road	4/2	-
20 - LVIA - A14 bridge over the River Cam	2/2	Type 2 due to safety issues in proving a photograph and survey from the A14
21/E3 - HER - Stourbridge Common - Red Lion bridge	4/2	-
22 - HER - Chapel of St Mary Magdalene, Newmarket Road	4/2	Excluded in the LVIA as the proposal is not visible
23 - LVIA/HER - Horningsea Road bridge over A14		Excluded as the proposal is not visible
24 - LVIA/HER - Fen Ditton Conservation Area, High Street		Excluded as the proposal is not visible
E1 - LVIA - Chisholm Trail bridge on River Cam	4/3	-
E2 - LVIA - Chisholm Trail	4/3	-
E4 - LVIA - Stourbridge Common, riverside		Excluded as the proposal is not visible
E5 - LVIA – Discovery way	2/2	Added post agreement of technical visualisations
E6 - LVIA – Fen Road	2/2	Added post agreement of technical visualisations
P1 - LVIA - Harmcamlow Way - north	4/0	-

VIEWPOINT	TYPE/AVR	COMMENT
P4 - LVIA - Little Wilbraham Road	4/0	-
P5 - LVIA - Worts' Causeway/Shelford Road	4/0	Appendix F
P6 - LVIA - Limekiln Road, West Pit LNR	4/0	Appendix F
P7 - LVIA - Redmeadow Hill	Appendix F / Excluded as the proposal is not visible	
P8 - HER - Coronation Avenue, Anglesey Abbey	4/0	-

Planning Policy Context

National Planning Policy Framework (NPPF)

- 12.25 The National Planning Policy Framework 2019 (NPPF) sets out the overall economic, social and environmental objectives that the planning system should follow to achieve sustainable development. At the heart of the NPPF is a *'presumption in favour of sustainable development'* (Para. 11).
- 12.26 The NPPF stresses the concept of good design as a key aspect of sustainable development; it *'creates better places in which to live and work and helps make development acceptable to communities'* (Para. 124). Furthermore, the policy states that development must (Par. 127):
- be *'sympathetic to local character and history, including the surrounding built environment and landscape setting, while not preventing or discouraging appropriate innovation or change (such as increased densities)'*; and
 - *'establish or maintain a strong sense of place, using the arrangement of streets, spaces, building types and materials to create attractive, welcoming and distinctive places to live, work and visit'*.
- 12.27 Therefore, design quality and appropriateness to its surroundings is an important part of the evaluation of planning proposals. *'In determining applications, great weight should be given to outstanding or innovative designs which promote high levels of sustainability, or help raise the standard of design more generally in an area, so long as they fit in with the overall form and layout of their surroundings'* (Para. 131).
- 12.28 Conservation and enhancement of the natural environment are also at the heart of the NPPF objectives. Planning decisions should contribute by *'protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan)'* (Para. 170).
- 12.29 Valued landscapes might also be found within an urban context; however, it is noted that the NPPF does not clearly define what constitutes a 'valued landscape'. Useful in the NPPF 2019 revision is the update to Para. 11, which provides some additional guidance through footnote 6. This defines, more thoroughly than before, *'areas or assets of particular importance'* as: *'habitats sites (and those sites listed in paragraph 176) and/or designated as Sites of Special Scientific Interest; land designated as Green Belt, Local Green Space, an Area of Outstanding Natural Beauty, a National Park (or within the Broads Authority) or defined as Heritage Coast; irreplaceable habitats; designated heritage assets (and other heritage assets of archaeological interest referred to in footnote 63); and areas at risk of flooding or coastal change.'* For the purposes of this LVIA, it is acknowledged that the 'Stroud DC v Gladman High Court judgement

(reference CO/4082/2014) concluded that, in order to be valued in terms of the NPPF, the landscape is required to show *'some demonstrable physical attribute rather than just popularity,'* (i.e. it has to be 'out of the ordinary'), as well as the recent Landscape Institute guidance TGN 02/21.

Local Plans

12.30 The Site is located within the South Cambridgeshire Local Authority jurisdiction, and it is identified as a 'Major Development Site' in the development strategy. Due to the proximity to the boundary of the Cambridge City Local Authority and strong association with Cambridge urban settlement, relevant policies in the Local Plan for the latter authority are also considered.

South Cambridgeshire Local Plan (2018)

- Policy S/2: Objectives of the Local Plan.

12.31 This policy sets out the strategic objectives of the local plan, setting out six key objectives to guide development within the district. Objectives include the protection of *'the character of South Cambridgeshire, including its built and natural heritage, as well as protecting the Cambridgeshire Green Belt.'*

- Policy HQ/1: Design Principles.

12.32 This policy is prefaced with the acknowledgement that settlements within the district vary in character. *'All new development will have an impact on its surroundings. Development needs to be of an appropriate scale, design and materials for its location and conform to the design principles set out in the policy.'*

12.33 *'Any development must also take proper care to respond to its surroundings, and create sustainable, inclusive and healthy environments where people would wish to live, work, shop, study or spend their leisure time.'* In order to achieve such design quality, the policy lists fundamental design principles, which include protection and enhancement of natural and historical assets, as well as conserving the countryside and open spaces, referring to the District Design Guide SPD and village design guides where appropriate.

- Policy NH/2: Protecting and Enhancing Landscape Character.

12.34 This policy focuses on the preservation and enhancement of local and national character and distinctiveness of the landscape as prescribed by existing evidence, such as the National Character Area Profiles.

12.35 *'The district's landscape is dominated by arable farmland with dispersed woodlands and often low, trimmed hedgerows. As a result, it is a predominantly open landscape, allowing long views. A mosaic of hedgerows, fields, parkland and small woodlands create variety and combine to create an often treed skyline. A greater degree of enclosure and a more detailed landscape is often associated with settlements and the many small river valleys.'*

South Cambridgeshire Design Guide Supplementary Planning Document (2010)

12.36 This Supplementary Planning Document (SPD) forms part of the South Cambridgeshire Local Development Framework (LDF), with a purpose to ensure *'the delivery of sensitively and appropriately designed, sustainable developments.'* The Guide identifies that all *'new development will have an impact on its surroundings. The aim must be that any development, from a major urban extension to Cambridge to an extension to an existing home, takes all proper care to respond to its surroundings, including existing buildings, open spaces and village*

edges, and ensure an integrated scheme that does not harm local amenity and wherever possible, brings benefits to the area.'

- 12.37 The SPD requires that any new development '*must sit comfortably in its landscape, taking account of the topography and natural or man-made features. New development should not intrude upon the skyline, with the exception of specifically agreed features selected as landmarks, in the tradition of church spires or towers. ... careful consideration must be given to the height and form of buildings, with the built form broken down to appear as a composition of forms, rather than one large form and utilising trees and other planting to soften the impact on long distance views.'*

Cambridge Local Plan (2018)

- Policy 60: Tall Buildings and the Skyline of Cambridge.

- 12.38 The policy sets out criteria that should be considered to protect or enhance the character and qualities of Cambridge's skyline; these include:
- '*location, setting and context – applicants should demonstrate through visual assessment or appraisal with supporting accurate visual representations, how the proposals fit within the existing landscape and townscape;*'
 - '*impact on the historic environment - ... including impact on key landmarks and viewpoints, as well as from the main streets, bridges and open spaces in the city centre and from the main historic approaches, including road and river, to the historic core. Tall building proposals must ensure that the character or appearance of Cambridge, as a city of spires and towers emerging above the established tree line, remains dominant from relevant viewpoints as set out in **Appendix F;***' and
 - '*scale, massing and architectural quality – applicants should demonstrate through the use of scaled drawings, sections, accurate visual representations and models how the proposals will deliver a high-quality addition to the Cambridge skyline and clearly demonstrate that there is no adverse impact.'*
- 12.39 The policy describes Cambridge as free from clusters of modern towers and bulky buildings, except for the hospital and airport areas, contrasting with the surrounding low-lying suburbs. Also noted is the difference between the '*background buildings*' in the historic core and the suburb's built-form. The former rises between three to five storeys with occasionally, modern, six-storey buildings, while two-storey buildings largely characterise the latter with only a few areas with three storeys.
- 12.40 Policy 60 goes on to state: '*Trees form an important element of the Cambridge skyline, within both the historic core and surrounding suburbs. Elevated views from the rural hinterland and from Castle Mound reveal a city of spires and towers emerging above an established tree line. Buildings therefore work with subtle changes in topography and the tree canopy to create a skyline of 'incidents', where important buildings rise above those of a prevailing lower scale.'*
- 12.41 Appendix F (Tall Buildings and the Skyline) provides further guidance in regard to Policy 60.
- 12.42 Relevant to this assessment are the following criteria listed in **Appendix F**:
- '*maintain the character and quality of the Cambridge skyline;*'
 - '*ensure that tall buildings, as defined in this guidance, which break the established skyline are well considered and appropriate to their context;*' and

- *'support only new buildings which are appropriate to their context and contribute positively to both near and distant views.'*

12.43 **Appendix F** acknowledges that it is the nature of the contextual townscape that defines a tall building; based on this, in Cambridge a tall building is *'any structure that breaks the existing skyline and/or is significantly taller than the surrounding built form.'*

12.44 The key characteristics of Cambridge's skyline identified in **Appendix F** include:

- *'Trees form an important element in the modern Cambridge skyline, within both the historic core and the suburbs. Many of the elevated views of the city from the rural hinterland and from Castle Mound show a city of trees with scattered spires and towers emerging above an established tree line.'*; and
- In the suburb, the height of the building is generally lower, with some three-storey Victorian and Edwardian buildings on the main approach roads.

12.45 **Figure 12.1** from the Cambridge Local Plan 2018 provides a list of 'Strategic Viewpoints', including Castle Mound, Castle Hill, (32m AOD), the only vantage point affording significant panoramic views across the city (apart from the tops of tall buildings).

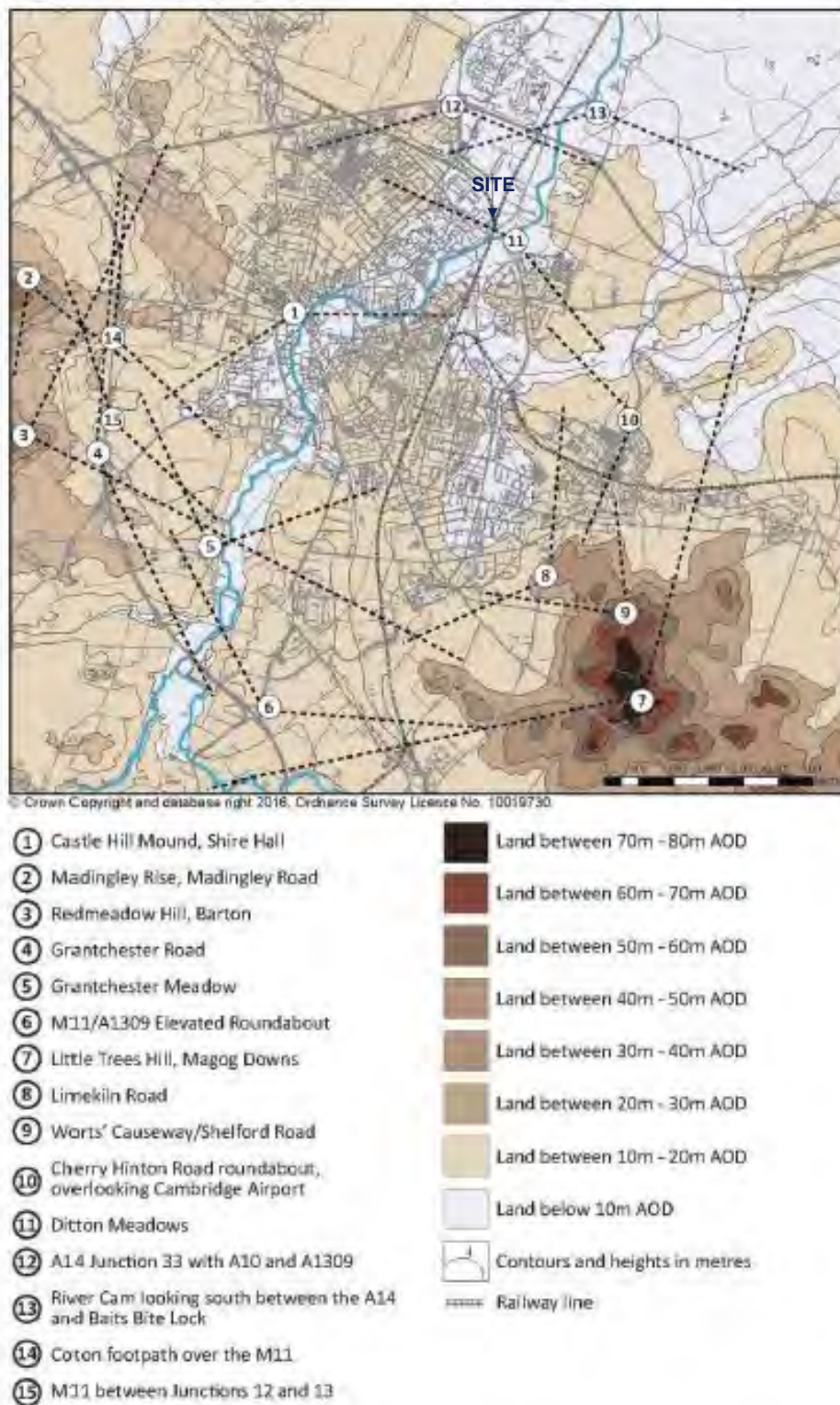


Figure 12.1: Figure F.3 from Cambridge Local Plan 2018 showing key Viewpoints

Baseline Conditions

Landscape/Townscape Baseline

12.46 This section considers the relevant designations, constraints and existing documentation that provides the context for assessing landscape and townscape character.

Designations

12.47 The planning designations and constraints that are within 1.5km of the Site and relevant to the LVIA assessment are set out in **Table 12.2**. They are also shown on Map 4 and 5 in **Appendix 12.2**.

Table 12.2: Designations and Protection

DESIGNATION/PROTECTION	STUDY AREA STATUS
National Park	None within the study area.
Area of Outstanding Natural Beauty	None within the study area.
Area of High Landscape Value	None within the study area.
Green Belt	Yes, the Cambridge Green Belt runs up to the train line immediately to the east of the Site. This then extends south into Cambridge City along the River Cam, through Stourbridge Common and into Midsummer Common. The wider green belt extends east and north within the study area.
World Heritage Sites	None within the study area.
Scheduled Monuments (SAM)	None within the study area.
Conservation Area (CA)	Yes, to the south and east of the Site is the Fen Ditton Conservation Area and to the south is the Riverside and Stourbridge Common Conservation Area.
Listed Buildings	Yes, there are a number of Listed Buildings within the study area. Those closest to the Site are concentrated around the historic cores of Fen Ditton and Chesterton.
Registered Parks and Garden	None within the study area.
Local Designations	Yes, there are City / County Wildlife Sites within the study area. Generally, these sites are associated with the alignment of the River Cam and along the railway tracks to the south of the Site. Bramblefields LNR is immediate to the south of the Site. Within the wider landscape context, Stourbridge Common and Logan's Meadow are designated LNRs.
Recreations Routes and Public Rights of Way (PRoW)	Yes, the majority of the PRoWs are located along the River Cam, including several Recreation Routes. A Public Bridleway also extends from the intersection of Milton Road and the Cambridgeshire Guided Busway, please see Map 4 for alignments.

DESIGNATION/PROTECTION	STUDY AREA STATUS
Tree Preservation Orders (TPO)	No, there are no trees within the Site which are subject to Tree Preservation Orders.
Flood Risk	Yes, refer to Map 10 in Appendix 12.2 .

Conservation Area Appraisals

- 12.48 Two Conservation Areas (CA) sit within the study area; the Fen Ditton CA and the Riverside and Stourbridge Common CA. The former is within the Cambridge City Council boundaries, while the second is in South Cambridgeshire.
- 12.49 Fen Ditton CA is described in the Appraisal (2005) as a townscape of ‘exceptional quality’ with an ‘unmistakably rural feel’ reinforced by the ‘bucolic riverside setting’. The village is surrounded by good agricultural land and the ‘attractive water meadow’ on the river side, which ‘combined with the surrounding fields serve visually to separate the village from the city. This separation is enhanced by the boundary of the River Cam and the fields on the west bank.’
- 12.50 It is also noted that the Appraisal map indicates a number of views that contribute to the character of the CA, which on the western edge of the CA focus toward the river, across the meadows.
- 12.51 The Stourbridge Common CA is a section of the Central Conservation Area. The Appraisal (March 2012) identified the following key aspects of the CA qualities and setting:
- *‘A backcloth of trees surrounds the open commons to the south, softening and at times hiding the built-up area beyond.’*
 - A rural landscape as Fen Ditton is approached *‘yet much of it is well within the urban bounds of a City.’*
 - The CA is part of a green wedge *‘which penetrates to the heart of Cambridge’*.
 - The Riverside and Stourbridge Common is considered an *‘important landscape feature’* as well as *‘a significant linear wildlife corridor, linking the City Centre with its countryside.’*
 - *‘There are no views of rolling countryside, despite the slight rise of the land towards Fen Ditton. It provides a pleasant setting for Ditton Meadows. It is on the fen edge with buildings confined to river terraces beyond the water meadows.’*
 - Stourbridge Common, along with Ditton Meadow, is considered of rural character *‘with well screened, low buildings on its edge. In some areas, the edges have been neglected and are fragmented, therefore needing strong enhancement.’*
 - *‘Ditton Meadows is countryside, but still accessible to the town and paths well used by cyclists and walkers... it is quieter and buildings on the north side more sparse’*
 - The meadows are used by commuters but are also a popular recreational destination for residents and visitors that *‘alike meander along the river towpath’*.
- 12.52 Finally, it is noted that the Stourbridge Common CA appraisal map highlights Long Important Positive Views from Stourbridge Common looking north-east, towards the Site.

Landscape/Townscape Character

- 12.53 The review of existing landscape and townscape character is an integral part of the prescribed

methodology for determining relevant effects arising from development. This requires a full appreciation of the features that make up the quality and value of an area. The identification of these features will also inform future mitigation measures if required.

- 12.54 The landscape and townscape character of the Site can be considered in terms of the following levels, moving from a 'macro' to a 'micro' consideration:
- National setting, in relation to the National Character Area Profiles, produced by Natural England;
 - Cambridge Landscape Character Assessment (Cambridge City Council, 2003);
 - Greater Cambridge Landscape Character Assessment (February 2021);
 - North East Cambridge Landscape Character and Visual Impact Appraisal: Development Scenarios; and
 - Local setting as observed on-site.

- 12.55 This hierarchy of landscape and townscape consideration is described in the following sections, with reference to published guidance and appraisal where existing.

National Landscape Character Areas (NCA)

- 12.56 The National Landscape Character Area profiles were published by Natural England in 2014. The Site is located within National Character Area (NCA) profile 88: Bedfordshire and Cambridgeshire Claylands (**Figure 12.2**).
- 12.57 The NCA largely concerns the study area's landscape rather than townscape qualities. Therefore, the following document review concentrates on the aspects of the NCA profile that are relevant to understanding the river valley and countryside adjacent to the Site.
- 12.58 This Character Area is described as a '*broad, gently undulating, lowland plateau dissected by shallow river valleys that gradually widen as they approach The Fens NCA.*'
- 12.59 Key landscape characteristics of the NCA profile include:
- '*Variable, scattered woodland cover comprising smaller plantations, secondary woodland, pollarded willows and poplar along river valleys, and clusters of ancient woodland...*'
Secondary woodland is evident in the river valley.
 - '*Predominantly open, arable landscape of planned and regular fields bounded by open ditches and trimmed, often species-poor hedgerows which contrast with those fields that are irregular and piecemeal.*'
 - '*The rivers are generally slow flowing, in shallow, broad valleys of significant ecological value containing distinctive vegetation not common in, and in contrast to, the surrounding arable landscape...*'
- 12.60 Generally, the NCA is sparsely populated with settlements, such as Cambridge, located within the river valleys. The presence of the settlements is described as:
- 12.61 '*A feeling of urbanisation is brought by numerous large towns, including Milton Keynes, Bedford, Cambridge, Huntingdon and Peterborough, and major transport routes...*'
- 12.62 Generally, settlement expansion has caused a decline of tranquillity within the NCA which is also affected by visual intrusion, noise and light pollution from agriculture. Page 10 describes

as follows: ‘Strong contrasts exist between greater tranquillity in more rural, inaccessible areas (including sections of the river valleys) and lower tranquillity in areas with a settled, urban and developed feel.’

- 12.63 However, the NCA is also focused on new growth and development: ‘Transport infrastructure, business and commercial development are now major components of the NCA’s character, with good transport links north and south and particular nodes along the corridors of the A1, M1 and A14.’
- 12.64 The NCA notes the importance of recreational facilities linked to the enjoyment of the outdoors and landscape. Large towns within this character area provide substantial green spaces within the urban fabric, including improved green infrastructure links to the wider countryside.
- 12.65 The above information has informed the landscape/townscape and visual assessment process providing guidance on the value and quality of the townscape and relevant receptors.

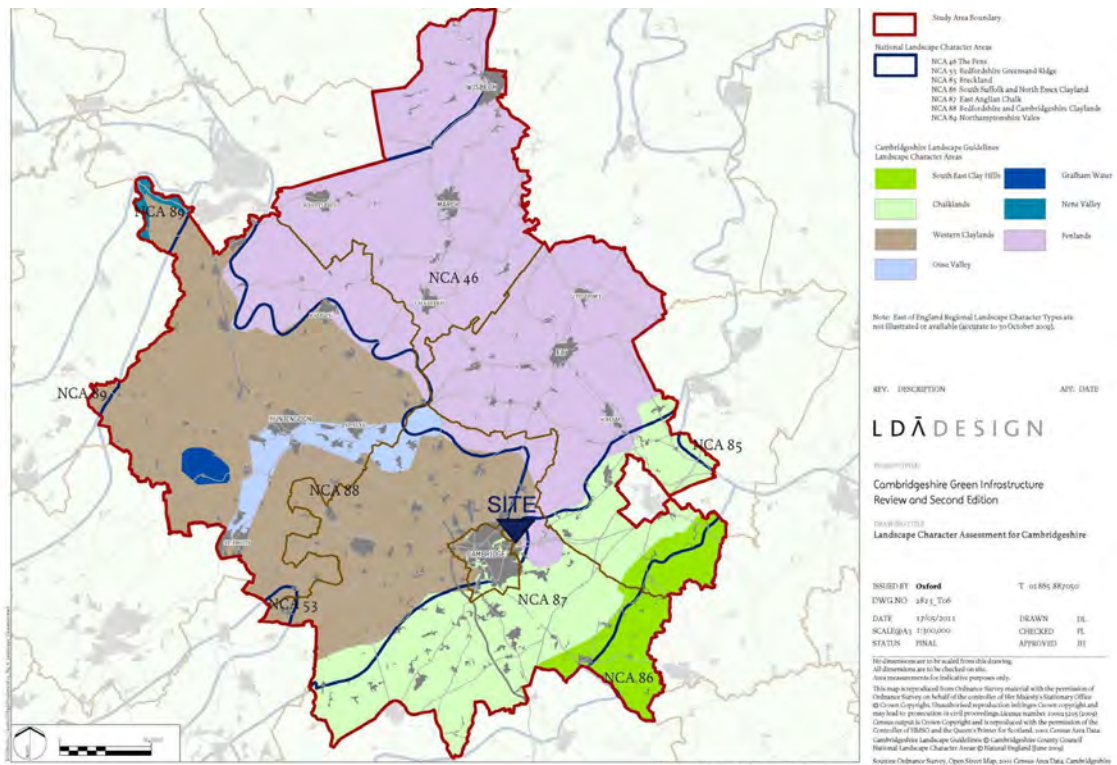


Figure 12.2: NCA map from the Cambridgeshire Green Infrastructure Strategy by Cambridge Horizons 2011

Cambridge Landscape Character Assessment (Cambridge City Council, 2003)

- 12.66 The Cambridge Landscape Character Assessment was adopted in 2003 in order to:
 - Understand and identify the key resources – the ‘Defining Character’ - which make up and are essential to the spirit of Cambridge. This indicates areas or features which are so important to the Cambridge environment and setting that they should remain undeveloped; and
 - Identify and describe the essential character of the townscape and its rural hinterland into Character Types and Character Areas. This will enable judgements to be made to ensure

that new development will take account of the existing character and where possible achieve environmental or visual improvement.

- 12.67 While it is noted that the document is somewhat dated and the landscape and townscape of Cambridge have evolved since its publication, some elements identified in this assessment are still considered to be relevant. It is also noted that the Cambridge Local Plan 2018 still references this assessment's findings, validating its relevance.
- 12.68 A principal term utilised in the Cambridge Landscape Character Assessment is that of *'Defining Character'*. This term refers to the *'key resources that are essential to the special qualities of Cambridge and its setting. If these resources were jeopardised or removed Cambridge and its setting would be compromised.'*
- 12.69 Generally, Cambridge is defined as a collegiate city in a rural setting, with good accessibility to the countryside and green corridors. The Assessment considers that the city's compactness and sense of arrival are important features and *'where the edges are positive, and the City is anticipated by glimpsed and distinctive views to the skyline or landmarks, this is a Defining Character of views and setting.'* However, it is acknowledged that, although intrinsic to the quality of Cambridge, the notion of compactness and sense of arrival is difficult to define.
- 12.70 The Assessment identifies six physical features that are *'Defining Character'* of Cambridge; the following are relevant to the understanding of the Site and study area.
- Green Fingers and Corridors.
- 12.71 It is noted within the Assessment that green corridors penetrating the urban fabric of the City are an important feature of Cambridge. It states that: *'The corridors provide a landscape framework for the whole City and Cambridge owes much of its very special character to the way these spaces penetrate the urban fabric and the unique association between the built spaces and green space.'*
- 12.72 Furthermore, these green corridors contribute to the assimilation of the countryside into the urban area, blurring the distinction between the landscape with the townscape.
- 12.73 The green corridor to the south of the Site is described as: *'The green space that sweeps in along the corridor of the Cam from the south-west linking the claylands with the fenlands to the north-east. It consists of a string of major open spaces, mostly Commons, encircling the City centre which relate and give a setting to the historic City core.'*
- Water Courses and Bodies.
- 12.74 Water courses are an important element of the Cambridgeshire countryside as well as crucial environmental features due to the associated flood plains.
- Separation.
- 12.75 One of the main purposes of the Cambridge Green Belt is to prevent the communities around Cambridge from merging with one another and with Cambridge itself. Consequentially, *'where the separation between the City and the necklace villages is much reduced, the remaining areas represent Defining Character.'*
- 12.76 The aspects of Supporting Character relevant to the assessment of the development are as follows.
- Edges.

- 12.77 The Assessment identified a 'Negative Edge' to the north of the Site (**Figure 12.3**). A 'Negative Edge' is defined as: 'edges that are abrupt and lack tree cover or hedgerows or which are adjacent to degraded landscapes, major arterial roads or detracting views are regarded as negative assets.'
- Local Views.
- 12.78 Views within and into the urban fabric are also a 'significant to the character of Cambridge... Important landmarks may be visible at a local scale such as fine panoramic views to church spires and towers, college and other buildings.' For this reason, it is important to identify positive and negative landmarks (**Figure 12.4**).
- Ecology, Natural History and Landscape Structure.
- 12.79 The Ecology and Natural History Supporting Character refers to the numerous County and City Wildlife Sites, Site of Special Scientific Interest and Local Nature Reserves located within the urban extent of Cambridge. These features become Defining Character by association when located within such areas.
- 12.80 The Assessment continues with the definition of Cambridge Character Types and Areas. According to this, the Site is located in the 'Industrial – Railway Corridor' character type, which is not a Defining Character. Although, as noted in the local setting analysis (12.68), the railway townscape character has experienced substantial modern changes, it is useful to understand how the evolution of this character type originated and highlights discrete elements that are still relevant to the Site and study area.
- 12.81 The Assessment states that *'the position of the railway line brought not only industry directly associated with rail, but also created a hinterland – mostly unsuited to housing – where industrial buildings and sheds, storage warehouses and large retail concerns have taken advantage of this land.'*
- 12.82 Railway corridors have been acknowledged within the assessment as potentially valuable habitats for plants and animals, with a number designated as City Wildlife Sites.
- 12.83 Characteristic features of this Character Type are:
- 'Large warehouses and derelict sites;
 - Derelict and underused large urban spaces – gradually passing out of this phase;
 - Rail corridor gives poor impression to those entering the city; and
 - Disused track beds are often important for wildlife.'
- 12.84 The Assessment considers that pressures on the Character Type include:
- 'Development pressures from industrial to residential; and
 - Development pressures on disused track bed for transport corridors.'
- 12.85 The Assessment then presents the following as some of the opportunities for enhancement of the Character Type:
- 'Through development opportunities in the station area especially to improve and create a new district with its own character;
 - Make further provisions for access to railway station;

- Alternative rapid transport opportunities;
- Development to put derelict areas to good use;
- Seek mitigation where sites important for wildlife are developed;
- Take Biodiversity Action Plans into account in future development or management plans; and
- In association with new development, encourage the use of trees and shrubs which are appropriate to the character type.'

12.86 The above information has informed the LVIA process providing guidance on the value and quality of the townscape and relevant receptors. The LVIA also considers the Site characteristics and how it contributes to or differs from the urban context as described in the Cambridge Landscape Assessment evidence.

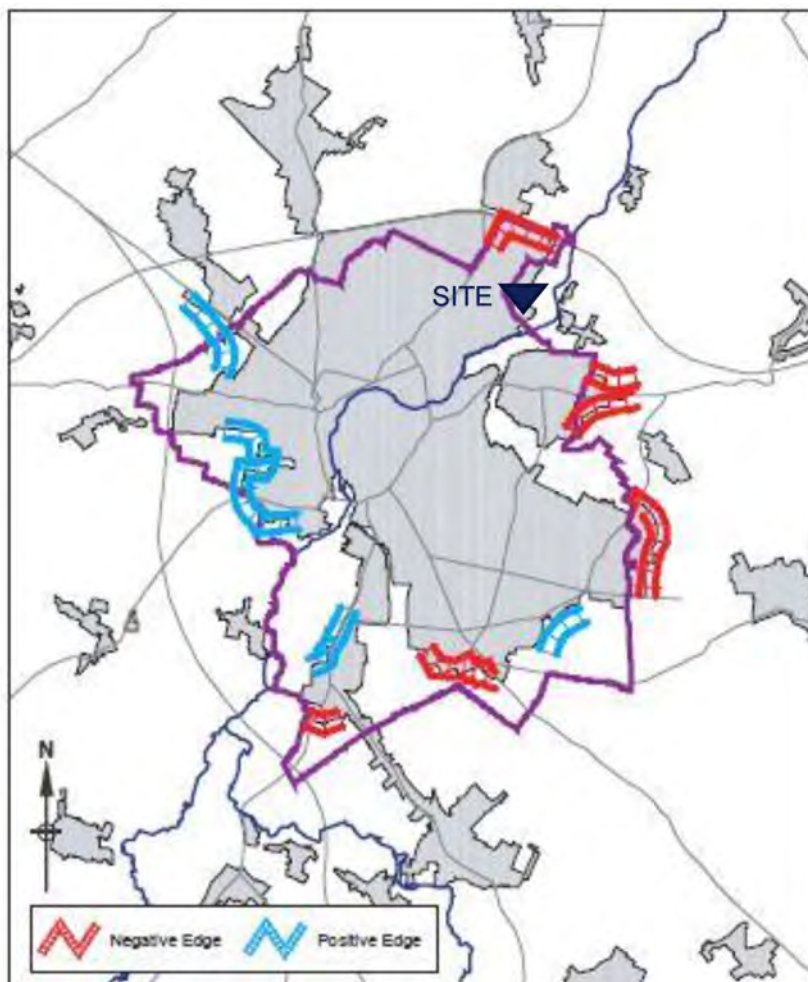


Figure 12.3: Edges Assessment from Cambridge Landscape Character Assessment

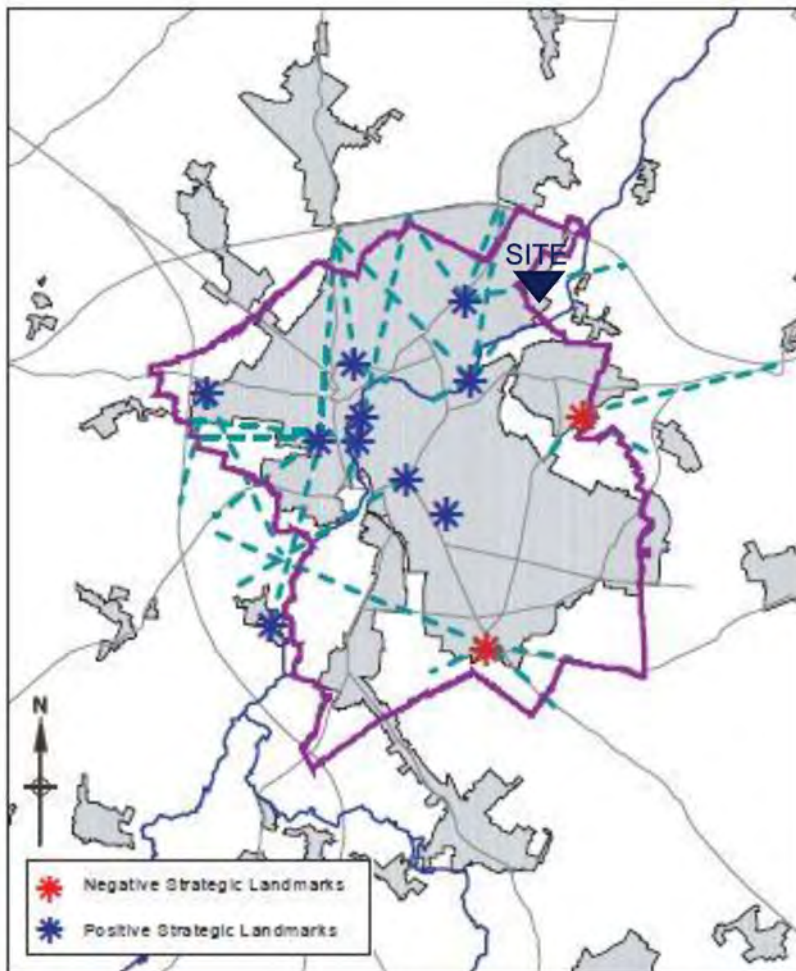


Figure 12.4: Local Views and Landmarks from Cambridge Landscape Character Assessment

Greater Cambridge Landscape Character Assessment (Chris Blandford Associates, February 2021)

- 12.87 The Greater Cambridge Shared Partnership published an updated Landscape Character Assessment, produced by Chris Blandford Associates. As shown on Map 8 in **Appendix 12.2**, the Site is located in the Cambridge Urban Area. The railway line and caravan development along Fen Road provide a substantial buffer from the adjacent Landscape Character Area (LCA) 9A Cam River Valley - Cambridge.
- 12.88 Cambridge is described as a small-scale city focused on the historic core. Reference is made to the Cambridge Inner Green Belt Boundary Study (LDA, 2015) in regard to the detailed townscape character areas. According to the LDA document, the Site is located in Townscape Character Area 5B – Railway Corridor (**Figure 12.5**). This is characterised by:
- ‘medium and large-scale commercial, light industrial and office development on both sides of the railway line’; and
 - ‘extensive areas of hard surfacing for car parks and little vegetation’.

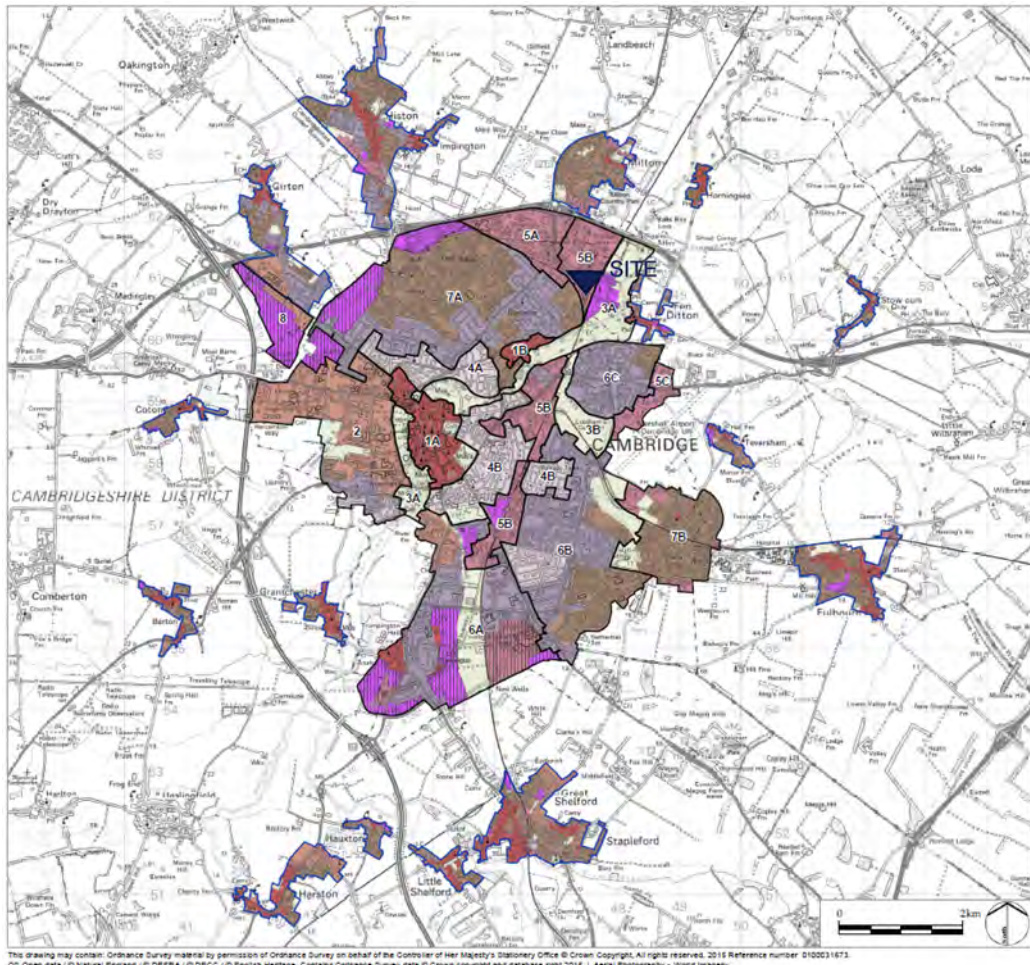


Figure 12.5: Townscape Character Areas extract from the Cambridge Inner Green Belt Boundary Study, 2015

- 12.89 The River Valley landscape character type (LCT) key characteristics include: *'Intimate, small-scale riverine landscape.'*
- Flat, low-lying, broad valleys cut through the chalkland landscape.
 - Shallow river valleys have a rich mosaic of grazing meadow and wet woodlands with lines of willows along the rivers.
 - Clusters of deciduous woodland scattered through the valleys, including willow and poplar along the course of the rivers.
 - Generally unsettled landscape, with occasional mill buildings providing local features and historic village edges on the lower river terraces.
 - Generally strong rural character that is occasionally disrupted by major roads that cut across the valleys in places.'
- 12.90 The Assessment notes that the LCT affords clear physical qualities associated with the riverine landscape and topography. It also supports a variety of habitats, some protected by statutory and local designations.

- 12.91 The LCT's historical association is linked to the development of settlements along the river: *'There is a complex history of settlement within this and surrounding LCTs, evidenced by Roman Roads, Anglo-Saxon earthworks, large fields and modern roads that are all interlinked.'* The presence of a number of historic parklands and Conservation Areas consolidates the heritage value of this landscape.
- 12.92 In terms of urban influence, the LCT is considered generally sparsely settled with a prevailing presence of low density, historic villages. *'The exception to this is the southwest and northeast edge of Cambridge, which influences the character of the River Cam as it flows northeast through the Study Area.'* Consequentially, *'modern development on the west and north of Cambridge has created a more enclosed character to the River Cam as it flows into and out of the city, although the rural meadows character has been retained as part of a wider corridor.'*
- 12.93 Accessibility to the landscape includes minor roads, some major roads cutting across the river, and a limited number of PRoWs. However, *'the exception to this is the within River Cam valley to the northeast of Cambridge, where the Fen Rivers Way long distance path, Harcamlow Way long distance path and Sustrans Route 11 all follow the river course northeast towards The Fens.'*
- 12.94 The Assessment lists the following key landscape features:
- 'Intimate, small-scale pastoral landscape;
 - Largely unsettled with distinctive former mill buildings, manor houses and moated sites;
 - Tranquil rural qualities created by the presence of water through the unsettled meadowlands; and
 - Rich mosaic of grazing meadow and wet woodlands of high ecological value'.
- 12.95 It is also noted that the pressure for new development in the adjoining LCT could intrude on the valley landscape and is therefore considered a force for change.
- 12.96 The River Valley landscape character type (LCT) is evaluated in the Assessment with a *'strong'* sense of character and *'good'* landscape condition. The former is due to the riverine landscape, sense of tranquillity linked to the pastoral land and limited settlements. It also notes that *'the visual and historic relationship between Cambridge and particularly the River Cam as it flows into and out of the city further enriches the LCT. Busy trunk roads and some suburban edges of large settlements occasionally, locally detract from the rural, peaceful, small-scale landscape.'*
- 12.97 The *'good'* condition is associated with the rich biodiversity and ecosystems. However, *'There are some elements of declining condition, where settlements have expanded along the upper slopes of the valleys in the adjoining LCTs and some fragmentation of hedgerow boundaries'*.
- 12.98 LCA 9A surrounds and penetrates into the built-up area, *'contributing to the unique setting of the city and providing links with the wider rural area.'* In fact, listed in the key characteristics of the LCA is the *'distinctive green corridor within the Cambridge urban area.'*
- 12.99 The LCA is aligned to the LCT qualities as it is characterised by sparse settlements, with views of urban edges often filtered or framed by the tree cover. The diverse vegetation cover of mature trees and hedgerows also provides a *'strong sense of enclosure'*.

- 12.100 Built form on the edges of Cambridge's urban edge is considered a '*distinctive feature*' of the LCA. It is also stated that: '*This LCA enriches the setting of Cambridge through the relationship between built and green spaces and the historic association between the city and its river. The river, riverbanks and the towpath have strong historical and cultural associations with University life. The river landscape is aesthetically pleasing and is well used by people, both on and off the water.*'
- 12.101 The relation with Cambridge's urban edge is further defined with the built form considered a '*distinctive feature*'. It is also stated that: '*This LCA enriches the setting of Cambridge through the relationship between built and green spaces and the historic association between the city and its river. The river, riverbanks and the towpath have strong historical and cultural associations with University life. The river landscape is aesthetically pleasing and is well used by people, both on and off the water.*'
- 12.102 Although generally a tranquil and intimate landscape, the intrusion of some major transport infrastructure (railway line, A14 and Fen Causeway) crossing the river create localised disruption, introducing noise and interrupting views.
- 12.103 Finally, it is noted that the specific landscape guidelines for the LCA include protection of the views, essential character and setting.

**North East Cambridge Landscape Character and Visual Impact Appraisal (LCVIA):
Development Scenarios**

- 12.104 The North East Cambridge Landscape Character and Visual Impact Appraisal LCVIA: Development Scenarios document was completed by The Environment Partnership and published in December 2019. It was commissioned to consider the potential Landscape Character and Visual Impact effects of development with the North East Cambridge Area Action Plan (NECAA), which straddles the border of Cambridge City Council and South Cambridgeshire District Council. This site is located within the NECAAP and is located within Parcel 4 on LCVIA **Figure 5**, an extract from which is presented in **Figure 12.6**.
- 12.105 The LCVIA models the potential effects of three height scenarios for development within the NECAAP area. The landscape and visual impacts of each of these scenarios are considered in detail in the LCVIA, which concludes that development within the NECAAP site should respect the parameter set out in LCVIA **Figure 5**. The overall effects of the three proposals were found to vary from Major to Moderate overall effects. However, the LCVIA recommends that further block refinement should be undertaken at planning application stage to include a variety of individual building heights and massing to result in a '*rich layering of buildings, open spaces with large trees and edge treatments.*'
- 12.106 Design guidance within the document recommends that the eastern and northern edges of the Site are sensitive to high and medium height development. However, some development of this height could be achieved elsewhere within the NECAAP in areas which have less effect on the sensitive Fen Edges.



Figure 12.6: Figure extracted from the LCVIA indicating potential areas of development height, however discrepancies are found between the legend and the plan (further details in the Planning Statement by Bidwells).

12.107 The recommendations shown in LCVIA **Figure 5** should ‘also avoid dominating views of the skyline from the east and should avoid creating an abrupt transition from development to rural edge. However, the height and massing of further development would need careful consideration to avoid compromising the quality and character of views and landscape in the River Cam Corridor LCA and the western part of the Eastern Fen Edge LCA to avoid extending development across the skyline.’

12.108 The LCVIA identifies that the south east, east and north east areas of the NECAAP (which include the Site) are those which are potentially more sensitive to change, due to the number of public rights of way, cycle routes and long distance trails within the vicinity, along with the sensitivity of these areas comprising edge landscapes which are important to the setting and identity of Cambridge.

Local Setting: The Site and its Surroundings

12.109 The Site is located on Cambridge’s fringe within the Milton and Waterbeach ward. The character of the local area is in transition, with the newly constructed Cambridge North railway station to the south of the Site, the Cambridge Business Park and an un-named industrial area to the north, and the residential areas to the south east and south west.

12.110 The Site includes part of Cowley Road, which provides direct access to Cambridge North station. This is accompanied by generous foot and cycle paths for access. Cowley Road defines the Proposed Development plots, which vary in condition, including remnant vegetation, the station car park and areas which appear to have been used as part of the Site compounds for construction of the station area.

12.111 This temporary landscape appears to have regenerated, contributing to the biodiversity value of the Site, with remnant vegetation providing some areas of visual green relief between the Cambridge Business Park and industrial area to the north west and Cambridge North Station to the south east.

- Vegetation Cover.

12.112 Whilst Cambridge is generally a well-treed city, this tree cover transitions to the more open fens to the north and east of the city.

12.113 Cowley Road is well treed along its length (**Figure 12.7**), although this is more informal towards its west, with recent avenue planting through the Site and onwards towards Cambridge North Station.



Figure 12.7: View along Cowley Road towards Cambridge North Station.

12.114 Cambridgeshire Guided Busway runs along the western boundary of the Site, with its southern edge providing a well vegetated boundary, which is supported by Bramblefields and Chesterton Nature Reserve to the south of the Site.

12.115 There are patches of remnant vegetation to the north east of the Site, adjacent to the railway line.

12.116 Within the wider context of the Site tree cover is largely associated with rear gardens within the urban area, as buffers along the A14 and defining field boundaries towards the River Cam and out into the fens.

12.117 Representative of the Chalkland character area is the extensive grazing marsh along the River Cam to the south of the Site (see Map 9 in **Appendix 12.2**). The floodplain priority habitat is comparatively broader than the woodland habitats, which are more sparse.

- Topography.

12.118 Due to the Site's close proximity to the River Cam, the Site is located on low-lying topography which rises towards the west. Whilst there is a local area of raised ground to the east associated with Fen Ditton, beyond this to the north and east the flat, consistent topography of the Fens is dominant (see Map 3 in **Appendix 12.2**).

- Tranquillity.

- 12.119 Proximity to Cambridge North Station and the traffic and works associated with the industrial area to the north of the Site greatly decrease the tranquillity of the immediate site (**Figure 12.8**). Transport infrastructure, including the Cambridge to Ely train line, is a detracting feature within the landscape.



Figure 12.8: Industrial Area to the north of the Site.

- 12.120 Notwithstanding the immediate site context, there is a high degree of tranquillity within the study area towards the south-west, east and north, away from the urban context of Cambridge. This tranquillity extends somewhat into the city along the length of the River Cam, and the retained fields, meadows and publicly accessible open space along its length, although it is diminished by its urban context.

- Site Boundaries.

- 12.121 Cambridge Business Park and the un-named industrial estate define the northern site boundary.

- 12.122 The south western boundary is defined by an off-road section of the Cambridgeshire Guided Busway, Routes A + B, which is densely planted along the western boundary (**Figure 12.9**).



Figure 12.9: View South along the Cambridgeshire Guided Busway

- 12.123 The southern boundary is defined by Cambridge North Station, and associated development, including One Cambridge Square, which is currently under construction.
- 12.124 The eastern site boundary is defined by the 'Fen Line,' with an hourly rail service operated by Great Northern.
- Townscape.
- 12.125 The local context of the Site has experienced rapid change with the construction of Cambridge North Station and the Novotel. This has resulted in a noticeable character change as Cowley Road has been extended to provide access to the new station. One Cambridge Square office block, adjacent to the station, is currently under construction, which is contributing to further change within the local context of the Site. Cowley Road provides the only vehicular access to the Site from the surrounding areas.
- 12.126 The hotel and new station have added a modern, urban, less characteristic development type into an area which previously represented the Industrial – Railway Corridor Character Type (**Figure 12.10**).
- 12.127 The Site itself does exhibit some characteristics of this Character Type, notably '*derelict and underused large urban spaces- gradually passing out of this phase*', whilst also exhibiting opportunities identified for this type including '*opportunities in the station area especially to improve and create a new district with its own character*' (Cambridge Landscape Character Assessment, 2003).
- 12.128 Within the Site's immediate context, the transition to the adjacent industrial area is abrupt and highlights the varying character within close proximity to the Site.
- 12.129 The residential area to the south-west of the Site is largely imperceptible from within the Site boundary, but forms part of the Site approach via the Cambridgeshire Guided Busway. This post-war residential area differs substantially from the emerging modern urban context appearing around Cambridge North Station by means of scale and pattern, as it differs from the large scale, commercial built form in the adjacent Cambridge Business park and Science Park. Similarly, the fine grain, low lying townscape of the static caravan park off Fen Road, to the south-east of the Site, is not consistent with the emerging proposals within the NECAAP's area.
- 12.130 Notably, the residential townscape to the south-west includes more vegetative cover than the static caravan park, providing a degree of visual screening towards the Site.



Figure 12.10: View of Cambridge North Station Forecourt

- 12.131 The wider Fenlands character area is not perceptible from the Site itself, as the existing boundary vegetation and the 'Fen Line' railway provide a barrier to this experience.

Landscape and Townscape Value

- 12.132 The baseline study identifies two prominent landscape and townscape areas within the study area that are likely to experience the impact of the Proposed Development. One is the river corridor landscape, and the other is the railway corridor townscape. These areas are both considered thoroughly in the baseline analysis. The river corridor is commended for its strong landscape qualities and the railway corridor for its aspirational potential.
- 12.133 The residential townscape areas to the south and east of the Site are secondary in the hierarchy of quality; they are not so thoroughly described in the available evidence base, nor do they show distinctive townscape elements or qualities. However, they are still considered as townscape receptors, despite appearing less outstanding in the local context.
- 12.134 The definition of these receptors' landscape and townscape value is detailed in **Table 12.3**, following the relevant Landscape Institute literature (TNG 02/21 and TIN 05/2017) and LVIA methodology (Table A, **Appendix 12.1**). However, it is noted that the description of the river corridor in the documents published in the South Cambridgeshire and Cambridge City Local Plans already presents this as a landscape of high value due to its strong sense of character and good landscape conditions. Conversely, the description of the railway corridor suggests a low value.

Landscape and Townscape Receptors

- 12.135 Based on the landscape and townscape baseline study findings, the following receptors, divided into areas and components, were agreed with the Local Authority.
- 12.136 Landscape/Townscape areas:
- **NCA88: Bedfordshire and Cambridge Clayland:** This NCA is characterised by a strong dichotomy whereby the urban influence of the large town erodes the more rural and tranquil landscape. The Site sits at the transition between these two realities, where settlement expansion could increase the urban character over the distinctive rural landscape.
 - **LCA 9A Cam River Valley - Cambridge:** The LCA is considered of high value, with distinctive green open spaces articulated along the River Cam. This green corridor is also a distinctive townscape feature, where green fingers, a Defining Character according to the Cambridge Landscape Character Assessment (2003), bring the Green Belt's landscape within the urban fabric of Cambridge, providing diverse opportunities for recreation and contact with nature.
 - **The railway corridor:** This townscape character area was historically characterised by a deprived and nondescript industrial townscape. However, it has in recent years seen a rapid evolution, with the emergence of modern architecture replacing the negative space. It is also noted that the new built form along this transport corridor is characterised by large scale buildings with taller elements clustered around Cambridge Station, also known as the CB1 area. The NECAAP allocation and continuous upgrading of brownfield land along the railway line (see most recently the construction works at the Ironworks and Timber Works sites) fulfil the aspiration for this townscape area to turn into a positive and distinctive gateway to Cambridge.
 - **The local residential area:** Whilst the residential areas to the south and east of the Site are not considered of great townscape quality, they have a distinctive and coherent low lying,

small scale, built form with a fine urban grain. The residential area to the east also affords a distinctive grid structure, typical of a static caravan site. In comparison, the area to the south and west presents a greener character.

12.137 Landscape/townscape components:

- **The city skyline:** The distinctive skyline of Cambridge is characterised by a horizon of spires and towers emerging above an underlayer of tree canopies. The heritage assets and green character of the city are distinctive features of this receptor. Concurrently, clusters of modern tall buildings are scattered within the city's skyline, with some distinctive groups at the edge of the city: the Addenbrookes and Marshall Airport sites. The development of the land around Cambridge North is likely to create a new cluster beyond the city's historic core.
- **The landscape setting of Fen Ditton Conservation Area:** This receptor is characterised by a distinctive rural feel that is strongly associated with the riverine setting. The CA, considered a high sensitivity asset in Chapter 8, appears separated from the city, with the existing, low lying urban area to the west of the river well screened by the intervening vegetation.
- **The setting of Riverside and Stourbridge Common Conservation Area:** The CA, considered a high sensitivity asset in Chapter 8, is strongly associated with the distinctive green corridors that penetrate the city. The receptor is characterised by a distinct rural character to the north-east, approaching the Fen Ditton CA, while to the north of the CA, towards the Site, there is a strong element of intervening development and planting in the background. While the light industrial character is not a positive element of the receptor, the low-lying residential area and other CAs are distinctive features that preserve the Riverside and Stourbridge Common CA's qualities.

Visual Baseline

- 12.138 The Site is located at the edge of Cambridge's urban area. The adjacent residential development to the south east and south west is largely low lying, allowing extensive views from the eastern open landscape towards the Site. To the south of the Site the river corridor is characterised by a reasonable sense of openness. Consequentially, as noted in the LCVIA, the edge of the NECAAP is substantially visible from the contextual landscape which is served by a good network of PRowWs.
- 12.139 The Zone of Theoretical Visibility (ZTV, **Appendix 12.4**) studies suggest the Proposed Development would be extensively visible, particularly from the open landscape to the east. The dense urban fabric constrains the visual envelope to the west, limiting visibility to the immediate vicinity of the Site and along the main transport corridors.
- 12.140 The Site survey confirmed that the Site's visibility, currently lacking any major structures, is limited by the intervening built form and vegetation. However, the height of the Proposed Development is such that the ZTV represents a realistic scenario, whereby visibility from areas of open landscape would be accentuated. The study area for the visual assessment has therefore extended up to a 7km radius from the Site (see the location of Viewpoint P4).
- 12.141 During the initial site surveys, a number of viewpoints were tested to understand the potential visual impact on receptors within the extended study area. Aided by the use of VuCity, a number of these were excluded from further assessment (refer to **Table 12.1** and **Appendix 12.4**), in agreement with the LPA and relevant officers, due to the lack of visibility of the proposal from these locations.

12.142 The remaining viewpoints are representative of views experienced by the following groups of visual receptors (see **Appendix 12.3** and **12.4** for baseline photography):

- Visitors to the Bramblefields LNR (Viewpoint 2);
- Visitors to the Limekiln Road West Pit LNR (Viewpoint P6);
- Road users in proximity of the Site, including the guided busway (Viewpoints 4, 9, 14);
- Road users on the A14 (Viewpoint 20);
- Ramblers on the public footpaths to the east of the Site (Viewpoints 8,10);
- Ramblers in the green open spaces along the river (Viewpoints 5, 15, 16);
- Ramblers on footpaths in the wider landscape - long distance views, including relevant Policy 60 key views – (Viewpoints P1, P4, P5);
- Cyclists and pedestrians on the Chisholm Trail (Viewpoints E1, E2); and
- Local residents to the south-east and south-west of the Site (Viewpoints E5, E6).

12.143 It should be noted that the One Cambridge Square office building, currently under construction, is considered part of the visual baseline. Therefore, the mass of the building as completed is represented in the technical visualisations in **Appendix 12.4**.

Representative Viewpoints

12.144 Eighteen viewpoints were selected to represent typical views from potential receptors at varying distances and orientations from the Site. Whilst the viewpoints are mostly located within 3 km of the Site, some long-distance views are also considered up to 7km away from the Site (refer to the viewpoint's location plan in **Appendix 12.3**).

12.145 Viewpoint 2 - Bramblefield LNR: This viewpoint is located within Bramblefields Local Nature Reserve (LNR), looking northeast towards the Site, which is largely screened by the intervening vegetation. The receptors represented by the viewpoint are visitors to the LNR.

12.146 The LNR has a high proportion of mature vegetation, which results in a strong sense of enclosure and some perception of remoteness. Although the view is fundamentally verdant, the 1 Cambridge Square building (currently under construction) introduces an element of urbanity, breaking the wooded skyline (see the technical visualisations in **Appendix 12.4**).

12.147 Viewpoint 4 – Cowley Road: This viewpoint is located on Cowley Road, looking southeast towards the Site, which is largely screened by intervening vegetation and built form. The viewpoint represents views experienced by road users, pedestrians and cyclists who are travelling towards Cambridge North Station and One Cambridge Square. The road-side vegetation acts to screen the built form along the road. This screening will become more apparent in the summer months when they are in leaf. This distribution of vegetation also acts to frame the view, drawing the eye down the road and towards the more open horizon.

12.148 Despite the reasonable green cover, the road infrastructure dominates the view. The urban character is augmented by the large scale, commercial built form that encloses the view.

12.149 Viewpoint 5 – Ditton Meadows – Footpath 85/2: This viewpoint is located within the Fen Ditton CA on footpath 85/2 in Ditton Meadow on the bank of the River Cam, on a footpath that directly connects to Fen Ditton High Street. The view looks west towards the Site, which is not visible. The receptors associated with this viewpoint are ramblers within the green space.

- 12.150 The dense vegetation along the river shortens the view, reinforcing the sense of enclosure, despite the visible open sky. The view appears verdant and pleasant, with the only example of residential built form being filtered by the vegetation along the river.
- 12.151 Viewpoint 8 – Footpath 85/6 Fen Ditton: This viewpoint is located on the public footpath 85/6, which leads to the countryside north of Fen Ditton. The view is looking in a southwest direction towards the Site and is representative of the visual experience of ramblers on the PRow. The Site is screened by the intervening vegetation, although the viewpoint's slightly elevated position provides an opportunity for partial views of the surrounding urban form, such as the hotel and One Cambridge Square. Despite the existing large-scale built form and dense vegetation, the view appears essentially open and rural. Although glimpses of the industrial area to the north of the Site are visible, the view is characterised by a concentration of natural features, with a variety of vegetation, green space and the river creating a visually appealing immediate view.
- 12.152 Viewpoint 9 – Field Lane byway: This viewpoint is located on Horningsea Road at the junction with Field Lane byway. It provides a view in a western direction towards the Site, which is not visible due to intervening vegetation and built form. The receptors experiencing this view are the users of the byway as well as road users.
- 12.153 The view overlooks open agricultural land enclosed by dense vegetation. Some dwellings on the field edge are clearly visible and glimpses of built form are available through the trees, including the Novotel and One Cambridge Square. The lack of immediate tree cover or built form creates an open, expansive field of view with a largely wooded skyline.
- 12.154 Viewpoint 10 – Low Fen Drove Way – West: This viewpoint is located on Low Fen Drove Way, looking southwest towards the Site. Receptors associated with this viewpoint are road users and ramblers on the track. The Site is heavily screened by intervening vegetation. The immediate view is of open agricultural land, which allows for an expansive skyline. The vegetative enclosure in the distant background provides a wooded skyline, where the line of pylons emerges, detracting from the otherwise rural and verdant qualities of the view.
- 12.155 Viewpoint 14 – Guided busway: This viewpoint is located on the pavement running adjacent to the Cambridgeshire Guided Busway, at the junction with Milton Road. The view is towards the Site from a southeast direction. The receptors associated with this view are road users, commuters using the busway and any pedestrians using the accompanying footpaths. Warehouses and industrial buildings obscure the Site within the Cambridge Business Park.
- 12.156 The view is characterised by a clutter of features related to the road infrastructure, which detracts from the focus of the view. Vegetative elements are few, resulting in a strong urban influence on the quality of the view, which lacks consistency and distinctiveness.
- 12.157 Viewpoint 15 – Ditton Meadows: This viewpoint is located on a path to the south of Ditton Meadows. It views the Site from a north-eastern direction, looking across permeable green public space which is crisscrossed by several footpaths. The receptors are users of this green space, whether this is for commuting or recreation. The Site is obscured by vegetation, consisting of tree cover along the River Cam. However, the vegetative enclosure appears fragmented, with large glimpses of the existing built form. Therefore, despite the strong verdant qualities, the urban influence on the view lessens the sense of remoteness. The skyline in the background reflects the mixed qualities of the view, with a combination of built form and trees.

- 12.158 Viewpoint 16 – Stourbridge Common: This viewpoint is located on a path running through Stourbridge Common. The view is looking north towards the southern edge of the Site. The receptors are users of this green space, whether this is for commuting or recreation. The Site is obscured by immediate vegetation which lines the riverside footpath. The path is well-used and defined, and a pedestrian bridge is visible within the view. The tree cover acts to also screen the residential properties bordering this green space and the new development at Cambridge North Station, allowing it to retain a natural and open appearance with a wooded skyline.
- 12.159 Viewpoint 20 – A14 bridge over the River Cam: Due to safety reasons it was not possible to obtain photography for this view. As shown in the Google Earth image (**Appendix 12.3**) this viewpoint is located on the A14, which wraps around the northern edge of Cambridge. The viewpoint is associated with the road users on this fast, main road.
- 12.160 The elevated position of the viewer allows extensive views across the rural landscape typical of the setting of Cambridge. The extent of the urban settlement is marked by the recent hotel and office buildings at Cambridge North, which contrast with the scale of the surrounding, low lying residential dwellings. Nonetheless, the green character of the view is prominent, with some distinctive features such as the River Cam corridor.
- 12.161 Viewpoint E1 – Chisolm Trail bridge over the River Cam: This viewpoint is located on the Chisholm Trail Bridge, a dual-use pedestrian and cycle bridge that crosses the River Cam. The view is looking north towards the Site's southern edge, which is not visible. Receptors are users of the bridge. The Novotel is visible on the horizon, between One Cambridge Square and residential dwellings. The urban features prevail over the few green elements; the clutter of railway infrastructure, bridge railings and built forms of various styles result in a poor sense of cohesiveness.
- 12.162 Viewpoint E2 – Chisolm Trail: This viewpoint is located on the Chisholm Trail, just south of the pedestrian bridge which crosses the railway line and the River Cam. The view is looking north towards the Site, and receptors at this location will be the pedestrians and cyclists using this route. The Site is screened by vegetation, the rail bridge, the pedestrian bridge, and the existing built form at Cambridge North Station, including the Novotel and One Cambridge Square.
- 12.163 The view across Ditton Meadows is enclosed by vegetation along the railway line and river. The green horizon is interrupted by residential development which, together with the visible Cambridge North Station buildings and the infrastructure of the railway and Chisholm trails, augments the urban character of the view.
- 12.164 It should be noted that the Chisholm Trail includes the planting of saplings visible along the length of the fence. Their continued growth and maturing will further increase the amount of vegetation that acts to screen the Site and foreshorten the view.
- 12.165 Viewpoint E5 – Discovery Way: This viewpoint is located within the Discovery Way residential cul-de-sac, looking east toward the Site. The receptors are the residents of this area, as well as road users. The Site is currently obscured by the residential properties. One Cambridge Square is emerging over the rooflines as the prevailing single storey dwellings only screen the lower levels. The residential character of this view is evident, with vegetation defining front garden boundaries and softening the visual clutter that is created by the high number of parked cars.
- 12.166 Viewpoint E6 – Fen Road: This viewpoint is located on Fen Road, looking west towards the Site, along the Sunningdale Caravan Park access. Receptors are residents and users of this caravan park, as well as road users travelling along Fen Road. The Site is screened by the existing built

form. The low heights of these immediate properties, coupled with limited mature vegetation, create an open skyline and a sense of high exposure. These low surrounding building heights also make the Novotel and One Cambridge Square visible.

- 12.167 Viewpoint P1 – Harmcamlow Way- North: This viewpoint is located on public footpath 130/7, heading east from the village of Horningsea. The view is looking southwest towards the Site, which is not visible. The receptors are ramblers on the Harmcamlow Way recreational route. Field boundaries are permeable, but the skyline is essentially defined by vegetative cover resulting in a strong wooded character. This view is characterised by strong agricultural and rural qualities, and this is reflected in the open fields, vast skyline and limited visibility of the built form.
- 12.168 Viewpoint P4 – Little Wilbraham Road: This viewpoint is located on Low Fen Drove Way, looking west across agricultural land towards the Site, which is not visible. The receptors are road users.
- 12.169 The open countryside, prominent in the view, is characteristic of the rural setting of Cambridge, with an essentially wooded skyline interrupted only by the cluster of large buildings at Marshall Airport. The transition into urban space is also emphasised by the visible cranes breaking the horizon.
- 12.170 Viewpoint P5 – Worts' Causeway/Shelford Road: This viewpoint is located on the Worts' Causeway, looking north towards the Site, which is not visible in the far background. The receptors of this view are road users and ramblers accessing the 92/12 byway.
- 12.171 The elevation of this viewpoint, coupled with the open horizon, provides unobstructed views towards Cambridge's skyline. The cluster of tall, white buildings at Cambridge City Airport is a prominent feature, with the historic core of Cambridge located on the left side of the view, at a distance from this and the Site.
- 12.172 Viewpoint P6 – Limekiln Road, West Pit LNR: This viewpoint is located within the Limekiln Road West Pit LNR. The view looks north towards the Site, which is not visible in the far background. Receptors of this view are visitors to the LNR.
- 12.173 The area around this viewpoint is heavily wooded, and this vegetation continues into the urban and residential spaces, which are visible in the middle ground. The elevated position provides expansive views of Cambridge's skyline and the wider horizon beyond. The Marshall Airport cluster of tall buildings is a prominent feature emerging over the dense tree canopies

Future Baseline Conditions

- 12.174 As required by Schedule 4 of the 2017 EIA Regulations, the ES must contain an outline of the likely evolution of the baseline conditions without implementation of the development. This needs to be "*as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge*".
- 12.175 With the completion of One Cambridge Square, this would form a discrete cluster of tall buildings with the Novotel. The cluster would be visually prominent as it is surrounded by open land and low-lying built form.

- 12.176 It is also noted that the Site's allocation for Major Development as part of the emerging North East Cambridge Area Action Plan suggest the potential for future development to occur within the study area that would substantially change the existing landscape/townscape and visual baseline, introducing large scale built form for mixed uses as well as green open spaces.
- 12.177 Finally, it is noted that the effects of climate change (refer to Chapter 7) could alter the vegetative cover within the study area and therefore result in less visual screening provided by the existing planting. However, the extent of any vegetative loss cannot be identified at this stage. Conversely, vegetation could also fail for other natural reasons; therefore, safeguarding measurements such as Tree Preservation Orders) may be required to ensure that visual screening is preserved in the long term.

Predicted Effects

- 12.178 This section identifies and assesses the likely significant impacts resulting from the Proposed Development and considers impacts during the construction phase and once the development is complete and operational. Reference is made to the nature, extent and magnitude of effects resulting from the Proposed Development.
- 12.179 The relevant parameters applied to the assessment of how effects are transmitted from the source to the receptor and their potential consequences are set out in the methodology in **Appendix 12.1**.

Assessment of Landscape/Townscape Effects

Assessment of Sensitivity

- 12.180 Landscape/townscape sensitivity refers to the degree to which the landscape/townscape resource can accommodate the Proposed Development. It is calculated by combining the 'value' attributed to the resource with its 'susceptibility' to change.
- 12.181 The landscape/townscape receptors are key components of the landscape/townscape that are likely to be affected by the proposed scheme. The Landscape Institute and Institute of Environmental Management & Assessment guidance defines them as '*overall character and key characteristic, individual elements or features, and specific aesthetic or perceptual aspects of the landscape*' (GVLIA3, 2013).
- 12.182 A value of 'low', 'medium' or 'high' is attributed to the sensitivity of each receptor and is shown in **Table 12.3** below (see **Appendix 12.1** for value and susceptibility criterion).

Table 12.3: Landscape/Townscape Sensitivity

RECEPTORS	FACTORS INFLUENCING VALUE AND SUSCEPTIBILITY OF RECEPTORS	VALUE	SUSCEPTIBILITY	RECEPTOR SENSITIVITY
Character Areas/Types which may be affected by the proposals				
NCA88: Bedfordshire and Cambridge Clayland	<p><u>Value</u> – The NCA includes a positive rural landscape which affords a distinctive sense of tranquillity. However, this is eroded by the expanding urban settlements (such as Cambridge) and major transport infrastructure (such as the A14). Therefore, the value of this receptor within the study area is considered medium.</p> <p><u>Susceptibility</u> – Considering the strategic location of the proposal on brownfield, on an allocated site, the receptor could accommodate the proposal without undue consequences on the baseline.</p>	Medium	Low	Medium-Low
LCA 9A Cam River Valley -Cambridge	<p><u>Value</u> – The receptor is strongly associated with a Defining Character of Cambridge and several CAs. Furthermore, it provides a recreational landscape with high wildlife and ecological interest. These and the prominent vegetative cover also positively contribute to the effects of climate change. The value is considered high.</p> <p><u>Susceptibility</u> – The receptor has some ability to accommodate the proposal, which would not directly change the receptor’s qualities and could be appropriate to the existing landscape character. However, some adverse changes to the existing character are expected.</p>	High	Medium	High-Medium
The railway corridor	<p><u>Value</u> – The receptor is characterised by several detracting features associated with the transport infrastructure and derelict or un-descript land (including the Site). The value is therefore considered low.</p> <p><u>Susceptibility</u> – The receptor has the ability to accommodate the proposal with no adverse consequences to the baseline and in line with the relevant policies which allocate the Site for major development.</p>	Low	Low	Low
The local residential area	<p><u>Value</u> – The receptor is not designated with CA, nor does it include architectural exemplars of high quality. The post-war development to the south-west and the static caravan park lack consistent character but are not remarkable. The value of the receptor is considered low.</p> <p><u>Susceptibility</u> – The receptor has some ability to accommodate the proposal, which would not directly change the receptor’s qualities and fits within some of the existing settings’ character; however, some changes to the baseline are expected.</p>	Low	Medium	Low - Medium
Components which may be affected by the proposals				
The skyline of Cambridge	<p><u>Value</u> – The receptor is highly valued and safeguarded within Policy 60 as it is strongly associated with distinctive heritage (spires) and landscape (tree cover) features.</p> <p><u>Susceptibility</u> – The receptor has some ability to accommodate the proposal, which would not directly change the qualities described in Policy 60. However, the proposal would introduce some new features to the baseline with a new cluster of tall buildings.</p>	High	Medium	High - Medium

RECEPTORS	FACTORS INFLUENCING VALUE AND SUSCEPTIBILITY OF RECEPTORS	VALUE	SUSCEPTIBILITY	RECEPTOR SENSITIVITY
The landscape setting of Fen Ditton CA	<p><u>Value</u> – The receptor is associated with the distinctive rural setting of Cambridge and the river landscape. Although urban intrusion is recessive, there are some prominent detracting features, such as the emerging cluster of tall buildings at Cambridge North Station has diminished the sense of remoteness and tranquillity. The receptor value is considered high - medium.</p> <p><u>Susceptibility</u> – The receptor has some ability to accommodate the proposal, which does reflect some of the existing townscape qualities; however, some adverse changes to the baseline are expected.</p>	High - Medium	Medium	High -Medium
The townscape setting of Riverside and Stourbridge Common CA	<p><u>Value</u> – The receptor is associated with a number of CAs; however, it includes some detracting features (i.e. the existing industrial uses around the Site), which lessen its aesthetic qualities. The urban influence is fairly intrusive over the rural qualities of the receptor. The value is considered medium.</p> <p><u>Susceptibility</u> – The receptor has some ability to accommodate the proposal, which does reflect some of the existing townscape qualities; however, some changes to the baseline are expected with the introduction of new urban features.</p>	Medium	Medium	Medium

Operational Landscape/Townscape Effects

Landscape/Townscape Effects Year 1

12.183

Table 12.4 below sets out the predicted magnitude of change and significance of effects at Year 1 on the identified landscape/townscape receptors. The assessment relates to the start of the operational phase, when the construction phase is complete, and before the proposed planting is mature.

Table 12.4: Predicted Landscape/Townscape Effects Year 1

RECEPTORS	FACTORS INFLUENCING LANDSCAPE/ TOWNSCAPE EFFECTS YEAR 1	SENSITIVITY	MAGNITUDE OF EFFECTS	SIGNIFICANCE OF EFFECTS
Character Areas/Types which may be affected by the proposals				
NCA88: Bedfordshire and Cambridge Clayland	As illustrated in the bird-eye image from VuCity in Appendix 12.4 , the Proposed Development is located to the north of Cambridge but within the perceived urban extent, and it does not constitute urban sprawl. While it will not impact the physical character of the receptor, it would locally intensify the urban character, which would create further detriment to the sense of tranquillity perceived in the contextual rural landscape. This would be partially mitigated by the high-quality design aspiration of the detailed application, however, the outline application does not provide similar certainty on the architectural delivery at his stage.	Medium - Low	Low	Minor Adverse
LCA 9A Cam River Valley -Cambridge	The Proposed Development will not have a direct effect on the receptor, but it will have a detrimental effect on the receptor's sense of intimacy and tranquillity with the densification of urban features that would be prominent in the currently verdant riverine landscape. The intimate nature of this receptor intensifies the perception of the effects; however, only a small part of the receptor would be affected as the Site is not within this LCA. The high-quality design intentions set up for the detail application are likely to be appreciated, resulting in some strong aesthetic qualities. The outline application will have less influence on this eastern landscape. In conclusion, while the nature of effects is adverse, the magnitude of change is reduced by the high-quality design.	High - Medium	Low	Moderate – Minor adverse
The railway corridor	The Proposed Development will improve the townscape quality of what is currently a brownfield site with a fragmented character. Furthermore, the buildings directly adjacent to the railway are submitted with a detailed application that aspires for high-quality design, which would suggest the achievement of strong aesthetic qualities. The Proposed Development is appropriate with the emerging railway corridor character and the aspirations of the NEC AAP, with large scale buildings providing a positive gateway experience while responding appropriately to the contextual low-lying urban areas.	Low	High	Moderate Beneficial

RECEPTORS	FACTORS INFLUENCING LANDSCAPE/ TOWNSCAPE EFFECTS YEAR 1	SENSITIVITY	MAGNITUDE OF EFFECTS	SIGNIFICANCE OF EFFECTS
The local residential area	<p>The Proposed Development accommodates mitigation measurements that lessen the sense of disproportion of the large scale built form against the low-lying residential area. These include: stepping down of the volumes towards the eastern boundary and articulation of the facades through 3D modelling as well as materials variation from dark to light (at Year 15 the proposed landscape scheme, which includes low and high-level softening of the elevations, will also contribute). While there isn't a direct effect on the receptor qualities (see also results of Chapters 6 and 13), the great scale of change in the setting of the receptor is noted. However, adverse changes, such as a partial loss of sense of openness, are compensated by the improvements that the re-development of currently negative space with high-quality buildings will provide. The nature of the effects is therefore considered neutral at year one as the proposal will help ground the existing, prominent buildings and better the chaotic clutter of railway infrastructure with a coherent a backdrop.</p>	Low – Medium	High	Moderate Neutral
Components which may be affected by the proposals				
The skyline of Cambridge	<p>The Proposed Development will not result in a direct impact on the distinctive qualities of Cambridge's skyline, as it does not sit within the historic core and it does not compete with the skyline of spires and tree cover.</p> <p>It does, however, introduce a new cluster of tall buildings within an area designated for major change. The proposal will exceed the height of the existing commercial built form in the Science Park and adjacent industrial area, and care was given to the articulation of the proposed volumes to avoid the creation of a flat, inelegant horizon.</p> <p>It is also noted that the geographical extent of the proposal is limited within the receptor's area, with the new built form strategically sited in a gateway location along the railway corridor at the edge of the city.</p>	High - Medium	Medium	Moderate Neutral
The landscape setting of Fen Ditton CA	<p>The Proposed Development will intensify the urban influence on the receptor, eroding its rural quality. Consequentially, there would be a detriment to the sense of remoteness and detachment from the city, altering the receptor's distinctiveness.</p> <p>Although it is noted that the proposal on the eastern edge benefits from detailed design, which would promote high-quality design principles, these would not mitigate the loss of rurality.</p>	High - Medium	Medium	Moderate Adverse
The townscape setting of Riverside and Stourbridge Common CA	<p>The Proposed Development results in the intensification of the urban features within the receptor. However, this will be perceived within the context of the existing tall buildings and industrial areas. Therefore, the overall qualities of the receptor would be preserved.</p> <p>There would be no loss of distinctive features.</p>	Medium	Negligible	Minor Neutral

12.184 In conclusion, the assessment of landscape and townscape effects during the first operational year predicts some adverse effects, although none are considered to be significant. The adverse effects are generally associated with the intensification of urban qualities that would detract from the distinctive rural setting of Cambridge. However, the proposal will be well integrated within the existing townscape. The iterative design process has resulted in the adoption of mitigation measures that mitigate the effects on the identified receptors, with particular benefits drawn from the high-quality design aspirations of the detailed scheme.

Landscape/Townscape Effects Year 15

12.185 The Proposed Development includes new planting along the eastern and western edges of the Site, including street trees. As it matures, this planting is likely to assist with the visual assimilation of the Proposed Development (see the Assessment of Visual Effects), and will enhance the proposed streetscape, providing local townscape benefits. In particular, it is noted that the matured planting will further mitigate the indirect effects of the proposal on the local residential townscape character area by softening the large elevations of the proposed buildings and thereby reducing their prominence.

12.186 However, this mitigation would be insufficient to reduce the predicted adverse townscape effects, such that the effects at Year 15 would remain the same as those at Year 1.

Construction Landscape/Townscape Effects

12.187 Apart from phasing, details of the construction works were not available at the time of this assessment. For the purposes of the LVIA, it is considered that cranes are likely to be a prominent and persistent feature of the construction work. Also, the building process will include a number of activities that would impact the townscape baseline, such as removal of the existing car park, construction vehicle movements and temporary disruption of pedestrian and cycle routes on Cowley Road.

12.188 Based on the above, it is likely that the construction activities would result in a temporary increase in noise and activity, which could detract from the surrounding landscape/townscape (e.g. by reducing tranquillity), including the nearby residential areas, and could be notably more apparent than the operational phase.

12.189 The construction works could cause Major Adverse effects on the receptors identified. However, the effects would be temporary and of limited duration. Good working practices will also mitigate adverse effects. No significant residual effects are expected at the conclusion of the construction phase.

Assessment of Visual Effects

12.190 The visual assessment considers the effects on visual receptors who currently gain views towards the Site and may therefore be affected by the Proposed Development. The assessment has been based on:

- Site observations made during the Site visits;
- Zone of Theoretical Visibility (ZTV) analysis; and
- The technical visualisations provided in **Appendix 12.4**.

12.191 An assessment of visual effects, undertaken from the representative viewpoints, is provided in **Appendix 12.3**. The viewpoint locations are shown on the ZTV map (**Appendix 12.4**) and on the aerial map in **Appendix 12.3**. For each viewpoint, the following information is provided:

- A panorama representing the wider context (Type 1 technical visualisations in **Appendix 12.3**);
- A representative single frame photograph (Type 3 and 4 technical visualisations in **Appendix 12.4**);
- A description of the existing view;
- The type and sensitivity of the receptor were assessed using **Appendix 12.1**, Table A;
- Predicted changes to the view are described and the magnitude of the effect (at Year 1) is quantified using the criteria given in **Appendix 12.1** Table B; and
- The significance of the effect is determined by correlating the sensitivity of the visual receptor with the magnitude of effect, using **Appendix 12.1**, Table C.

12.192 Technical visualisations of the Proposed Development were produced for all the viewpoints (see **Appendix 12.4**). These were produced in accordance with the ‘Visual Representation of Development Proposals, Landscape Institute Technical Guidance Note, 06/19), and informed the assessment of the magnitude of the potential visual effects.

12.193 Following the LPA request for winter views, the photographs for technical visualisations were re-taken in late winter (March 2022), with most of the trees not in leaf, therefore representing the ‘worst-case’ situation. However, due to complications with the surveying process, some of the latest photographs (taken in April 2022) could not be classified as Type 4, resulting in Type 3 visualisations. For completion, when this occurred, we included both sets of photographs and presented both Type 4 and Type 3 technical visualisations.

12.194 The assessment considers the visual effects at year 1 and year 15 of the operational phase. It should also be noted that the proposed planting, even at year 15, is unlikely to influence the visual effects in winter. Therefore, technical visualisations representing the Year 15 scenario are available for viewpoints where a spring photograph was also undertaken.

Operational Visual Effects

Year 1 Visual Effects

12.195 The Year 1 assessment is based on the first year after the construction works are complete, the proposed planting scheme is not considered influential at this stage. A full assessment of each viewpoint is presented in **Appendix 12.3**.

12.196 **Table 12.5** provides a summary of the significance of visual effects for each viewpoint.

Table 12.5: Year 1 Visual Impact

VIEWPOINT	RECEPTOR SENSITIVITY	MAGNITUDE OF CHANGE	SIGNIFICANCE OF VISUAL EFFECTS
2 – Bramblefields LNR	Medium - High	Medium	Moderate (Adverse)
4 – Cowley Road	Medium - Low	Medium	Moderate (Neutral)
5 – Ditton Meadow – Footpath 85/2	High	None	None
8 – Footpath 85/6 Fen Ditton	High	High	Major (Adverse)
9 – Field Lane Byway	Medium - Low	Medium	Moderate (Neutral)
10 – Low Fen Drove Way	Medium	None	None
14 – Guided Busway	Medium - Low	Low	Minor (Neutral)

VIEWPOINT	RECEPTOR SENSITIVITY	MAGNITUDE OF CHANGE	SIGNIFICANCE OF VISUAL EFFECTS
15 – Ditton Meadows	High	Low	Minor - Moderate (Neutral)
16 – Stourbridge Common	High	Negligible	Minor (Neutral)
20 – A14 Bridge Over the River Cam	Medium	Low	Minor - Moderate (Neutral)
E1 – Chisholm Trail Bridge on River Cam	High	Negligible	Negligible (Neutral)
E2 – Chisholm Trail	Medium	Negligible	Negligible (Neutral)
E5 – Discovery Way	Medium	Medium	Moderate (Adverse)
E6 – Fen Road	Low	Medium	Minor - Moderate (Neutral)
P1 – Harmcamlow Way	High - Medium	None	None
P4 – Little Wilbraham Road	Medium - High	None	None
P5 – Worts’ Causeway/Shelford Road	High	None	None
P6 – Limekiln Road. Wet Pit LNR	High	None	None

12.197 The assessment of the representative viewpoints informs the understanding of visual effects on the identified groups of visual receptors. It is evident that specific groups are likely to be subject to significant impact.

12.198 Firstly, it is noted that the proposal does not result in any visual effects on the ramblers on footpaths in the wider landscape (P1 and P4), including views identified in Policy 60 (P5, P6). Although experiencing some medium magnitude of change, the majority of the remaining receptors are also not exposed to adverse visual effects. Most of the visual effects are considered to be neutral, as the proposal fits within the Site’s urban context without substantially altering the qualities of the views.

12.199 Visitors to the Bramblefields LNR and local residents to the south-west are likely to experience moderate adverse effects, albeit not significant, due to the imposing nature of the proposed outline scheme, which does not provide sufficient details to account for the mitigation that high-quality design could provide. On the other hand, receptors on the public footpaths to the east of the Site are subject to some significant adverse effects (Viewpoint 8). In this instance, the Proposed Development contrasts with the distinctive rural qualities of Cambridge’s setting, resulting in a detriment to their visual amenity.

Year 15 Visual Effects

12.200 The technical visualisations in **Appendix 12.4** show the mature planting at year 15 where a spring photograph is available. The proposed planting on the eastern edge of the Site is considered to have the greatest influence on the visual effects, together with the climbers on portions of buildings S6 and S7. In both cases, the vegetative cover will help soften the continuous built form, creating visual breaks that would mitigate the prominence of these buildings.

12.201 Receptors represented by Viewpoint 8 benefit from the growth of the landscape scheme, with trees clearly visible when in leaf. Although the change to the view would still detract from the more intimate scale and valued qualities of the River Cam Valley, the planting scheme will

help mitigate the visual impact by providing breaks in the perceived scale and massing and by integrating the Proposed Development within the existing vegetation along the river.

12.202 Furthermore, it is noted that the eastern edge is also relevant to the views obtained by residents of the static caravan park. While the Proposed Development mitigates visual effects by providing generous gaps between buildings and stepping down the structures located at a distance from the boundary to reduce the sense of dominance, the tree planting along the development edge is crucial to further mitigating the visual effects. Albeit not visible in Viewpoint E6, the mature planting scheme includes strategically placed groups of trees that will soften the buildings' frontages.

12.203 Therefore, although the significance of visual effects at Year 1 would remain unchanged at Year 15, the proposed vegetation on the eastern edge would help to improve the experience of the Proposed Development for receptors to the east of the Site.

Construction Visual Effects

12.204 For the reasons set out in the landscape/townscape effects during construction, the visual effects during the construction phase are likely to be Major Adverse due to the high visibility of the cranes. However, the resulting significant effects would be temporary and short term (less than 5 years).

Mitigation

12.205 The LVIA, which was undertaken in accordance with current best practice guidance, has identified residual significant adverse effects on the following visual receptors:

- Ramblers on the public footpaths to the east of the Site.

12.206 As identified in the Visual Assessment section, the proposed landscape scheme, although supporting the principle of high-quality design, would not markedly reduce the significant adverse visual effects at year 15. However, continuous, healthy growth of the trees on the eastern edge would, in time (i.e. 30 years from landscape completion), provide substantial screening of the proposal, thereby reinstating the visual amenity. Therefore, an efficient and appropriate maintenance regime should be conditioned with the landscape proposal to ensure that the proposed planting will thrive in the longer term.

Residual Effects

12.207 In the long term, there would be no residually significant adverse landscape/townscape effects following the mitigation measures incorporated in the Proposed Development. However, there would be a residual significant visual effect at Year 15 (major adverse) on the receptors represented by Viewpoint 8 before the proposed landscape scheme has fully matured.

Monitoring

12.208 As identified in the assessment of the visual and landscape/townscape effects, the proposed planting scheme would aid the assimilation of the Proposed Development into the surrounding context. The correct installation and maintenance of the proposed landscape scheme are vital to ensure that such assimilation is achieved.

12.209 A Landscape and Ecological Management Plan (LEMP), which could be implemented by condition, will provide for a stated period of monitoring for the landscaping. Noting that the Biodiversity Net Gain requirement prescribes a 30-year monitoring period, it is recommended to

align the LEMP to the same timeframe, which would safeguard proper growth and establishment of the proposed trees.

Cumulative Effects

- 12.210 Four planning applications were included in the EIA scoping request to consider cumulative effects. Of these four, two lack critical information (i.e. indicative master plan or parameter plans) in the planning portal to be able to undertake a reliable assessment of cumulative impact in visual or landscape/townscape terms, these are:
- 21/04640/SCOP (Cambridge Waste- Water Treatment Plant Relocation Horningsea Road Fen Ditton Cambridgeshire); and
 - 17/1616CTY (Waterbeach New Town Waterbeach Barracks and Airfield Site Waterbeach Cambridgeshire).
- 12.211 Further investigation of the potential cumulative effects was carried out for the following applications:
- 21/02450/REM (aka Marleigh Dev Phase 2); and
 - 20/03524/FUL (aka St Johns Innovation Park).
- 12.212 In terms of landscape/townscape effects, the Marleigh Dev Phase 2 sits outside the LVIA study area, creating a new interface between the city and different character areas from those associated with the Site. Therefore, it could not result in cumulative effects in relation to the receptors relevant to the Site.
- 12.213 The St John's Innovation Park application is located within the commercial townscape to the north west of the study area. This will provide an additional commercial built form akin to the existing townscape character. Therefore, the Proposed Development will neither change nor transform the existing townscape character of the study area when assessed cumulatively with this project, as it will not tip the balance towards creation of a new townscape character area.
- 12.214 Consequently, it is considered that the current proposal will not add to or combine with 20/03524/FUL to create a significant cumulative effect.
- 12.215 The assessment of cumulative visual effects has been informed by the technical visualisations in **Appendix 12.4**. The cumulative projects are visible in viewpoints 4, 14, 15, 16, P4, P5, P6. However, in the close and middle range views, the Proposed Development's remains dominant in the foreground, compared with the other developments, such that cumulative effects will not occur.
- 12.216 There is a clearer appreciation of all the Proposed Developments in the long-distance views, P4, P5 and P6. However, the Marleigh Dev Phase 2 sits below the skyline and appears considerably separated and independent from the Proposed Development and the St John's Innovation Park cluster. Hence, cumulative effects are not considered to be significant.
- 12.217 The clustering of St John's Innovation Park with the Proposed Development is more evident in P6. In this instance, the Proposed Development is not considered to result in changes to the visual amenity (see visual assessment in **Appendix 12.3**), due to the screening provided by intervening built form and vegetation. Similarly, the St John's Innovation Park is considered to benefit from the same degree of screening, such that there would be no significant cumulative visual effects.

Conclusions and Summary of Effects

- 12.218 The LVIA has concluded that the Proposed Development would result in one residual, significant adverse effect. This is associated with the visual experience of ramblers on a public footpath to the east of the Site; see the assessment of Viewpoint 8.
- 12.219 The visual amenity of this receptor group is strongly associated with appreciation of Cambridge's rural setting. Due to its height and mass, the Proposed Development will erode the sense of rurality and extend the urban influence of the city. Although the aspiration for high-quality design provides some mitigation of the visual effects, it would not compensate for the loss of the distinctive character of this view.
- 12.220 Two of the identified groups of visual receptors are subject to moderate adverse effects, which are not considered significant for EIA purposes. Notwithstanding the sensitivity of the receptors, in both instances the magnitude of change is considered to be medium, introducing a change that partially alters the view but affords a degree of screening. In the case of visitors to the Bramblefields LNR, it is noted that the vegetative screening will increase substantially during summer and that the existing influence of urban elements has already compromised the visual experience. By contrast, the residents on Discovery Way will be subject to visual change associated primarily with the outline scheme, for which the lack of architectural detailing determines the adverse nature of the effects.
- 12.221 In terms of landscape and townscape effects, the Proposed Development does not result in any significant effects. The evolution of the master plan considered the sensitivities highlighted in the LVIA process, resulting in a proposal that appropriately responds to its context. Nonetheless, it is noted that the sensitivity of the eastern edge of the Site is sufficient to give rise to moderate adverse effects on the landscape setting of the Fen Ditton CA, aligned with the significant effects on receptors at viewpoint 8. However, these effects should be read in conjunction with the lack of adverse visual effects on viewpoints 5 and 24, indicating that the change in townscape terms is not perceived equally across the receptor. As a result, the effect on the landscape setting of the Fen Ditton CA is not considered to be significant.
- 12.222 In conclusion, the Proposed Development is acknowledged as a noticeable change in the study area, due to the introduction of large-scale buildings that will reinforce the emerging cluster of tall buildings at Cambridge North Station, contributing to the evolution of this gateway to the railway corridor. The aspiration for high-quality design is crucial to mitigating the visual and landscape/townscape impact. In particular, the successful establishment of the landscape scheme will reduce the dominating effects of buildings of such scale over the identified landscape/townscape receptor and will improve the streetscape experience locally.

Table 12.6: Summary of Impacts: Landscape and Visual

DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION				IMPACT AFTER MITIGATION (RESIDUAL)			
				ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/ LONG TERM	SIGNIFICANCE	ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/ LONG TERM	SIGNIFICANCE	ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/ LONG TERM	SIGNIFICANCE
LANDSCAPE/TOWNSCAPE IMPACT															
Introduction of the Proposed Development in 'NCA 88: Bedfordshire and Cambridge Clayland'	Reg	Med-Low	Low	Adv	Irrev	LT	Min	Propose a development of high-quality design therefore appropriate to the Site's context in terms of scale, form, materiality and landscape.	Adv	Irrev	LT	Min			
Introduction of the Proposed Development in 'LCA 9A Cam River Valley – Cambridge'	Loc	High-Med	Med.	Adv	Irrev	LT	Mod	Propose a development of high-quality design therefore appropriate to the Site's context in terms of scale, form, materiality and landscape.	Adv	Irrev	LT	Mod-Min			
Introduction of the Proposed Development in the railway corridor	Loc	Low	High	Adv	Irrev	LT	Mod	Propose a development of high-quality design therefore appropriate to the Site's context in terms of scale, form, materiality and landscape.	Ben	Irrev	LT	Mod			
Introduction of the Proposed Development in the context of the local residential area	Loc	Low-Med	High	Neu	Irrev	LT	Mod	Propose a development of high-quality design therefore appropriate to the Site's context in terms of scale, form, materiality and landscape. Implementation of a 30-year landscape maintenance plan.	Ben	Irrev	LT	Mod			
Introduction of the Proposed Development in the Cambridge's skyline	Loc	High-Med	Med	Adv	Irrev	LT	Mod	Propose a development of high-quality design therefore appropriate to the Site's context in terms of scale, form, materiality.	Neu	Irrev	LT	Mod			

DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION	IMPACT AFTER MITIGATION (RESIDUAL)			
				ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE		ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE
Introduction of the Proposed Development in the landscape setting of Fen Ditton CA	Loc	High-Med	High	Adv	Irrev	LT	Maj	Propose a development of high-quality design therefore appropriate to the Site's context in terms of scale, form, materiality and landscape.	Adv	Irrev	LT	Mod
Introduction of the Proposed Development in the landscape setting of Riverside and Stourbridge Common CA	Loc	Med	Neg	Adv	Irrev	LT	Min	Propose a development of high-quality design therefore appropriate to the Site's context in terms of scale, form, materiality and landscape.	Neu	Irrev	LT	Min
VISUAL IMPACT												
Introduction of the Proposed Development in the visual experience of visitors of the Bramblefields LNR	Loc	Med-High	High	Adv	Irrev	LT	Maj	Propose a development appropriate to the Site's context in terms of scale, height and form.	Adv	Irrev	LT	Mod
Introduction of the Proposed Development in the visual experience of visitors of the Limekiln Road West Pit LNR	Loc	High	High	Adv	Irrev	LT	Maj	Propose a development of high-quality design therefore appropriate to the Site's context in terms of scale, height and form.	N/A	N/A	N/A	None
Introduction of the Proposed Development in the visual experience of road users in proximity of the Site, including the guided busway.	Loc	Med. - Low	Med-Low	Adv	Irrev	LT	Mod-Min	Propose a development appropriate to the Site's context in terms of scale, height, materiality and form.	Neu	Irrev	LT	Mod-Min

DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION	IMPACT AFTER MITIGATION (RESIDUAL)			
				ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE		ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE
Introduction of the Proposed Development in the visual experience of road users on the A14	Loc	Med.	Low	Adv	Irrev	LT	Mod-Min	Propose a development of high-quality design therefore appropriate to the Site's context in terms of scale, form, materiality and landscape.	Neu	Irrev	LT	Mod-Min
Introduction of the Proposed Development in the visual experience of ramblers on the public footpaths to the east of the Site	Loc	High	Med-High	Adv	Irrev	LT	Maj	Propose a development appropriate to the Site's context in terms of scale, height and form.	Adv	Irrev	LT	Mod-Maj
Introduction of the Proposed Development in the visual experience of ramblers in the green open spaces along the river	Loc	High	High	Adv	Irrev	LT	Maj	Propose a development of high-quality design therefore appropriate to the Site's context in terms of scale, form, materiality and landscape.	Neu	Irrev	LT	Min
Introduction of the Proposed Development in the visual experience of ramblers on footpaths in the wider landscape (long distance views, including relevant Policy 60 key views)	Loc	High	High	Adv	Irrev	LT	Maj	Propose a development of high-quality design therefore appropriate to the Site's context in terms of scale, height and form.	N/A	N/A	N/A	None

DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION				IMPACT AFTER MITIGATION (RESIDUAL)			
				ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/ LONG TERM	SIGNIFICANCE	ADVERSE/BENEFICIAL	MITIGATION	ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/ LONG TERM	SIGNIFICANCE		
Introduction of the Proposed Development in the visual experience of cyclists and pedestrians on the Chisholm Trail	Loc	High	High	Adv	Irrev	LT	Maj	Propose a development of high-quality design therefore appropriate to the Site's context in terms of scale, form, materiality and landscape.	Neu	Irrev	LT	Neg			
Introduction of the Proposed Development in the visual experience of local residents to south-west of the Site	Loc	Med	High	Adv	Irrev	LT	Maj	Propose a development of high-quality design therefore appropriate to the Site's context in terms of scale, form, materiality and landscape.	Adv	Irrev	LT	Mod			
Introduction of the Proposed Development in the visual experience of local residents to the south-east	Loc	Low	High	Adv	Irrev	LT	Maj	Propose a development of high-quality design therefore appropriate to the Site's context in terms of scale, form, materiality and landscape.	Neu	Irrev	LT	Min - Mod			

Key:

Reg: Regional Med: Medium Min: Minor Maj: Major Irrev: Irreversible LT: Long Term Adv: Adverse
 Loc: Local Neu: Neutral Mod: Moderate Ben: Beneficial Neg: Negligible ST: Short Term

Lighting

13

13.0 Lighting

Introduction

- 13.1 This chapter addresses the impacts of the Proposed Development on lighting for the surrounding receptors. Lighting impacts are subdivided into three main aspects: impacts on sunlight and daylight availability, obtrusive lighting, and reflected solar glare.
- 13.2 The following appendices present the results of the lighting assessments and should be read in conjunction with this chapter:
- Appendix 13.1: Sunlight and Daylight Assessment
 - Appendix 13.2: Obtrusive Lighting Assessment
 - Appendix 13.3: Reflected Solar Glare Assessment

Potential Sources of Impact

- 13.3 The potential sources of impact from the Proposed Development are the introduction of buildings across the Site, impacting on sunlight and daylight availability for surrounding receptors; the combined effect of building envelopes and reflective cladding areas, including glazed areas, in proximity to the railway line, with the potential to cause reflected solar glare to train drivers; and the introduction of lighting onto the Site, which could give rise to obtrusive light spill affecting surrounding areas. The roads, car park, and pedestrian areas surrounding the Site are currently lit to standard.

Methodology

- 13.4 The methodology has been structured consistently with the scoping opinion and successive correspondence. In particular, the following methodology has been used.

Sunlight and Daylight Assessment

- 13.5 The effects of the Proposed Development on sunlight and daylight availability have been based on the guidance in document BR 209 - *Site layout planning for daylight and sunlight – A guide to good practise, Second edition. Paul Littlefair, BRE, 2011*. This is a *de facto* standard in the design of developments to optimise daylight and sunlight availability.
- 13.6 Since the document is guidance, the targets within it should be interpreted flexibly. It describes a methodology to evaluate sunlight and daylight for buildings and external amenity areas. The calculation is carried out for baseline and proposed scenarios, and the difference between them used to measure the significance of the effects of the Proposed Development on its surroundings.
- 13.7 The following metrics are used in assessing sunlight and daylight:
- **Vertical Sky Component (VSC);** this indicator is used to measure the amount of sky visible from the centre of a window. Based on the reduction from the baseline, it is possible to determine the degree of the impact. Values range from 0 to 40% and 27% is considered a satisfactory value. However, in city centres and high-density areas, it is not uncommon to record values of 20% or less. A preliminary geometrical rule that is used is that when the proposed building obstructions lie below a 25° plane from a receptor, it can be quickly concluded that the effects are negligible.

- **Annual and Winter Probable Sunlight Hours (PASH and PWSH).** This indicator applies to windows which are facing within 90° due south. It measures the potential for sunlight reaching a window, on an annual basis and considering the weather effects, hence “probable”. The values range from 0 to 100% and it is recommended for the sun hours to be at least 25% of the annual available total, of which at least 5% should occur in the winter. Reductions are assessed in respect to the combined annual and winter probable sun hours. A preliminary geometrical rule that is used is that when the proposed building obstructions lie below a 25° plane from a receptor, it can be quickly concluded that the effects are negligible.
- **Percentage area exposed to 2 or more sun hours on 21st of March.** This test is applicable to amenity areas surrounding the proposed buildings. The reduction in area is used as the measure for the effect.

13.8 The significance of the effects has been determined from the following considerations:

- When the loss of light is well within guidance, or above the reduction threshold (i.e., reductions of less than 0.20 of baseline condition performance) this is considered negligible.
- Minor effects are those where reductions are recorded for a small number of receptors, or where these reductions are only marginally outside the guidelines target.
- Further reductions, for more receptors, or of higher degree, are considered of moderate significance, and when severe, of major significance.
- The following tables summarise the classification of the effects, negligible, minor, moderate and major adverse. Based on the sensitivity of the receptors, these effects determine the effect, which can be considered significant or not significant.

Table 13.1: Classification of the effects for sunlight and daylight assessment.

METRICS	NEGLIGIBLE EFFECTS	MINOR EFFECTS	MODERATE EFFECTS	MAJOR EFFECTS
VSC	>27% or > 0.8 baseline	Less than 0.8 but more than 0.7 baseline	Less than 0.7 but more than 0.6 baseline	Less than 0.6 baseline
PASH	>25% or > 0.8 baseline	Less than 0.8 but more than 0.7 baseline	Less than 0.7 but more than 0.6 baseline	Less than 0.6 baseline
PWSH	>5% or > 0.8 baseline	Less than 0.8 but more than 0.7 baseline	Less than 0.7 but more than 0.6 baseline	Less than 0.6 baseline
Area Exposed to sunlight on 21 st of March	50% of area or > 0.8 baseline	Less than 0.8 but more than 0.7 baseline area	Less than 0.7 but more than 0.6 baseline area	Less than 0.6 baseline area

Table 13.2: Significance of the effects as a function of the sensitivity of a receptor and the magnitude of the effects.

	NEGLIGIBLE EFFECTS	MINOR EFFECTS	MODERATE EFFECTS	MAJOR EFFECTS
NO SENSITIVITY	Not significant	Not significant	Not significant	Not significant
LOW SENSITIVITY	Not significant	Not significant	Not Significant	Significant
MODERATE SENSITIVITY	Not significant	Not Significant	Significant	Significant
HIGH SENSITIVITY	Not significant	Significant	Significant	Significant

13.9 Calculations have been carried out by means of computer simulations. These simulations are based on a ray tracing algorithm and 3d computer models provided by the Architect (ACME).

13.10 The receptors included in the assessment are determined based on their proximity to the Proposed Development, according to the BR 209 methodology. **Figure 13.1** shows the study area marked in yellow.



Figure 13.1: Extent of Study area and location of receptors included in the sunlight and daylight assessment.

- 13.11 The receptors included in the assessment of sunlight and daylight availability are:
- The north elevation of the existing Novotel. This is considered a low sensitivity set of receptors, including guest rooms that are typically used for a short period (as opposed to residential properties). Since it has a northerly orientation, this elevation is not included in the probable sunlight assessment as per BR 209 guidance.
 - Also consistent with BR 209, One Cambridge Square has not been included in the assessment as this is an office building with open plan.

- 13.12 The open areas included in the assessment are:
- the Nuffield Road Allotments to the west of the site, these are considered high sensitivity receptors.
 - the natural habitat in the north of the Site, these are considered high sensitivity receptors.
 - two green areas to the east, these are considered high sensitivity receptors. These are currently green sites.

- 13.13 All these areas are at a distance to the development (approx.100m) and just on the boundary of the study area.

Reflected Solar Glare Assessment

- 13.14 The purpose of the assessment was to investigate whether sunlight reflected off the envelopes of the proposed buildings could affect train drivers on the nearby railway sufficiently to impair their view of signals.
- 13.15 Guidance relevant to solar reflected glare is scarce in the UK, namely a paper, the IL3/87 by BRE, provides some details. The document defines glare and dazzle and explains how to estimate glare based on geometrical considerations. Other guidance is provided by the document *Reflectivity: Dealing with Rogue Solar Reflections, Illustrated by David N. H. Hassall, Publisher D.N.H. Hassall, 1991* which is based on the calculation of glare using the Holladay equation for veiling luminance, which accounts for the reflective properties of the materials and the position of the reflected solar image to the viewer eyes. A threshold veiling luminance, the metric used to determine glare, is proposed for bus drivers by Hassall. This threshold is 500 cd/sqm and is commonly used in the UK for train drivers.
- 13.16 The assessment uses 3D simulations to predict the reflection of sunlight and to provide a quantifiable and visual representation of the potential for sunlight reflection effect as follows. Solar glare is assessed by considering the visibility of reflected sunlight image on the envelope of the proposed buildings from surrounding receptors. This check is based on geometrical computation: for each receptor included, the visibility of reflected sunlight is determined by means of ray tracing algorithms. This process allows to identify when reflections are visible, on annual basis, and from where. In this case, receptors are located along the train path, at regular intervals, 10m.
- 13.17 By doing so, it is possible to estimate the exposure to reflected glare along the track, at any time. Results are represented through a series of diagrams. Instances of reflected sunlight are filtered, based on the angle between the line of sight of the train driver and the position of sun reflections to the eye. The remaining instances, within a 30° angle, have a higher probability of causing glare (See **Figure 13.2**).

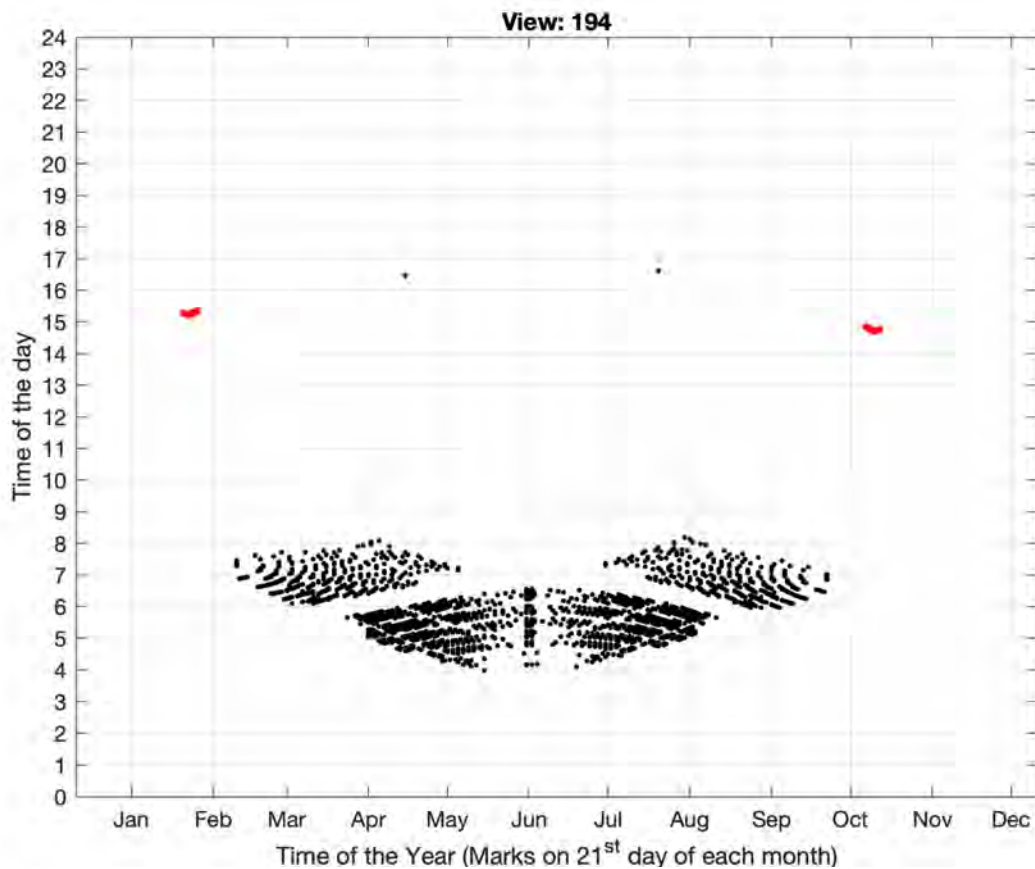


Figure 13.2 – Example of diagram summarising the exposure to reflected sunlight from an observer. The dots represent instances of visible reflected sunlight. Red dots indicate reflected sunlight with a 30° angle to the viewing direction.

- 13.18 The reflections are considered likely to have an adverse impact on vision, based on their relative positions in the field of view. The following criteria are used for estimating their effects:
- Any reflection within 30° from view axis is considered a possible source of glare. Therefore, the Hassall methodology is applied, and the Veiling luminance is estimated. The threshold proposed by Hassall, exceeding 500 cd/sqm, determines instances of glare. This calculation is performed on typical instances of reflected light to the observer (for example, reflected light incoming from a certain direction).
 - Instances when direct sunlight and reflections are visible at the same time are discounted, as in these cases the direct view of the sun will be the main source of glare.
 - Reflections beyond 30° from view axis are not considered likely sources of glare and have been discarded. This occurs when sunlight is oblique and is therefore less noticeable when looking ahead along the tracks.
- 13.19 The tracks referred to in this chapter are described in **Table 13.3** and shown in **Figure 13.3**. Signal positions are marked in red. Typically, for this track orientation, North-South, the elevation next to the tracks is unlikely to cause glare, and the potential for reflected glare comes from elevations that, in this case, face south.

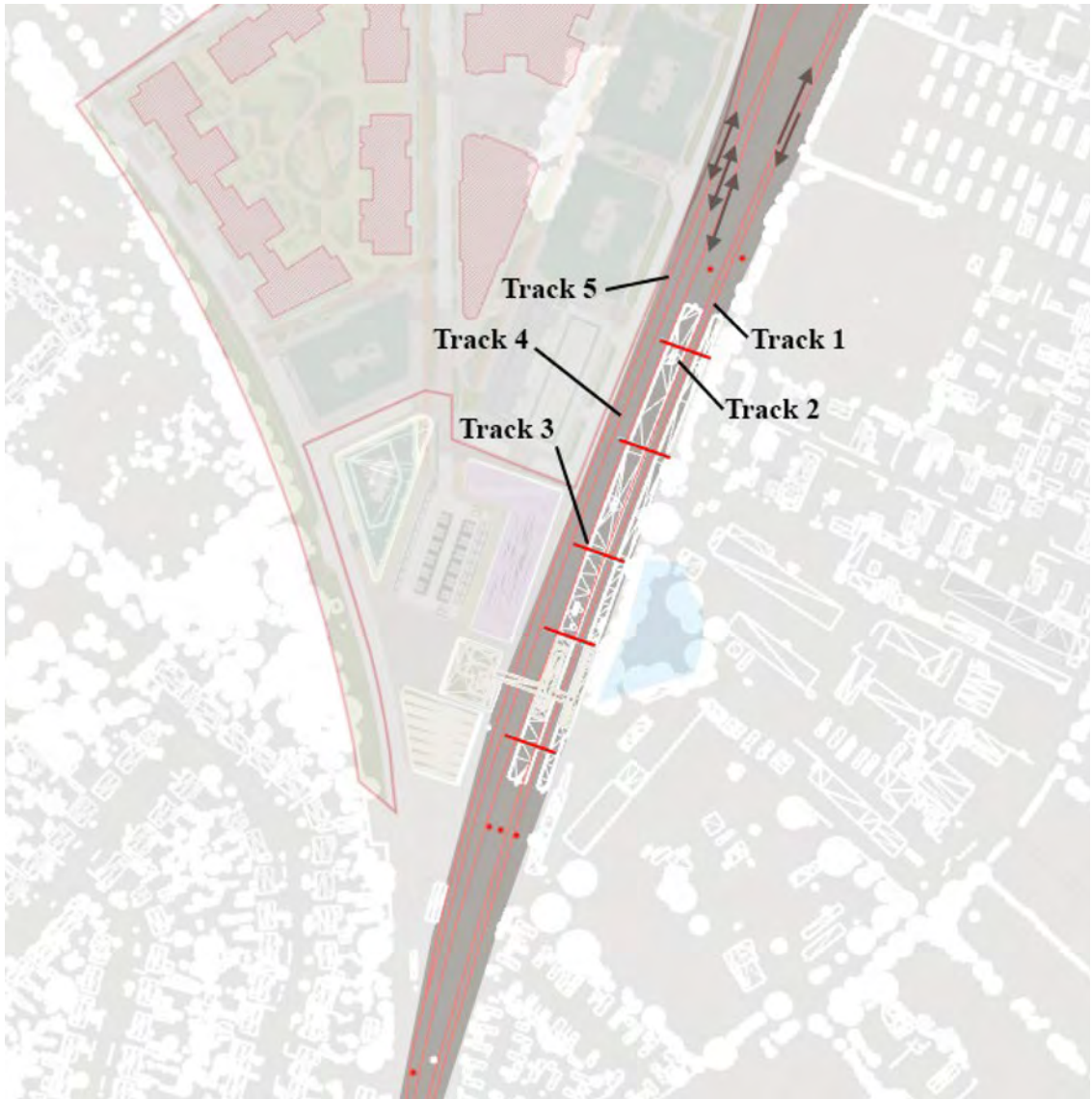


Figure 13.3: Image of site showing location of tracks with designation and direction.

Table 13.3: Track designation and directions.

TRACK REFERENCE	TYPICAL TRAIN DIRECTION
T1	South
T2	North
T3	North/South to Depot
T4	North/South to Depot
T5	North/South to Depot

13.20

The materials that are used for the proposed building envelopes will have an effect on the veiling luminance calculation. For these, the following assumptions have been made based on the architect's CGIs:

- Surrounding landscape, matte material with 20% reflectance.
- Existing buildings, matte material with 50% reflectance.

- Proposed buildings, matte material with 50% reflectance.
- Glazed areas, glass surface, transmission of 70% and refraction index of 1.5.
- Metallic finishes, material with 50% semi specular reflectance.

13.21 The impact of the sunlight reflection differs depending on the direction of the reflection and their duration. Professional judgment has been used to assess the degree of the impact with consideration of frequency, directionality, concurrent visibility of sun and reflected sun, and simulated veiling luminance data compared to the Hassall recommended threshold of 500 cd/sqm. Through the methodology used, the following criteria have been used to determine the degree of impact as shown in **Table 13.4**.

Table 13.4: Classification of the effects of reflected solar glare on high sensitivity receptors.

NEGLIGIBLE EFFECTS	MINOR EFFECTS	MODERATE EFFECTS	MAJOR EFFECTS
No instance of veiling luminance exceeding 500 cd/sqm.	Some instance of veiling luminance exceeding 500 cd/sqm, however intermittently along the track and not in proximity of track signal viewing positions, less than the train breaking distance.	Some instance of veiling luminance exceeding 500 cd/sqm, however intermittently along the track but in proximity of track signal viewing positions, less than the train breaking distance.	Instances of veiling luminance exceeding 500 cd/sqm along any of the tracks for more than the train breaking distance.



Figure 13.4: Architect CGI showing the material palette for the Proposed Development elevation fronting the rail tracks. These are mainly matte surfaces; some elements of the building are clad in metal and there are glazed areas.

Obtrusive Lighting Assessment

- 13.22 The assessment methodology has been informed by the following recognised industry standards and guidance:
- Institute of Lighting professionals (ILP) Guidance Note GN01 (2020): Guidance Notes for the Reduction of Obtrusive Light.
 - ILP Guidance Note GN08 (2018): Bats and artificial lighting in the UK.
 - ILP Professional Lighting Guide PLG 04 (2013): Guidance on Undertaking Environmental Lighting Impact Assessments.
 - BS EN 12464, Part 2 (2014): Outdoor Lighting.
 - BS 5489, Part 1 (2020): Code of Practice for the design of road lighting.
 - SLL LG6 (2016): The Exterior Environment.
- 13.23 The obtrusive lighting assessment has considered the effects of electric lighting from the Proposed Development to the surrounding receptors. The proposed lighting includes the lighting of the exterior areas of the Proposed Development and any significant lighting departing its envelope. This usually does not include the interior lighting as this is often reduced by the window glass and can be mitigated by the use of curtains or louvers. For example, laboratories and offices often use louvers to reduce glare for users of these, during the day, or to provide privacy. For this reason, the effects of the interior lighting are not considered in the assessment.
- 13.24 ILP Guidance considers pre curfew / post curfew lighting scenarios. The pre-curfew is considered a more permissive set of requirements, this is intended to enable all activities during the evening; post-curfew is intended for when most activities have ceased, and a darker scene is more suitable. A typical post-curfew period is between 23:00 at 07:00.
- 13.25 The following metrics are used to characterise obtrusive lighting:
- 13.26 **Light spill** is the spilling of light beyond the boundary of the development site. Units: illuminance (E), measured in lux.
- 13.27 **Façade Luminance**: how bright an illuminated façade appears to the observer. The ILP Guidance Note GN01 details limiting values of façade luminance for different environmental zones. Assessment is required to establish that the limiting values are not exceeded. Units: Luminance (L) measured in cd/m².
- 13.28 **Source Intensity**: how bright the light source appears to an observer. The brightness of luminaires can impact on the view towards the development site and affect the ability of road users to see essential information. The installation should be assessed to ensure that visible luminaires comply with the limiting values of ILP GN01. Units, Intensity (I), measured in candelas (cd).
- 13.29 **Skyglow**: a combination of Direct Upward Light and Indirect Upward Light. This effect is seen as a glow in the night sky and reduces the view of the stars. Skyglow is quantified in the ILP GN01 by the percentage of the luminous output emitted above the horizontal plane.
- 13.30 Guidance classifies areas based on their lighting character. A number of zones are defined which have different brightness. From this classification, the area surrounding the Site is considered to be an environmental zone **E2**. This is based on the measurements from the baseline survey and considering the character of the area, which is suburban/rural. Based on

this classification the threshold values for the obtrusive lighting metrics are set, based on in the ILP GN01 guidance (see **Table 13.5**).

13.31 As the Proposed Development does not yet have a detailed lighting design, a review of this is deferred and will be conditioned. The detailed design is expected to include positions, typologies, powered, photometrical characteristics of the lighting proposed. Alongside this documentation the designers will provide an assessment of the obtrusive lighting metrics based on ILP guidance so that it will be possible to ascertain that the effects of the Proposed Development on the surrounding areas are not significant.

Table 13.5: Environmental Zone Classification

ZONE	SURROUNDING	LIGHING ENVIRONMENT	EXAMPLES
E0	Protected	Dark (SQM 20.5+)	Astronomical Observable dark skies, UNESCO starlight reserves, IDA dark sky places
E1	Natural	Dark (SQM 20 to 20.5)	Relatively uninhabited rural areas, National Parks, Areas of Outstanding Natural Beauty, IDA buffer zones etc.
E2	Rural	Low district brightness (SQM ~15 to 20)	Sparsely inhabited rural areas, village or relatively dark outer suburban locations
E3	Suburban	Medium district brightness	Well inhabited rural and urban settlements, small town centres of suburban locations
E4	Urban	High district brightness	Town/city centres with high levels of night-time activity

13.32 The following receptors, which are considered highly sensitive, have been included in the study area:

- Wild habitat located in the North of the Site. This will be remodelled as part of the Proposed Development.
- Residential properties located to the East of the Site (These are located along Grange Park and the Sunningdale Caravan Park).
- Residential properties located to the South, along Discovery Way.
- Green areas located to the East of the Site (adjacent to Sunningdale Caravan Park and to the Cambridge North platform).
- Nuffield Road Allotments located to the West of the Site.

13.33 In undertaking the assessment, the following limitations have been addressed. As the lighting design for the Proposed Development is still at strategic level, benchmarking against the existing condition has been used as the basis of the assessment.

References

13.34 The following documents have been reviewed as part of the assessment:

- Design Book 02D from April 2022 by EQ2Light.
- Design and Access Statement, dated May 2022, by ACME architects.

Baseline Conditions

13.35 **Figure 13.5** shows the configuration of the baseline model used in the assessment.



Figure 13.5: Baseline Model

Sunlight and Daylight Assessment

- 13.36 The baseline condition shows that all receptors included in the assessment currently meet BR 209, since the Site is largely undeveloped and open.
- 13.37 In particular, all receptors on the Novotel elevations meet the 27° target for VSC.
- 13.38 The solar penetration to all areas considered substantially exceeds the BR 209 target (50% of the area with at least 2 hours of sunlight).

Solar Glare Assessment

- 13.39 The baseline has been assessed qualitatively. Whilst the Novotel and the station bridges could be potential causes of reflected glare, it is assumed that any such glare has not impaired the operational safety of the railway.

Obtrusive Lighting Assessment

- 13.40 Measurements have been carried out in situ to characterise the existing lighting. Measurements have been collected around the Site red line, the Novotel car park, adjacent to the Wild Habitat to the North, along Cambridgeshire Guided Busway and Cowley Road.
- 13.41 The data, collected in **Appendix 13.2**, shows that obtrusive lighting is extremely well controlled by the existing lighting systems. These systems included standard road lighting provision by column mounted lighting fixtures, car park lighting by a regular array of lighting columns and accent lighting to the Novotel façade with illuminated signs.
- 13.42 There is little or no light spill at the boundary of the Site from either the road lighting, car park lighting, or façade accent lighting. The measured illuminance confirms an environmental zone E2 setting.
- 13.43 As an example, the light spill to the wild habitat from the car park, measured on a vertical plane at 1.5m from the ground and towards the car park, is characterised by an illuminance of less than 1 lux.

Future Baseline Conditions

- 13.44 The future baseline condition for daylight, sunlight and solar glare is expected to represent a continuation of the current baseline situation.
- 13.45 Any change due to climatic changes will not modify the assessment conclusions as these are based on a worst-case scenario logic (overcast sky) or by considering the geometry of the sun path.
- 13.46 No changes in environmental zoning are envisioned, which would affect the obtrusive lighting assessment.

Predicted Effects

- 13.47 **Figure 13.6** shows the configuration of the Proposed Development.



Figure 13.6: Proposed Model

Assessment of Effects on Sunlight and daylight

13.48 The numerical results for the assessment are presented in **Appendix 13.1**. The interpretation of these results is discussed in the following sections.

Operational Effects

13.49 The operational effects of the Proposed Development on sunlight and daylight availability for the surrounding buildings are:

- **Novotel North Elevation.** These receptors are considered low sensitivity This elevation shows values of VSC which are well above the BRE 209 threshold for all receptors except four. These windows, located at the lowest level of the hotel, which includes guest rooms, record a moderate reduction from baseline. It is noted that the corresponding baseline data shows values of VSC of 40% and therefore, even with a relatively small departure from 27% (the BRE 209 target), a moderate reduction is unavoidable. These four windows retain values of VSC between 24.5% and 26.5%. Because the reductions are generally negligible and the sensitivity of the receptors is low, the impact of the Proposed Development on this building elevation is considered **not significant**.

13.50 The operational effects of the Proposed Development on solar penetration in open areas are:

- Wild Habitat located in the North of the Site. This area fully meets BR 209 guidance, and the effects are considered negligible and **not significant**.
- Green Area A, located to the East of the Site. This area fully meets BR 209 guidance, and the effects are considered negligible and **not significant**.

- Green Area B, located to the East of the Site. This area fully meets BR 209 guidance, and the effects are considered negligible and **not significant**.
- Nuffield Road Allotments located to the West of the Site. This area fully meets BR 209 guidance, and the effects are considered negligible. It is important to note that the BR 209 guidance is usually applicable to amenity areas. For this reason, a simulation including the effect of trees has also been carried out, which shows that the difference in solar exposure between the baseline and the proposed scenario is less than 15 minutes, on average, for a typical sunny day in March. This impact is considered **not significant**.

13.51 The impact of the Proposed Development on the surrounding areas is **not significant**.

Construction Sunlight and Daylight

13.52 The construction effects of the Proposed Development on sunlight and daylight will be less than the operational effects, as the buildings will be incomplete.

13.53 As such, these impacts are considered to be negligible and the effects **not significant**.

Assessment of Effects Reflected Glare

13.54 The numerical results for the assessment are presented in **Appendix 13.3**. The interpretation of these results is discussed in the following sections.

Operational Effects

13.55 The Proposed Development is located adjacent to the rail tracks, at a distance between 17m and 50m depending on the track considered.

13.56 Since the orientation of the tracks is northeast - southwest, the reflections from the Proposed Development will primarily be projected from one side. Train drivers are unlikely to notice such reflections if looking ahead.

13.57 For trains travelling north, the likely reflections will be caused by the upper windows of the Lab Buildings, facing south.

13.58 Trains travelling south will likely experience reflected sunlight when the sun is visible in the field of view of the train driver. These instances are not considered critical as the direct sun image would be by far the primary source of glare.

13.59 **Figures 13.7** and **13.8** illustrate the two typical scenarios described above, a train travelling north, receiving reflected sunlight from the Lab Building and a train travelling south, experiencing direct sunlight and reflected sunlight at the same time.

13.60 Based on the results of the simulation, which show veiling luminance below 500 cd/sqm for all the instances considered, where no direct sunlight is visible, the impact of the Proposed Development for solar reflected glare is considered **not significant**.

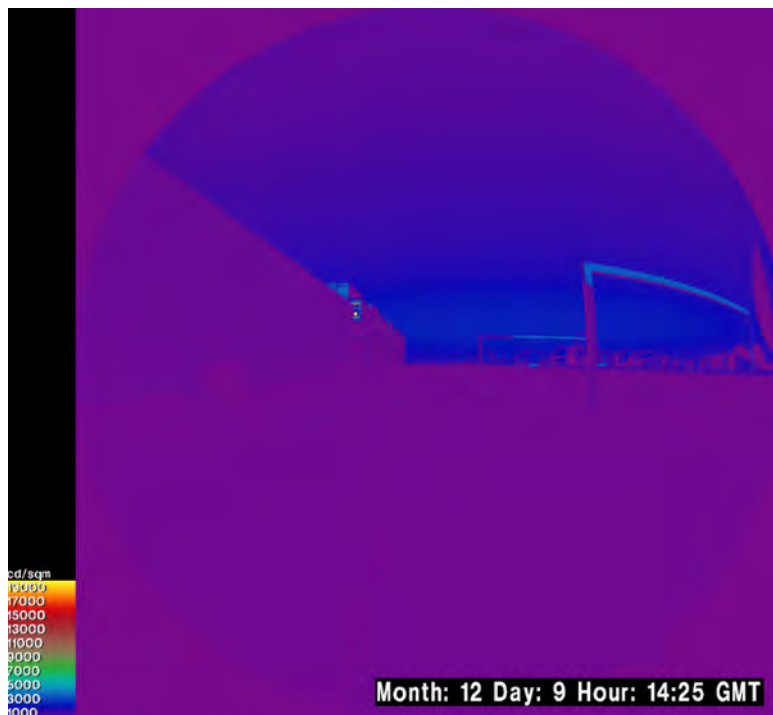


Figure 13. 7: Simulated driver's eye for train going North, showing the reflections to the train caused by the windows of the Lab Building. This effect is evaluated considering the veiling luminance. The maximum veiling luminance of this scenario has been found to be less than 200 cd/sqm.

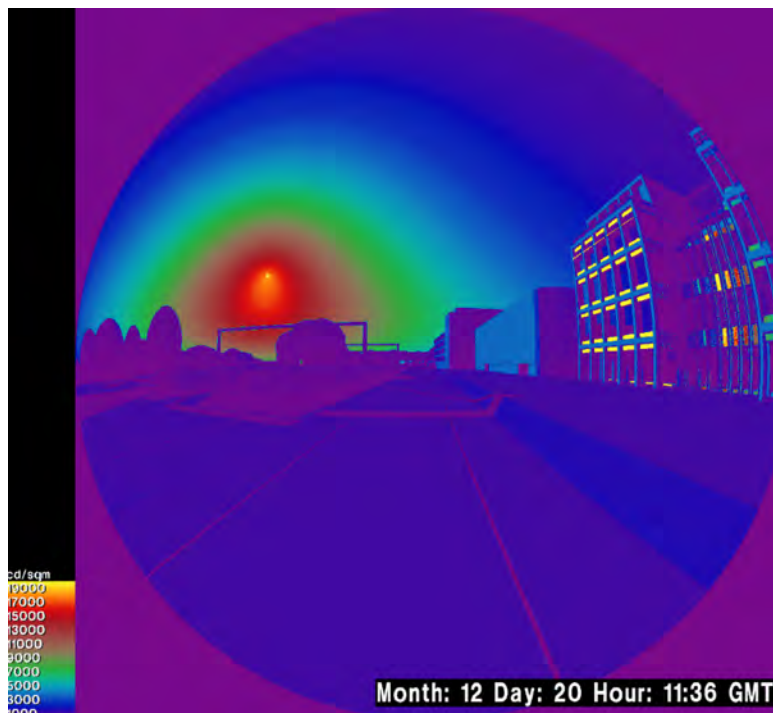


Figure 13.8: Simulated driver's eye for train going South, showing reflections from the proposed building cladding at the same time the Sun is visible. This is not considered a significant effect as the direct Sun overpowers the effects of any reflection.

Construction

- 13.61 The building core will be in place when the cladding is installed. The effects of construction are therefore reduced from the operational effects as cladding is not yet installed. It is concluded that the impact deriving from the construction phase is **not significant**, as the operational phase is also **not significant**.

Assessment of Effects Obtrusive Lighting

Operational Effects Obtrusive Lighting

- 13.62 The operational effects of the Proposed Development have been evaluated by reviewing the strategy document which illustrates the proposed lighting design for the Site. The document has been prepared by EQ2Light in April 2022.
- 13.63 As explained by EQ2Light in this document, The proposed lighting is organised in elements: the base lighting component, to provide safety for circulation, the enhanced lighting systems, to provide accent, the central site spine and the special area lighting, to activate open areas within the Site, and finally the feature lighting which is used to enhance specific architectural/artistic interventions.
- 13.64 The lighting strategy indicates that the Proposed Development will comply with ILP requirements for environmental zone E3. In doing so, the proposed design would extend and apply the existing road lighting to the boundary of the Site.
- 13.65 This approach guarantees compliance with the ILP requirements for environmental zone E2 at the boundary, for the surrounding receptors, whilst providing more flexibility for the lighting within the development.
- 13.66 It is noted that the strategy explains how lighting systems will be controlled, allowing dimming at selected times and based on activities and site use. This is important in consideration of pre-curfew and post-curfew requirements. As per ILP guidance the targets for post-curfew are more stringent and dimming or switching is often required.
- 13.67 The design team has provided reassurance regarding the light spill from the multi-storey car park to the Novotel by proposing a design which uses suitable luminaires (with sufficient cut-off) and by providing opaque parapets to block the car headlights. As the façade of the car park includes perforations, these will be fine-tuned on the elevation towards the hotel, and in the eastern elevation, to avoid any residual light spill.
- 13.68 The strategy document proposes to use accent lighting to the building elevations and renderings. This includes controlled up lighting to some of the architectural features. These visualisations provide reassurance that the façade luminance will be well within the ILP guidance, since the highlighted areas will represent a very small proportion of the façade extent.
- 13.69 The following effects on the sensitive receptors have been identified:
- Wild Habitat located in the North of the Site. The proposed design uses the same lighting systems that are now used along the existing roads. By doing so the effects will be negligible. The spill measured in this area is below 1 lux.

- Residential properties located to the East of the Site, located along Grange Park Residence and the Sunningdale Caravan Park. These properties are at a distance to the Proposed Development (between 70 and 100m). Whilst luminous intensity will need controlling, the only light sources capable of exceeding the luminous intensity threshold that are proposed, are car headlights from the multi-storey car park. The proposed design includes parapets and luminaires with cut-off which minimise direct source visibility, therefore mitigating this effect. The lighting of the other areas, road lighting and similar, will be blocked by the existing line of trees which is to the east of the rail tracks. Due to the distance and the trees, the spill lighting from the road lighting, park lighting, accent lighting of the facades, is unlikely to exceed ILP guidance. The lighting of the Laboratory buildings may have an effect, but provided windows are fitted with louvers and curtains, the lighting is switched off after office hours, the effects will be within guidance. As such, the Proposed Development is considered to have a negligible effect on these receptors.
- Residential properties located to the South, along Discovery Way. These properties are at distance of 90m or more from the residential properties of the Proposed Development. Road lighting and area lighting will be blocked by the trees along Cambridgeshire Guided Busway. Any residential lighting from the proposed buildings is unlikely to exceed the intensity threshold as these will be domestic lighting systems. As a conclusion the Proposed Development is likely to have a negligible effect on these receptors.
- Green areas located to the East of the Site, adjacent to Sunningdale Caravan Park and to the Cambridge North platform. The same considerations that are valid for the residential properties apply to these two green areas.
- Nuffield Road Allotments located to the West of the Site. Since the proposed design will retain the existing road lighting design, there will be no difference. It is important to note that the allotments are separated from the Site by a dense screen of trees.

Construction

- 13.70 It is not possible to determine the effects of the construction lighting on obtrusive lighting, as there is not yet a construction programme, nor design and provision for site lighting. However, it is the intention of the Applicant to use all means of mitigation to reduce the effects of the Site lighting on the surrounding areas. This will be achieved considering the guidance of ILP GN 01 as discussed under the mitigation section of this chapter.

Mitigation

Construction

- 13.71 From the results of the assessment, no mitigation measures are proposed nor necessary for daylight and sunlight effects or solar reflected glare. The effects of the Proposed Development would not be **significant** in either case.
- 13.72 For obtrusive lighting, it is understood that construction will be carried out by a competent workforce and all measures will be implemented to minimise the obtrusive lighting from the Site lighting systems. Such measures will include the use of correct power, aiming and positioning of temporary lighting systems and limiting of the operation of such systems during the hours of darkness. It is proposed that site operations will cease before 19:00 throughout the year. Asymmetric floodlighting is likely to be used to provide illumination to the Site, with the aim of not exceeding ILP upward flux targets for Environmental Zone E2 and not causing any glare to drivers on the adjacent roads, by limiting Threshold Illuminance as recommended.

Operational

- 13.73 From the results of the assessment, no mitigation measures are proposed nor necessary for daylight and sunlight effects or solar reflected glare. The effects of the Proposed Development for these are **not significant**.
- 13.74 For obtrusive lighting, given that the design is not evolved sufficiently for a full analytical assessment, the mitigation measures recommended are those included in the ILP guidance, with which the proposed strategy is consistent.

Residual Effects

- 13.75 No residual effects have been identified.

Monitoring

- 13.76 As the effects of sunlight and daylight are considered non-significant, these will not require monitoring.
- 13.77 For the effects on reflected solar glare on train drivers, it is recommended that this report is shared with a signal engineer to review the data presented in the Appendix. Once the building is in place, Network Rail has standard procedures for monitoring glare from building and structures adjacent to the railway.
- 13.78 Obtrusive lighting is expected to follow ILP guidance. Any nuisance deriving from the lighting installation will be promptly investigated and addressed by following this guidance.

Cumulative Effects

- 13.79 Committed developments identified at the scoping stage e are:
- 21/02450/REM Reserved matters application 421 new homes with associated infrastructure, internal roads and open space
 - 20/03524/FUL Upgrade to existing access roads and Cowley Road (as part of a wider proposal 20/03523/FUL for the erection of a 5-storey building and a 6-storey building for commercial/business purposes, erection of a transport hub, gymnasium, surface parking, landscaping and associated infrastructure including demolition of the existing building (St John's House) and associated structures).
 - 21/04640/SCOP | Request for a Formal Scoping Opinion for an Order granting Development Consent for the Cambridge Wastewater Treatment Plant Relocation (the Proposed Development) | Cambridge Waste- Water Treatment Plant Relocation Horningsea Road Fen Ditton Cambridgeshire.
 - 17/1616/CTY | EIA Scoping Opinion | Waterbeach New Town Waterbeach Barracks and Airfield Site Waterbeach Cambridgeshire.
- 13.80 None of these will incur material changes to the lighting conditions of the Site and all assumptions remain valid.

Conclusions and Summary of Effects

- 13.81 The Proposed Development effects on sunlight and daylight, reflected glare and obtrusive lighting have been assessed.
- 13.82 In particular:
- all receptors considered for the sunlight and daylight effects meet industry guidance (BR 209) and the effects would be **not significant**.
 - all receptors considered in the assessment of reflected solar glare meet targets for veiling luminance under the assumptions made and the effects are therefore **not significant**.
 - The information available for the proposed lighting of the Proposed Development is consistent with the ILP guidance. By adhering to this guidance, the effects of obtrusive lighting are **not significant**.
- 13.83 It has been concluded that the effects of the Proposed Development for lighting are **not significant**.
- 13.84 A summary of impacts can be found in the summary of impact table (**Table 13.6**).

Table 13.6: Summary of Impacts: *Lighting*

DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION				IMPACT AFTER MITIGATION (RESIDUAL)				
				ADVERSE/BENEFICIAL	IRREVERSIBLE/REVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE	ADVERSE/BENEFICIAL	IRREVERSIBLE/REVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE	ADVERSE/BENEFICIAL	IRREVERSIBLE/REVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE	
Impact of proposed massing on daylight and sunlight to surrounding buildings.	Loc	Low / Not sensitive	Generally Low with localised Mod and Maj	Adv	Irrev	LT	Not significant	Not required.	Adv	Irrev	LT	Not significant	Adv	Irrev	LT	Not significant
Impact of proposed massing on daylight and sunlight to surrounding areas.	Loc	High sensitivity	Neg	Adv	Irrev	LT	Not significant	Not required.	Adv	Irrev	LT	Not significant	Adv	Irrev	LT	Not significant
Impact of proposed massing on solar reflected glare to train drivers.	Loc	High sensitivity	Neg	Adv	Irrev	LT	Not significant	Not required.	Adv	Irrev	LT	Not significant	Adv	Irrev	LT	Not significant
Impact of Proposed Development lighting to surrounding areas.	Loc	High sensitivity	Neg	Adv	Irrev	LT	Not significant	Mitigation measures require the lighting systems to adhere to ILP guidance on obtrusive lighting.	Adv	Irrev	LT	Not significant	Adv	Irrev	LT	Not significant

Key:

Loc: Local
 Mod: Moderate
 Maj: Major
 Neg: Negligible
 Irrev: Irreversible
 LT: Long Term
 Adv: Adverse

Noise and Vibration

14

14.0 Noise and Vibration

Introduction

- 14.1 This chapter of the ES assesses the likely significant effects of the Proposed Development in terms of noise and vibration and is supported by the calculations presented in **Appendix 14.1**. A Noise Impact Assessment has also been prepared and can be found in **Appendix 14.2**.

Scope of Assessment

- 14.2 The chapter describes: the assessment methodology; the baseline conditions currently existing at the Site and in the surrounding area; the likely significant environmental effects; the mitigation measures required to prevent, reduce or offset any significant adverse effects; the likely residual effects after these measures have been employed; and the cumulative effects associated with the Proposed Development in combination with other developments within the vicinity of the Application Site.
- 14.3 Impacts are considered during the construction phase and on completion and operation of the Proposed Development. In particular, the chapter considers potential impacts on identified receptors, in terms of:
- noise from construction works;
 - noise from building services plant associated with the Proposed Development during operation; and
 - any increases to road traffic noise during construction and operation attributed to the Proposed Development.
- 14.4 This chapter also provides an assessment of the suitability of the Application Site for the proposed uses, in terms of existing exposure to noise and vibration, and of the need to provide an adequate internal and / or external noise environment.
- 14.5 The cumulative effects considered in this assessment are the combined effects of two or more development projects, which may, on an individual basis not be significant but, cumulatively, might have a significant effect alongside the Proposed Development.

Key Legislation, Policy and Guidance

- 14.6 The noise and vibration assessment has been undertaken within the context of relevant planning policies, guidance documents and legislative instruments. These are summarised below.

Planning Policy

The National Planning Policy Framework

- 14.7 The National Planning Policy Framework¹ (NPPF) sets out the government's planning policies for England and how these are expected to be applied. The revised NPPF comments on noise in the following ways:
- 14.8 *Paragraph 170: "Planning policies and decisions should contribute to and enhance the natural and local environment by:*

¹ Department of Communities and Local Government (July 2021), The National Planning Policy Framework

e) *preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability.*"

14.9 *Paragraph 180: "Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the Site or the wider area to impacts that could arise from the development. In doing so they should:*

- a) *mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life; and*
- b) *identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.*"

Noise Policy Statement for England (NPSE)

14.10 The Noise Policy Statement for England² (NPSE) seeks to clarify the underlying principles and aims in existing policy documents, legislation and guidance that relate to noise. The statement applies to all forms of noise, including environmental noise, neighbour noise, and neighbourhood noise.

14.11 The statement sets out the long-term vision of the government's noise policy, which is to:

14.12 "promote good health and a good quality of life through the effective management of noise within the context of policy on sustainable development".

14.13 The guidance promotes the effective management and control of noise, within the context of Government policy on sustainable development and thereby aims to:

- avoid significant adverse impacts on health and quality of life;
- mitigate and minimise adverse impacts on health and quality of life; and
- where possible, contribute to the improvements of health and quality of life.

14.14 The statement adopts established concepts from toxicology that are currently being applied to noise impacts. The concept details noise levels, at which the effects of an exposure may be classified into a specific category. The classification categories as detailed within NPSE are as follows:

- No Observed Effect Level (NOEL) - the level below which no effect can be detected. Below this level no detectable effect on health and quality of life due to noise can be established.
- Lowest Observable Adverse Effect Level (LOAEL) - the level above which adverse effects on health and quality of life can be detected; and
- Significant Observed Adverse Effect Level (SOAEL) - the level above which significant adverse effects on health and quality of life occur.

14.15 It is recognised that SOAEL does not have a single objective noise-based level that is applicable to all sources of noise in all situations and therefore the SOAEL is likely to be different for different sources, receptors and at different times of the day.

2

Defra (March 2010), The Noise Policy Statement for England

14.16 No guidance has been issued at the time of writing to identify the SOAEL and LOAEL for typical noise sources and receptors.

National Planning Practice Guidance (NPPG) – Noise

14.17 The National Planning Practice Guidance³ (NPPG) expands on the use of SOAEL:

“if the exposure is above this level the planning process should be used to avoid this effect occurring, for example through the choice of sites at the plan making stage or by use of appropriate mitigation such as by altering the design and layout. While such decisions must be made taking account of the economic and social benefit of the activity causing or affected by the noise, it is undesirable for such exposure to be caused.”

14.18 The NPPG also goes on to identify unacceptable noise exposure:

“at the highest extreme, noise exposure would cause extension and sustained adverse changes in behaviour and/or health without an ability to mitigate the effect of noise. The impacts on health and quality of life are such that regardless of the benefits of the activity causing the noise, this situation should be avoided.”

14.19 In addition, the NPPG refers to further considerations to mitigating noise on residential developments. The NPPG states that the noise impact may be partially offset if the residents of those dwellings have access to:

- ‘a relatively quiet façade (containing windows to habitable rooms) as part of their dwelling, and/or;
- a relatively quiet external amenity space for their sole use, (e.g. a garden or balcony). Although the existence of a garden or balcony is generally desirable, the intended benefits will be reduced with increasing noise exposure and could be such that significant adverse effects occur, and/or;
- a relatively quiet, protected, nearby external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings, and/or;
- a relatively quiet, protected, external publicly accessible amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within a 5 minutes walking distance).

Regional and Local Policy

South Cambridgeshire Local Plan

14.20 The South Cambridgeshire Local Plan (adopted September 2018) set out visions and objectives for the Greater Cambridge area to 2031 for new development to help support the transition to a more environmentally sustainable and successful low carbon economy and respond to the challenges posed by our changing climate.

14.21 Policy SC/10: Noise Pollution states the need for a noise impact assessment for residential and non-residential development. Details on noise pollution, including vibration can be found within the Greater Cambridge Sustainable Design and Construction Supplementary Planning Document (SPD)⁴, adopted in January 2020.

3 Ministry of Housing, Communities and Local Government (March 2014, Last updated 22 July 2019). Planning Practice Guidance - Noise

4 Greater Cambridge Sustainable Design and Construction Supplementary Planning Document (SPD), Adopted January 2020)

Greater Cambridge Sustainable Design and Construction Supplementary Planning Document (SPD)

- 14.22 The Greater Cambridge Sustainable Design and Construction Supplementary Planning Document (SPD) sets out the guidance to assist applicants in producing their Sustainability Statement and associated Checklist, together with other documents required to support planning applications. The checklist enables applicants to show that specific design guidance has been considered on issues such as e.g. noise pollution
- 14.23 Contents covered includes:
- Noise pollution;
 - Policy overview;
 - Initial site noise risk assessments, internal design noise levels, design noise levels for external amenity spaces and assessment of other relevant issues;
 - Ventilation and cooling;
 - Planning permissions requirements;
 - Good acoustic design;
 - Vibration; and
 - Construction and demolition work.
- 14.24 Appendix 8, Annex A summarises the types of development and instances when an acoustic assessment / report is likely to be required for both New Noise Sensitive Development (NSD) and Noise Generating Development (NGD). Appendix 8, Annex B details what a typical report should include and where details of acoustic consultants (Suitably Qualified and Competent Persons) may be obtained from. Appendix 8, Annex C includes tables with guideline “absolute” noise levels for “anonymous noise” and guideline “relative” noise level standards for “non-anonymous noise”.
- 14.25 Guideline “absolute” noise levels for “anonymous noise” are as follows:
- <40dB during daytime (NOEL), evening (NOEL), and night-time (NOEL) - no observed effect on health or quality of life. “Grant Consent - No Objection on Noise Grounds”, no specific measures required.
 - 41 – 45dB during the daytime (NOEL), evening (NOEL), and night-time (LOAEL) - sleep disturbance in bedrooms with window open. “Grant Consent - No Objection – Minimise Noise”, no objection in principle subject to the inclusion of suitable noise conditions.
 - 46 – 50dB - during the daytime (NOEL), evening (LOAEL), and night-time (SOAEL) - speech intelligibility within living areas with windows open resulting in moderate annoyance. Greater potential for sleep disturbance and adverse health impact. “Grant Consent - No Objection – Minimise Noise”, no objection in principle subject to the inclusion of suitable noise conditions mitigating and reducing noise to a minimum.
 - 51 - 55dB - during the daytime (LOAEL), evening (SOAEL), and night-time (SOAEL) - increased potential for sleep disturbance, including significant adverse health effects. Gardens and amenity spaces affected. “Grant Consent - No Objection – Minimise Noise”, no objection in principle subject to the inclusion of suitable noise conditions mitigating and reducing noise to a minimum.

- 56 - 60dB - during the daytime (SOAEL), evening (SOAEL), and night-time (SOAEL) - noticeable and disruptive. Significant adverse health effects likely to all habitable rooms. Occupants unable to open windows due to noise ingress and unable to enjoy garden / amenity areas. "Refusal / Object - Avoid on Noise Grounds", possibly Object - Should avoid but may be possible to mitigate and reduce noise to a minimum.
- 60-69dB - during the daytime (SOAEL+), evening (SOAEL+), and night-time (SOAEL+) - noticeable and disruptive. High risk of significant adverse health impact. Unable to use garden and amenity space or have windows open for ventilation. "Refusal / Object - Avoid on Noise Grounds", possibly Object - Presumption against planning permission being granted. Avoid.
- >69+dB - during the daytime (Unacceptable Adverse Effect), evening (Unacceptable Adverse Effect), and night-time (Unacceptable Adverse Effect) - noticeable and very disruptive. Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects. "Refusal / Object - Prevent on Noise Grounds", Object: Prevent - Planning consent should be refused on noise grounds regardless of other considerations ("prevent").

14.26 Guideline "relative" noise level standards for "non-anonymous noise" are as follows:

- < -10dB – NOEL - noise is likely to be inaudible and have no discernible impact on health or quality of life. "Grant Consent - No Objection on Noise Grounds", no objection and no specific noise measures required.
- -10dB to -5dB – NOEL – noise will become audible, although should not cause a change in behaviour or have an adverse impact on health or quality of life. "Grant Consent - No Objection – Minimise Noise", no objection, but developers should consider good design principles to preserve and enhance the noise environment.
- -5dB to 0dB – NOEL - sound will become more noticeable, particularly if the sound has characteristics which make it distinguishable from general environmental noise. However, this should not result in a change in behaviour or adverse impact on health, although the context and attitude to the noise source could influence the subjective response to the sound. "Grant Consent - No Objection – Minimise Noise", consider good design principles to preserve and enhance the noise environment, with particular emphasis on protecting habitable rooms.
- +1dB to +5dB – LOAEL - sound from the source is likely to be noticeable and can give rise to an adverse response, such as annoyance and behaviour change, for example having to close windows to cut out unwanted noise. Approved Plans and / or conditions to include structural noise mitigation and satisfactory window specification to all habitable rooms with facades exposed to LOAEL noise. Potential refusal if noise mitigation not included.
- +6dB to +10dB – SOAEL - sound is increasingly likely to be noticeable and intrusive resulting in significant adverse impacts such as sleep disturbance, annoyance and have an adverse health impact. Details of noise mitigation to be supplied as part of planning approval process. Conditions required to implement control measures within the noise report. Refusal if noise report is inadequate.
- > +10dB – Unacceptable Adverse Effect - Sound is very likely to be very noticeable and intrusive resulting in unacceptable significant adverse impact on health and quality of life. Presumption against planning permission being granted, unless detailed noise impact assessment and approved mitigation measures implemented through conditions. Post completion verification of mitigation measures required.

- 14.27 Policy TI/2: Planning for Sustainable Travel states that developments should promote sustainable travel options to reduce the need for travel, particularly by car.
- 14.28 For developments of more than 20 dwellings or 0.5 hectares for residential development and more than 1,000m² or 1 hectare for other developments, the provision of a Transport Assessment and Travel Plan will be required to demonstrate that they have maximised opportunities for sustainable travel and will make adequate provision to mitigate the likelihood of impacts.

Emerging North East Cambridge Area Action Plan (NEC AAP)

- 14.29 The Greater Cambridge Planning Service has plans to develop a new residential area on the Site of the old Anglian Water Sewage Works and beyond, west of the new Cambridge North Station and south of the A14. They have prepared the NEC AAP to identify the key issues, challenges and opportunities facing the area and sets out the different ways these could be responded to with focus on creating a healthy, safe, characterful district where people can live and work. The aim is to design the area in a way that improves wellbeing and the quality of life for anyone wishing to use the space.
- 14.30 The Proposed Submission version of the emerging NEC AAP (Regulation 19) was reported to the respective decision-making committees of the Councils over December 2021 to January 2022 and was approved for public consultation. However, the Proposed Submission Plan is not able to progress to public consultation until the Development Consent Order (DCO) process for the relocation of the Cambridge Wastewater Treatment Plant has concluded. Therefore, the NEC AAP remains at an early stage in its preparation and can only be afforded negligible weight in the determination of planning applications. However, the following evidence papers are of relevance:
- Noise Model and Mitigation Assessment;
 - Technical Note on examples of noise mitigation; and
 - Environmental Protection / Health Topic Paper.
- 14.31 The Noise Model and Mitigation Assessment report provides the noise contour maps from existing roads and the railway at the Site for all modelled situations, plus a series of potential noise mitigation options such as roadside barriers, bunds, and barrier apartment blocks. The mitigation suggestions in the report assume that the measures suggested are possible and buildable. Technical Note provides details of the mitigation examples that have been included in the study. The Environmental Protection / Health Topic Paper covers specific environmental protection issues to be considered, and these include consideration of noise.

Legislation and Regulation

Environmental Protection Act (EPA) [Sections 79 and 80]

- 14.32 The Environmental Protection Act⁵ 1990 defines matters that constitute a statutory nuisance:
“g) noise emitted from premises so as to be prejudicial to health or a nuisance”
- 14.33 When satisfied that a statutory nuisance exists or is likely to occur, the local authority shall serve an abatement notice requiring restriction or execution of such works.

5 The Environmental Protection Act (1990)

Control of Pollution Act (CoPA) [Sections 60 and 61]

- 14.34 The Control of Pollution Act 1974⁶ (CoPA) requires that ‘Best Practicable Means’ (as defined in section 72 of CoPA) are adopted to control construction noise on any given site.
- 14.35 CoPA makes reference to BS 5228 as best practicable means. Section 61 sets out the process for application to the local authority for prior consent to carry out works.

Technical Standards and Guidance

CIEH, IOA and ANC - ProPG: Planning & Noise Professional Practice Guidance on Planning & Noise New Residential Development, May 2017

- 14.36 Current Government guidance on planning and noise for new residential developments is found in the National Planning Policy Framework (NPPF). One of the strengths of the NPPF is that it sets clear objectives. However, the Institute of Acoustics (IOA), Association of Noise Consultants (ANC) and Chartered Institute of Environmental Health (CIEH) feel there is insufficient technical guidance to practitioners and developers on how to deliver the Government’s objectives. Therefore, these professional bodies have jointly produced the ProPG⁷ which aims to complement existing Government advice and provides a recommended approach that can be applied proportionately to each development site to encourage good acoustic design.
- 14.37 The ProPG seeks to promote the use of good acoustic design to:
- enable new homes to be built in areas previously considered unsuitable because of noise by appropriate evaluation and careful use of suitable mitigation;
 - allow rapid identification of sites where noise is unlikely to be a constraint for new residential developments, hence saving developers time and unnecessary costs on considering the matter further; and
 - permit swift recognition of noisy sites that are very unlikely to be suitable for new residential developments, hence saving developers time and unnecessary costs pursuing schemes that are unlikely to be permitted; and help to reduce the harmful impact of noise on those moving into the properties and the surrounding communities.
- 14.38 ProPG recommends the following:
- “Where ... there is a justification that the internal target noise levels can only be practically achieved with windows closed, which may be the case in urban areas and at sites adjacent to transportation noise sources, special care must be taken to design the accommodation so that it provides good standards of acoustics, ventilation and thermal comfort without unduly compromising other aspects of the living environment. In such circumstances, internal noise levels can be assessed with windows closed but with any façade openings used to provide “whole dwelling ventilation” in accordance with Building Regulations Approved Document F (e.g. trickle ventilators) in the open position.*
- “It should also be noted that the internal noise level guidelines are generally not applicable under “purge ventilation” conditions as defined by Building Regulations Approved Document F, as this should only occur occasionally (e.g. to remove odour from painting and decorating or from burnt food).”*

6 Control of Pollution Act. (1974)

7 IOA, ANC and CIEH (2017), ProPG: Planning & Noise Professional Practice Guidance on Planning & Noise New Residential Development

“In addition to providing purge ventilation, open windows can also be used to mitigate overheating. Therefore, should the ... scheme ... be assessed with windows closed, but this scheme is reliant on open windows to mitigate overheating, it is also necessary to consider the potential noise impact during the overheating condition.”

Acoustics Ventilation and Overheating: Residential Design Guide

14.39 ‘Acoustics Ventilation and Overheating: Residential Design Guide’ (AVO Guide)⁸ recommends an approach to acoustic assessments for new residential development that takes due regard of the interdependence of provisions for acoustics, ventilation, and overheating. Application of the AVO Guide is intended to form part of demonstrating good acoustic design as described in the ProPG when considering internal noise level guidelines.

The Building Regulations, Overheating, Approved Document O (2021)

14.40 Approved Document O⁹ (ADO) takes effect from 15 June 2022 for use in England and provides practical guidance in common building situations in residential buildings on how to meet the requirements of the Building Regulations with regards to overheating.

14.41 Requirement O1(2)(a) ensures the safety and reasonable enjoyment of the occupant is accounted for by the buildings overheating mitigation strategy. Guidance on night-time noise levels relating to this requirement states the following:

“In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).

Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits:

- a) *40dB L_{Aeq,T} averaged over 8 hours (between 11pm and 7am).*
- b) *55dB L_{AFmax} more than 10 times a night (between 11pm and 7am).”*

14.42 Where in-situ noise measurements are used as evidence that these limits are not exceeded, measurements should be taken in accordance with the Association of Noise Consultants’ Measurement of Sound Levels in Buildings with the overheating strategy in use.”

British Standard 7445

14.43 British Standard (BS) 7445-2:1991 ‘Description and measurement of Environmental Noise’¹⁰ defines parameters, procedures and instrumentation required for noise measurement and analysis.

British Standard 5228

14.44 British Standard 5228: 2009 + A1:2014, Part 1 and Part 2 ‘Code of practice for noise and vibration control on construction and open sites’¹¹ (BS 5228) provides a ‘best practice’ guide for noise and vibration control. It includes sound power level (SWL) data for individual plant as well as a calculation method for noise from construction activities. Part 1 of the standard relates to noise and part 2 relates to vibration.

8 Association of Noise Consultants (2020) Acoustics Ventilation and Overheating: Residential Design Guide, January 2020, Version

9 HM Government. The Building Regulations 2010 - Approved Document O, Overheating (2021)

10 British Standard 7445-2: 1991 Description and measurement of environmental noise, Part 2: Guide to the acquisition of data pertinent to land use, BSI, London.

11 British Standard 5228-1: 2009 + A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise

British Standard 4142

14.45 British Standard 4142:2014+A1:2019 ‘Methods for rating and assessing industrial and commercial sound’¹² (BS 4142) describes methods to assess the likely effect of sound of an industrial and/or commercial nature on people who might be inside or outside a dwelling or premises used for residential purposes upon which the sound is incident.

British Standard 8233

14.46 British Standard 8233:2014 ‘Guidance on sound insulation and noise reduction for buildings’ (BS8233) provides guidance for the control of noise in and around buildings. It is applicable to the design of new buildings, refurbished buildings undergoing a change of use. It does not cover assessing the effects of changes in the external noise levels to occupants of an existing building.

Calculation of Road Traffic Noise

14.47 Department of Transport/Welsh Office Memorandum ‘Calculation of Road Traffic Noise’¹³ (CRTN) describes procedures for traffic noise calculation. It is suitable for environmental assessments of schemes where road traffic noise may have an impact.

Design Manual for Road and Bridges

14.48 The Highways Agency Design Manual (DMRB) for Road and Bridges - LA 111 Noise and Vibration¹⁴ provides guidance on the appropriate level of assessment to be used when assessing the noise and vibration impacts arising from all road projects, including new construction, improvements and maintenance.

PPG24

14.49 Planning Policy Guidance 24 Planning and Noise¹⁵ (PPG24) was superseded by guidance in NPPF/NPSE and supplementary guidance notes. However, the guidance is referred to under South Cambridgeshire District Council Guide SPD to avoid noise sensitive dwellings being exposed to excessive noise.

14.50 Four noise exposure categories for new noise sensitive development are given in **Table 14.1**.

Table 14.1: PPG24 Noise Exposure Categories

CATEGORY	EXPLANATION
A	Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as a desirable level.
B	Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise.
C	Planning permission should not normally be granted. Where it is considered that permission should be given, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.

12 British Standard 4142: 2014 + A1 2019 Methods for rating and assessing industrial and commercial sound’. BSI, London

13 Calculation of Road Traffic Noise, Department of Transport Welsh Office, HMSO, 1988

14 Design Manual for Roads and Bridges, Volume 11, Environmental Assessment, Section 3, Environmental Assessment Techniques, Part 7 LA 111, Noise and Vibration, (formerly HD 213/11, IAN 185/15) The Highways Agency, May 2020

15 Ministry of Housing, Communities and Local Government (1994). Planning Policy Guidance 24 Planning and Noise

CATEGORY	EXPLANATION
D	Planning permission should normally be refused.

14.51 The associated daytime and night-time noise exposure levels dependant on the character of the noise source are summarised in **Table 14.2**.

Table 14.2: Noise levels corresponding to the Noise Exposure Categories for new Dwellings ($L_{Aeq, T}$ dB)

NOISE EXPOSURE CATEGORY					
NOISE SOURCE	PERIOD				
		A	B	C	D
	07:00 – 23:00	<55	55 - 63	63 - 72	>72
Road traffic					
	23:00 – 07:00	<45	45 - 57	57 - 66	>66
	07:00 – 23:00	<55	55 - 66	66 - 74	>74
Rail traffic					
	23:00 – 07:00	<45	45 - 59	59 - 66	>66
	07:00 – 23:00	<57	57 - 66	66 - 72	>72
Air traffic					
	23:00 – 07:00	<48	48 - 57	57 - 66	>66
	07:00 – 23:00	<55	55 - 63	63 - 72	>72
Mixed sources					
	23:00 – 07:00	<45	45 - 57	57 - 66	>66

14.52 Furthermore, on sites where individual noise events regularly exceed 82 dB L_{ASmax} several times in any hour during the night (23:00 – 07:00), the Site should be treated as being in NEC C, regardless of the $L_{Aeq, 8hr}$ (except where the $L_{Aeq, 8hr}$ already puts the Site in NEC D).

WHO Guidelines for Community Noise 1999

14.53 The World Health Organisation (WHO) Guidelines for Community Noise (1999)¹⁶ provides recommendations aimed to limit the adverse effects of noise on health.

ISO 9613

14.54 ISO 9613 ‘Attenuation of sound during propagation outdoors – Part 2: A general method of calculation’¹⁷ gives general methods of calculating sound propagation outdoors including attenuation due to geometrical divergence (distance); air and ground absorption; screening; reflections and other effects.

16 World Health Organisation (1999), WHO Guidelines for Community Noise

17 ISO 9613 Attenuation of sound during propagation outdoors – Part 2: A general method of calculation

IEMA and IOA Guidelines for Noise Impact Assessment 2014

14.55 The Institute of Environmental Management and Assessment (IEMA) and IOA Guidelines for Noise Impact Assessment¹⁸ sets good practice standards for scope content and methodology of noise impact assessment. The guidelines present categories of significance relating to the change of basic noise levels.

Consultation

14.56 On 28/01/2022, Richard Evans, a consultant at Temple, contacted Nick Atkins at South Cambridgeshire District Council via email. The correspondence summarised the proposed methodology for undertaking the noise survey and subsequent assessments. The results of the consultation are as follows:

- Residential units proposed would be expected to follow processes contained within the ProPG Planning and Noise guidance document (May 2017). Noise from the A14 should be included.
- The use of a BS4142 assessment should be carried out in relation to operational phase impacts on existing nearby residential premises, which should include the Network Rail compound area and its impact, principally on the occupiers of Fen Road to the west, as well as others further afield.
- Current government and industry standards, best practise and guidance, and local policy Section 3.6 Pollution - Noise Pollution (including vibration) (pages 89-113) and Appendix 8 of the 'Greater Cambridge Sustainable Design and Construction Supplementary Planning Document, adopted in January 2020' should all be considered
- An assessment of all relevant sources of construction noise and vibration must be carried out in accordance with BS5228: 2009 (+A1: 2014): Part 1 - Noise and BS5228: 2009 (+A1: 2014): Part 2 – Vibration.
- Noise from construction and operational traffic should be assessed in accordance with the methodology of the Calculation of Road Traffic Noise (CRTN) and the Design Manual for Roads and Bridges (DMRB) LA111 (where relevant).

14.57 A scoping report (**Appendix 2.1**) was submitted to South Cambridgeshire District Council on 25 November 2021 requesting a scoping opinion (**Appendix 2.2**). A response was received on 09 February 2022 with paragraphs 14.1 – 14.27 of the Scoping Report (**Appendix 2.1**) being agreed as submitted.

Assessment Methodology

Determination of Baseline

14.58 In order to assess the potential noise impact of the Proposed Development, it is necessary to determine the baseline conditions. The baseline conditions are typically the current (at the time of writing the ES) environmental and socio-economic conditions of the Application Site and surrounding area. Baseline noise and vibration surveys were undertaken in February 2022.

14.59 The Site lies within the land to the north of Cambridge North Station, to the west of the railway, off Milton Avenue & Cowley Road.

18 Institute Of Environmental Management and Assessment, (2014) Guidelines for Environmental Noise Impact Assessment

- 14.60 A survey exercise was undertaken by Temple with an unattended survey between Thursday 3rd and Friday 11th February 2022 and supplemented with additional attended surveys on Thursday 3rd and Friday 11th February 2022. All measurements were undertaken in accordance with BS 7445 and BS 6472. **Figure 14.1** shows the unattended and attended measurement locations from the survey.
- 14.61 Based on observations during the survey, the surrounding noise climate of the Proposed Development consists of contributions from the following sources:
- The mainline Fen Line railway;
 - A railway siding line feeding the Tarmac Cambridge Asphalt facility (noise was not prevalent during the attended survey);
 - Road traffic from Milton Avenue, Cowley Road, Milton Road and the A14;
 - The Cambridgeshire Guided Busway;
 - Cambridge North Station operations (i.e. PA System and Mechanical Plant); and
 - Cowley Road Industrial estate (noise was not prevalent during the attended survey).
- 14.62 Two unattended sound level meters (UN1 and UN2) were installed on the Site. At locations where it was not possible to securely leave unattended equipment, attended measurements (AN1 and AN2) were made along the remaining surrounding roads.
- 14.63 Vibration measurements were carried out at AV1 and AV2 using a vibration monitor and a triaxial accelerometer. Vibration Dose Value (VDV) and Peak Particle Velocity (PPV) measurements were taken in all three axes (X, Y, Z) with the X-axis parallel to the road/railway, Y-axis perpendicular to the road/railway and Z as the vertical axis.
- 14.64 To verify that periods of potential adverse weather conditions did not significantly impact the data collected, the local wind speed levels were collected using Wundermap¹⁹ data from weather station ICAMBRID5, located approximately 1.8km from the station.
- 14.65 Further details and results of the baseline noise and vibration surveys are provided in **Appendix 14.1**.



Figure 14.1: Unattended and Attended Noise and Vibration Survey Locations

Prediction Methodology and Significance Criteria

- 14.65.1 A noise impact is a change in the acoustic environment. This may be through the introduction of a new noise source, a change to an existing source causing change to the noise climate at existing receptors or the introduction of a new noise sensitive development.
- 14.65.2 The magnitude of the noise impact can depend on the absolute noise level, change in noise level, duration of the exposure and the time of day at which it occurs.
- 14.65.3 Noise impacts can lead to effects on receptors, such as annoyance or sleep disturbance for residential receptors or disturbance to non-residential receptors.
- 14.65.4 The significance of a noise effect can vary depending on the type of receptor and their sensitivity to noise, such as residential, commercial, or educational land uses.
- 14.65.5 The extent of the potential effects of the Proposed Development has been assessed using a four-point scale from 'major adverse' to 'negligible', a duration scale of short, medium and long term, and a geographic scale of local, district, regional, national and international. A 'major' or 'moderate' effect constitutes a 'significant effect'.
- 14.65.6 **Table 14.3** below details how the levels of significance relate to the national noise policy effect levels and therefore the action to be taken.

Table 14.3: Significance of Adverse Effect Related to National Noise Policy

SIGNIFICANCE OF EFFECT	INCREASING EFFECT LEVEL	ACTION TO BE TAKEN
Negligible	Noise impact exceeding NOEL	No Specific measures
Minor adverse	Noise impact exceeding LOAEL, just below SOAEL	Mitigate and reduce to a minimum
Moderate adverse	Noise impact exceeding SOAEL	Avoid
Major adverse	Unacceptable Adverse Effect	Prevent

Construction Noise

14.66 To quantify potential construction noise impacts, worst-case construction activity noise levels, $L_{Aeq,10hr}$ during weekdays from the assumed construction activities have been predicted in accordance with BS5228 Part 1 at a point 1 m from the façade of the relevant receptor. Calculations have been based on the construction methods and plant likely to be used.

Residential Receptors Impact Criteria (ABC Criteria)

14.67 Construction noise impacts on residential receptors have been assessed using the predicted noise levels in accordance with the evaluation criteria set out in **Table 14.4**. These criteria are based on the ABC construction evaluation criteria set out in BS 5228: Part 1.

Table 14.4: Construction Evaluation Criteria

ASSESSMENT CATEGORY AND THRESHOLD VALUE PERIOD	THRESHOLD VALUE, IN DECIBELS (DB) ($L_{Aeq, T}$)		
	CATEGORY A ^{A)}	CATEGORY B ^{B)}	CATEGORY C ^{C)}
Night-time (23:00 – 07:00)	45	50	55
Evening and weekends ^{D)}	55	60	65
Daytime (07:00 -19:00) and Saturdays (07:00 – 13:00)	65	70	75
<p><i>Note 1: A potential significant effect is indicated if the $L_{Aeq, T}$ noise level arising from the Site exceeds the threshold level for the category appropriate to the ambient noise level.</i></p> <p><i>Note 2: If the ambient noise level exceeds the Category C threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a potential significant effect is indicated if the total $L_{Aeq, T}$ noise level for the period increases by more than 3 dB due to site noise.</i></p> <p><i>Note 3: Applied to residential receptors only.</i></p> <p>^{A)} Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.</p> <p>^{B)} Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.</p> <p>^{C)} Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.</p> <p>^{D)} 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays.</p>			

14.68 The noise levels presented in **Table 14.4** are not intended to be used as a limit for noise emission from construction activities, but rather as a guide to determine the significance or otherwise of the noise effects during construction.

14.69 The magnitude of impact from construction noise can be summarised as shown in **Table 14.5**.

Table 14.5: Magnitude of Impact from Construction Noise

MAGNITUDE OF IMPACT	TOTAL CONSTRUCTION NOISE LEVEL
Negligible	Lower than ambient noise level
Minor adverse	Greater than ambient noise level
Moderate adverse	Greater than impact threshold value defined in Table 14.4
Major adverse	More than 5dB greater than impact threshold value defined in Table 14.4

14.70 The SOAEL is considered to be the level at which the predicted construction noise level (based on professional judgement/ guidance and industry norms) exceeds the construction noise evaluation 'Moderate Adverse' criteria. Construction noise levels which fall into the 'minor adverse' criteria are considered to fall between the SOAEL and the LOAEL.

14.71 If the moderate adverse impact criterion is exceeded, other project-specific factors such as the duration and the character of the impact, as well as the type of receptor, may also need to be considered to determine if there is a significant effect.

Non-residential Receptors Impact Criteria (5 dB Change)

14.72 Construction noise impacts have been assessed using the predicted noise levels in accordance with the evaluation criteria set out in **Table 14.6**. These criteria are based on the 5 dB(A) Change method set out in BS 5228: Part 1. The construction noise evaluation criteria shall apply to occupied non-residential buildings, for example commercial and educational institutions.

14.73 Noise levels generated by construction activities are deemed to be potentially significant if the total noise (pre-construction ambient plus site noise) exceeds the pre-construction ambient by 5 dB or more, subject to lower cut-off values of 65 dB, 55 dB and 45 dB $L_{Aeq,T}$ from site noise alone, for the daytime, evening and night-time periods respectively; and a duration of one month or more, unless works of a shorter duration are likely to result in a significant effect.

Table 14.6: Magnitude of Impact from Construction Noise

MAGNITUDE OF IMPACT	TOTAL CONSTRUCTION NOISE LEVEL
Negligible	Less than the Ambient Noise Level
Minor adverse	0 to 5 greater than the Ambient Noise Level
Moderate adverse	5 to 10 dB greater than the Ambient Noise Level
Major adverse	Over 10 dB greater than the Ambient Noise Level

14.74 If the moderate adverse impact criterion is exceeded, other project-specific factors such as the duration and the character of the impact, as well as the type of receptor, may also need to be considered to determine if there is a significant effect.

Construction Vibration

14.75 The Proposed Development will potentially introduce vibration from temporary construction plant and processes to the area. It is considered that the main sources of vibration during

construction relate to piling works. Continuous Flight Auger (CFA) and sheet piling are expected to be used on-site.

- 14.76 For CFA piling, example vibration levels given in BS5228: Part 2 have been used to predict typical construction vibration levels for these activities at the closest residential receptors to the various works phases.
- 14.77 For sheet piling, reasonable worst-case predictions of vibration from vibratory piling activities have been estimated using the formula for vibratory piling as included in Table E.1 ‘Empirical predictors for ground borne vibration arising from mechanized construction works’ given in BS 5228: Part 2. This has been used to predict typical construction vibration levels from sheet piling activities at the maximum distance, and then applied to the closest receptors to the relevant work phase.
- 14.78 Predicted vibration levels have been assessed utilising the example vibration criteria contained within BS 5228: Part 2 to assess the effect of perceptible vibration on people, and BS 7385: Part 2 to assess the effect of vibration on buildings.
- 14.79 **Table 14.7** below is reproduced from BS 5228: Part 2. The vibration levels are in terms of Peak Particle Velocity (PPV) at the receptor. The 0.3 mm/s level is considered to be the LOAEL and 1 mm/s level to be the SOAEL.

Table 14.7: From BS 5228 Part 2 ‘Guidance on Effects of Vibration Levels’

VIBRATION LEVEL	EFFECT
0.14 mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.3 mm/s	Vibration might just be perceptible in residential environments.
1.0 mm/s	It is likely that vibration of this level in residential environments will cause complaint but can be tolerated if early warning and explanation has been given to residents.
10 mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level in most building environments.

- 14.80 **Table 14.8** below is reproduced from BS 7385: Part 2. The levels given represent guide values for the onset of cosmetic damage in buildings.

Table 14.8: From BS 7385 Part 2: ‘Transient Vibration Guide Values’

TYPE OF BUILDING	PEAK COMPONENT PARTICLE VELOCITY IN FREQUENCY RANGE OF PREDOMINANT PULSE	
	4 HZ TO 15 HZ	15 HZ AND ABOVE
Reinforced or framed structures industrial and heavy commercial buildings	50mm/s at 4 Hz and above	
Unreinforced or light framed structures Residential or light commercial type buildings	15mm/s at 4 Hz increasing to 20mm/s at 15 Hz	20mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

TYPE OF BUILDING	PEAK COMPONENT PARTICLE VELOCITY IN FREQUENCY RANGE OF PREDOMINANT PULSE	
	4 HZ TO 15 HZ	15 HZ AND ABOVE
Note 1 Values referred to are at the base of the building Note 2 for unreinforced, at frequencies below 4Hz, a maximum displacement of 0.6 mm (zero to peak) should not be exceeded		

Off-Site Construction Traffic Noise

- 14.81 The change in noise associated with increased construction traffic on the surrounding road network has been calculated in accordance with the Calculation of Road Traffic Noise (CRTN).
- 14.82 The potential impacts as a result of off-site road traffic have been evaluated in accordance with the Design Manual for Roads and Bridges (DMRB) short term traffic noise effect criteria given in **Table 14.9**. The change has been calculated as the difference between the baseline scenario and baseline with peak construction traffic; the specific scenarios assessed are presented in the limitations and assumptions section below.

Table 14.9: DMRB Short Term Traffic Noise Effect Criteria

NOISE CHANGE, LA10,18HR DB	MAGNITUDE OF EFFECT
0	No Change
0.1 – 0.9	Negligible
1 – 2.9	Minor
3 – 4.9	Moderate
5+	Major

- 14.83 The SOAEL is considered to be equivalent to a 3 dB change for the short term effects and the LOAEL is a 1 dB change. Whilst the change in noise level is calculated on individual road links, the effect criteria apply to the total road traffic noise change at receptors, so in some cases additional calculations have been completed.

Operational Noise

Mechanical Plant Noise

- 14.84 The operation of noise sources from the Proposed Development, including building services and mechanical plant, has been assessed against BS 4142. The assessment is based on the difference between the rating noise level of the specific operational noise source and the measured background noise levels during periods of potential operation. The rating level includes corrections for acoustic character, should these be present in the specific operational noise (such as tones or impulsiveness).
- 14.85 **Table 14.10** gives an indication of how the BS 4142 assessment may align with the national noise policy effect levels; however, the actual impact will depend on the context the new noise source is introduced into.

Table 14.10: BS 4142 Criteria

DIFFERENCE BETWEEN RATING LEVEL AND BACKGROUND LEVEL	BS 4142 RATING	NPSE EFFECT LEVEL
- 10 dB*	N/A*	NOEL
0 dB	Indication of the specific sound source having a low impact depending on the context.	LOAEL
+ 10 dB	Likely to be an indication of a significant adverse impact depending on the context.	SOAEL

* The difference between rating level and background level of -10 dB was removed from BS 4142 in the 2014 revision; however, this rating level can still be used as an indication of NOEL.

Off-Site Operational Traffic Noise

- 14.86 The change in noise associated with increased operational traffic on the surrounding road network has been calculated in accordance with CRTN.
- 14.87 The potential impacts as a result of off-site road traffic have been evaluated in accordance with the DMRB long term traffic noise effect criteria in **Table 14.11**. The change has been calculated as the difference between the future year 'Do Nothing' scenario and a future year 'do something' scenario. The specific scenarios assessed are presented in the limitations and assumptions section below.

Table 14.11: DMRB Long Term Traffic Noise Effect Criteria

NOISE CHANGE, LA10,18HR DB	MAGNITUDE OF EFFECT
0	No Change
0.1 – 2.9	Negligible
3 – 4.9	Minor
5 – 9.9	Moderate
10+	Major

- 14.88 The SOAEL is considered to be equivalent to a 3 dB change for short to medium term effects and a 5 dB change for long term effects; the LOAEL is a 1 dB and 3 dB change respectively. Whilst the change in noise level is calculated on individual road links, the effect criteria apply to the total road traffic noise change at receptors, so in some cases additional calculations have been completed.

Site Suitability

- 14.89 The introduction of a noise sensitive development into areas exposed to noise requires a site suitability assessment to be completed to assess whether the new noise sensitive uses could be subject to nuisance or reduced amenity. The uses within the Proposed Development include residential units, which have noise sensitive internal rooms and external spaces.
- 14.90 On completion, the Proposed Development will be exposed to noise from the existing noise sources. The Site will also be exposed to new noise sources which will be introduced as part of the Proposed Development, such as mechanical plant servicing commercial units.
- 14.91 Assessment of the Residential Quarter of the Proposed Development has been based on survey data from the unattended and attended baseline measurements.

14.92 The Site suitability assessment involves a comparison of measured noise levels to various internal and external guidelines which the Residential Quarter of the Proposed Development should be designed to meet. Where the Residential Quarter of the Proposed Development meets these guidelines, it is expected that the noise levels experienced by future users will be below the LOAEL and adverse effects will be unlikely to occur.

Residential Uses – Internal Rooms

14.93 The following guideline internal ambient noise levels for habitable rooms, shown in **Table 14.12**, are given in BS 8233. The ability of the Residential Quarter of the Proposed Development to achieve these guideline levels has been assessed to determine the suitability of the Site for the proposed noise sensitive uses.

Table 14.12: BS 8233 Residential Internal Ambient Noise Level Criteria

ACTIVITY	TYPICAL SITUATION	AVERAGE AMBIENT DAYTIME NOISE LEVEL LAEQ,16HR DB	AVERAGE AMBIENT NIGHT-TIME NOISE LEVEL LAEQ,8HR DB
Resting	Living rooms	35	N/A
Dining	Dining rooms	40	N/A
Sleeping (Daytime resting)	Bedrooms	35	30

14.94 In locations where regular individual noise events occur (such as scheduled aircraft or passing trains) which can cause sleep disturbance, BS 8233 recommends that a guideline value be set in terms of L_{AFmax} depending on the character and number of events per night. Where development is considered necessary or desirable, these may be relaxed (increased) by up to 5dB.

14.95 The WHO Guidelines of Community Noise 1999 recommends that a 'Typical night-time L_{AFmax} dB' value of 45 dB should not be exceeded more than 10 to 15 times inside bedrooms during the night-time period to avoid potential sleep disturbance.

Office / Laboratory and Retail Uses – Internal Rooms

14.96 While the SPD recognises that office / laboratory buildings and retail units are noise sensitive, it does not provide internal sound criteria for such uses. It is, however, acceptable to demonstrate that the internal ambient sound levels specified in BS 8233 and in British Council for Office's Guide to Specification 2019 are met. The following guideline internal ambient noise levels office / laboratory and retail uses are presented in **Table 14.13**.

Table 14.13: Recommended Internal Ambient Noise Level Criteria

TYPE OF SPACE	RECOMMENDED INTERNAL AMBIENT SOUND LEVELS OWING TO EXTERNAL SOURCES	
	DESIGN RANGE (DB LAEQ,T)	GUIDELINE NR LEVEL (LEQ)
Boardroom	35 – 40	30
Meeting room/cellular office	35 - 45	35
Open plan offices / laboratories	45 - 50	40

TYPE OF SPACE	RECOMMENDED INTERNAL AMBIENT SOUND LEVELS OWING TO EXTERNAL SOURCES	
	DESIGN RANGE (DB LAEQ,T)	GUIDELINE NR LEVEL (LEQ)
Corridors / circulation space / toilets / changing rooms	45 - 55	45
Retail units	50 - 55	45

Residential Uses External Spaces

14.97 The suitability of the use of outdoor amenity spaces within the Proposed Development has been assessed in line with guidance from BS 8233 which states the following:

“For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$ with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognised that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces but should not be prohibited.”

“Other locations, such as balconies, roof gardens and terraces, are also important in residential buildings where normal external amenity space might be limited or not available, i.e. in flats, apartment blocks, etc. In these locations, specification of noise limits is not necessarily appropriate. Small balconies may be included for uses such as drying washing or growing pot plants, and noise limits should not be necessary for these uses. However, the general guidance on noise in amenity space is still appropriate for larger balconies, roof gardens and terraces, which might be intended to be used for relaxation. In high-noise areas, consideration should be given to protecting these areas by screening or building design to achieve the lowest practicable levels. Achieving levels of 55 dB $L_{Aeq,T}$ or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space.”

Site Vibration Exposure

14.98 The nearest potential vibration sources are local road traffic and railway lines.

14.99 Heavy road traffic would only be expected to lead to significant vibration levels if it is within a 5 to 10 m distance from the sensitive receptor and the roads are in poor condition. The roads surrounding the Site are in good condition. Therefore, road traffic is not expected to give rise to significant vibration effects due to the propagation distances and road surface conditions required to maintain significant levels of vibration at the receptor. During consultation with South Cambridgeshire District Council, it was stated that the impact of the Cambridgeshire Guided Busway should be considered, and so a vibration survey and assessment has been carried out. The Busway is located approximately 5m to the west of the residential portion of the Proposed Development.

14.100 The closest over ground railway is located approximately 30m to the east of the Site boundary. This is formed of the Fen Line which runs north out of Cambridge North station and a siding

feeding the Tarmac Cambridge Asphalt facility is located approximately 10m from the Site boundary. The potential vibration impact due to railway movements on nearby lines has been assessed in line with guidance from BS 6472 and criteria given in **Table 14.14**.

Table 14.14: Reproduced from BS 6472 Part 1 ‘Vibration Dose Value Ranges Which Might Result in Various Probabilities of Adverse Comment within Residential Buildings

PLACE AND TIME	ADVERSE COMMENT NOT EXPECTED (MS-1.75)	LOW PROBABILITY OF ADVERSE COMMENT (MS-1.75)	ADVERSE COMMENT POSSIBLE (MS-1.75)	ADVERSE COMMENT PROBABLE (MS-1.75)
Residential buildings 16hr day (07:00-23:00)	<0.2	0.2 to 0.4	0.4 to 0.8	>0.8
Residential buildings 8hr night (23:00-07:00)	<0.1	0.1 to 0.2	0.2 to 0.4	>0.4

Limitations and Assumptions

Construction Phase

Construction Noise

- 14.101 Detailed methodology for the construction of the Proposed Development is not available and would be determined by the appointed contractor. However, an outline construction programme and construction information have been provided in the CEMP in **Appendix 4.2**.
- 14.102 The construction of the Proposed Development is anticipated to be undertaken in distinct phases as follows:
- Enabling works commencing in April 2023, to be completed in November 2023;
 - Phase 1 comprising a Mobility Hub, S6 Lab Ready Offices and S7 Lab Ready Offices, commencing in August 2023, to be completed in August 2025;
 - Phase 2 comprising S4 Offices, commencing in November 2023, to be completed in December 2025;
 - Phase 3 comprising the Residential Quarter, commencing in April 2024, to be completed in October 2026;
 - Phase 4 comprising S9 Lab Ready Offices, commencing in April 2025, to be completed in November 2027; and
 - Phase 5 comprising S8 Offices, commencing in October 2025, to be completed in November 2027.
- 14.103 Based on the current available information, it is considered that the noise impact would be greatest during enabling and substructure works, and general construction activities. These activities will take place at various locations across the Site.
- 14.104 Noise impacts from superstructure and envelope works are likely to be lower than the substructure and enabling works, and would be lower still during the fit-out and landscaping stages of works.

- 14.105 An indicative programme of phases has been used to undertake the assessment, which considers the loudest activities (enabling and substructure works) and any overlapping between the phases.
- 14.106 An indicative list of the mechanical plant and equipment likely to be used per construction activity has been included in **Appendix 14.1**.
- 14.107 The core working hours for Site preparation and construction would be:
- 08:00 – 18:00 hrs weekdays
 - 08:00 – 13:00 hrs Saturdays
- 14.108 The core hours are in line with guidance in BS5228 Part 1; any work outside these hours would be subject to prior agreement, and/or reasonable notice given to South Cambridgeshire District Council and their Environmental Health Officer(s). These hours would be strictly adhered to unless or in the event of:
- an emergency demands continuation of works on the grounds of safety;
 - works are being carried out within the containment of the building envelope; or
 - completion of an operation that would otherwise cause greater interference with the environment / general public if left unfinished.

Future Sensitive Receptors

- 14.109 Under the current plans for the scheme, residents of the Residential Quarter (Phase 3) of the Proposed Development will potentially occupy properties in October 2026 when Phase 4 and 5 is still ongoing and will therefore become sensitive receptors to the rest of the construction site; these receptors (R6) have been included within the assessment from this date.

Construction Vibration

- 14.110 Of the works described above, it is assumed that piling has the potential to lead to the most significant levels of vibration at receptors. As per the outline CEMP in **Appendix 4.2** both vibratory piling (sheet piling) and continuous flight augur (CFA) piles are expected to be used during enabling and substructure works respectively, but a duration for piling works has not been stated. The assessment assumes that the piling works will be undertaken at the early stage of each phase of works. The distance to the future sensitive residential receptors (R6) from ongoing Phase 4 and 5 of works is circa 20 m. However, it is unlikely that the properties would be occupied at the time piling works would take place during Phase 4 or 5 of the development according to programme, and therefore the vibration assessment at this receptor has been omitted.

Construction Road Traffic Noise

- 14.111 Future traffic flows include all predicted flows to be generated by the proposed and committed developments in order to represent the worst-case noise change on the surrounding roads. The assessment is based on traffic data provided by the Applicant's Transport Consultants.
- 14.112 A construction traffic scenario has been modelled to represent worst-case noise change on the surrounding roads as a result of the Proposed Development during the construction phase.
- 14.113 The scenario that has been modelled is:
- 2019 Do Nothing Baseline compared to 2019 Do Nothing Baseline and Proposed Development construction traffic.

14.114 For the purpose of the assessment, the traffic data base year 2019 has been used as the baseline year instead of 2020, as this is considered to be the most recent, 'normal' year of monitoring data on record, due to the impact of the Coronavirus pandemic on travel behaviours during 2020 and 2021. This is to ensure a robust and conservative assessment.

Operational Noise

Operational Mechanical Plant

14.115 Reserved matters application plant assessment has been carried out for commercial buildings for plot S4 (1 Milton Avenue) and S6 - S7 (1 – 3 Swale Street) and an outline planning application plant assessment has been carried out for commercial buildings for S8 - S9 (Triangle Site) of the Proposed Development.

14.116 The proposed plant for plot S4 is expected to include multiple air source heat pumps, air handling units, smoke extract fans, and one life-safety generator. Spatial allowance has also been made for incoming tenants to install additional plant which is expected to consist of multiple condenser units.

14.117 The proposed plant for plots S6-S7 associated with the base build design is expected to include multiple air source heat pumps, air handling units, smoke extract fans, and one emergency backup generator. Spatial allowance has also been made for incoming tenants to install additional plant which is expected to consist of multiple fume extract fans and condenser units.

14.118 The proposed plant for plots S8–S9 associated with the base build design is expected to include multiple air source heat pumps, air handling units, smoke extract fans and an emergency backup generator serving each building. Spatial allowance has also been made for incoming tenants of commercial units to install additional plant which is expected to consist of multiple fume extract fans and condenser units. Consideration has also been given to the potential for noise associated with the proposed retail units and roof terrace to disturb neighbouring residential uses

14.119 Currently there is no specific information on mechanical plant to be used on plot S11 – S21 (Residential Quarter) but any mechanical plant should be located as far as possible away from or not overlooking any residential premises. Noise due to mechanical services equipment may need to be controlled by selecting low-noise items of plant, fitting acoustic louvred screens or enclosures or erecting acoustic screens.

14.120 Based on the requirements of the Local Planning Authority and typical prevailing background sound levels measured during the baseline noise survey, the following design limits are proposed for external plant associated with the day-to-day operations of the development.

Table 14.15: Proposed Operational Noise Limit Rating Levels

RECEPTOR	DAY (07:00-23:00)		NIGHT (23:00-07:00)	
	TYPICAL LOWEST BACKGROUND SOUND LEVEL, L_{A90} DB	OPERATIONAL NOISE LIMIT RATING LEVEL DB	TYPICAL LOWEST BACKGROUND SOUND LEVEL, L_{A90} DB	OPERATIONAL NOISE LIMIT RATING LEVEL DB
All Receptors	42	42	37	37

14.121 It is assumed that sufficient embedded mitigation will be employed so that the limits are complied with.

Operational Road Traffic

14.122 Future traffic flows include all predicted flows generated by the proposed and committed developments in order to represent the worst-case noise change on the surrounding roads, when the Site is fully operational, and all units are occupied. The assessment is based on traffic data provided by the Applicant's Transport Consultants.

14.123 The scenario modelled is:

- 2027 Do Minimum compared with 2027 Do Something and Proposed Development and committed developments operational.

Operational Servicing Movements Noise

14.124 Currently there is no detailed information of the likely activities that will take place to service the residential and commercial uses of the Proposed Development, and therefore no assessment has been undertaken. A BS4142 assessment of the proposed servicing movements will be undertaken during the detailed design stage to demonstrate that the effects can be minimised and it is assumed that sufficient embedded mitigation is employed so that any effects are not significant.

Site Suitability

14.125 Baseline measurements were undertaken around the perimeter of the Site.

14.126 Road traffic noise source levels have been calibrated using survey measurements carried out in accordance with CRTN.

14.127 Railway source noise levels have been calibrated from the noise levels measured at the nearest survey locations and using information obtained from Real Time Trains²⁰ to obtain an indicative CRN Level.

14.128 No significant change in noise level from rail sources is expected and future baseline noise levels are based on current use.

14.129 The predicted noise levels from the noise model were compared with the measured levels at all positions to verify the model and produced reasonable agreement.

14.130 Vibration exposure was measured during an attended survey at the Proposed Development in February 2022. Measured vibration of observed train and guided bus pass events were scaled up to 16hr day / 8hr night periods. The resultant VDV levels indicate that adverse comments are not expected based on assessment against criteria stated in BS 6472. The assessment indicates that the criteria can be met for all uses and therefore no significant effects are likely. The risk of disturbance from environmental vibration is considered to be sufficiently low so as to omit the need for a detailed assessment.

14.131 Vibration may adversely impact the operation of particularly sensitive laboratory equipment in proximity to the railway line which runs alongside the proposed two commercial office / laboratory buildings occupying plots S6 and S7 or give rise to structure-borne noise which may be disturbing to some users. The developer may wish to design to more stringent criteria, but

this is regarded as a commercial decision for the detailed design and is thus excluded from the scope of the planning assessment.

Baseline Conditions and Identification of Key Receptors

Noise Sensitive Receptors

- 14.132 The following existing noise sensitive receptors in proximity to the Site have been taken into consideration when assessing the impacts associated with noise and vibration from both the construction and operational phases of the Proposed Development.
- 14.133 The existing receptors and type of receptor are presented in **Table 14.16**; their locations are shown in **Figure 14.2**.

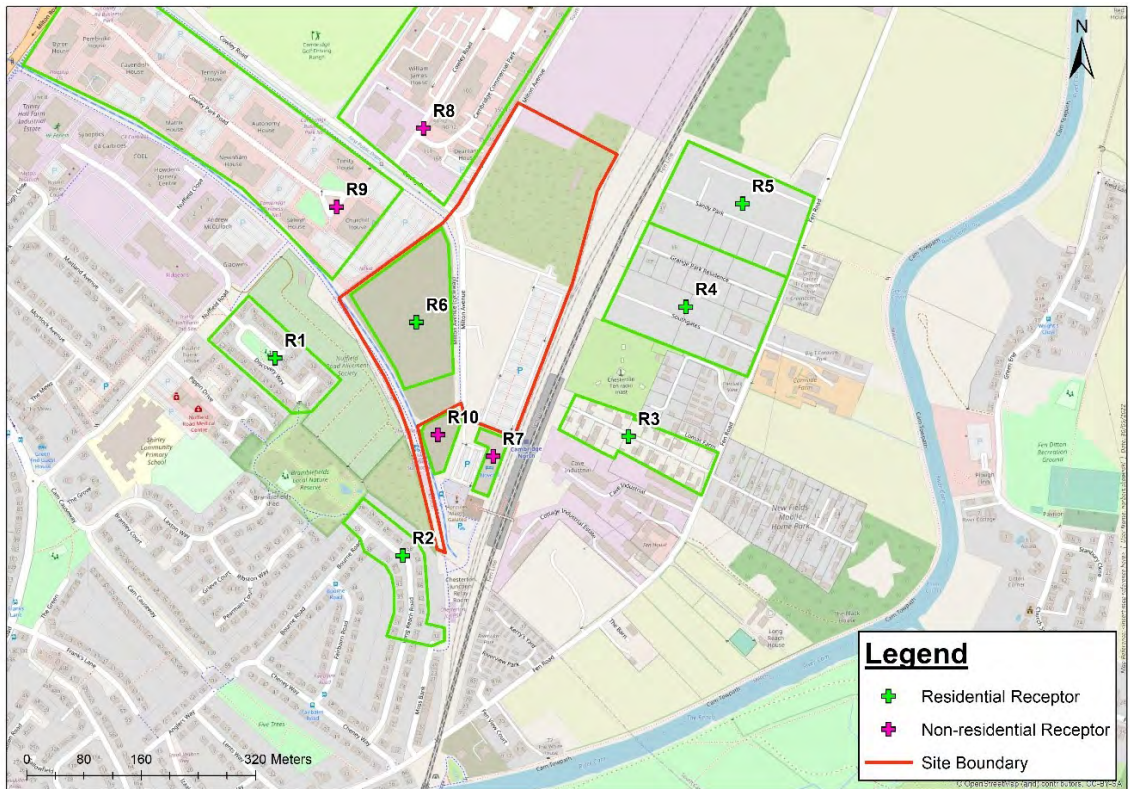


Figure 14.2 Map Showing Nearby Sensitive Receptors

Table 14.16 Noise Sensitive Receptors

RECEPTOR ID	RECEPTOR	TYPE	DISTANCE FROM SITE BOUNDARY
R1	Dwellings on Discovery Way	Residential	80m
R2	Dwellings on Long Reach / Bourne / Fairbairn Road	Residential	135 m
R3	Sunningdale Caravan Park	Residential	60 m
R4	Dwellings in Southgates	Residential	70 m
R5	Dwellings on Grange Park / Sandy Lane	Residential	150 m

RECEPTOR ID	RECEPTOR	TYPE	DISTANCE FROM SITE BOUNDARY
R6	Future residents of the Residential Quarter of the Proposed Development from October 2027 onwards	Residential	20 m (to boundary of Phase 4 / Phase 5)
R7	Novotel Hotel	Commercial	20 m
R8	Cambridge Commercial Park	Commercial	20 m
R9	Cambridge Business Park	Commercial	60 m
R10	One Cambridge Square	Commercial	20 m

Baseline Survey and Results

- 14.134 The existing acoustic environment for the Site includes a mixture of train noise, road traffic noise and minor construction noise from One Cambridge Square when present.
- 14.135 **Table 14.17** presents a summary of the results of the unattended noise survey. The noise levels presented are representative of free field conditions. Full results of the baseline noise surveys are presented in **Appendix 14.1**. Survey measurements were used to confirm modelled baseline levels within CadnaA, a 3D noise modelling program.

Table 14.17 Summary of Noise Levels Derived for each Receptor from Unattended Survey Results

RECEPTOR IDS REPRESENTED	RELEVANT MONITORING POSITION	AMBIENT NOISE LEVEL LAEQ,T DB		10TH HIGHEST LAMAX DB		TYPICAL LOWEST LA90 DB	
		DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
		07:00-23:00	23:00-07:00	07:00-23:00	23:00-07:00	07:00-23:00	23:00-07:00
R3, R4, R5, R7	UN1	52	48	79	74	42	37
R1, R2, R6, R8, R9, R10	UN2	51	44	73	64	42	37

Identification and Description of Changes Likely to Generate Effects

Construction Phase

- 14.136 Construction activities close to sensitive receptors could potentially generate noise impacts, particularly when more than one noisy activity coincides. These construction noise impacts can lead to temporary direct, reversible effects in the form of annoyance, speech interference and disturbance and are confined to the local scale (i.e. surrounding receptors).
- 14.137 Where vibration inducing activities (such as piling or compaction) are to take place near sensitive receptors, vibration impacts may arise. This impact can lead to temporary direct, reversible effects in the form of annoyance from perceptible vibration of short to medium duration and are confined to the local scale (i.e. surrounding buildings). In more extreme cases, it can also lead to direct and permanent effects in the form of building damage (cosmetic and structural) which would be confined to the local scale (i.e. surrounding receptor).

- 14.138 Construction road traffic could potentially generate additional noise impacts at noise sensitive receptors surrounding the Site. These impacts can lead to temporary effects in the form of annoyance and disturbance of short to medium duration and are generally confined to the local scale (i.e. surrounding roads) but has the potential to lead to effects on the district scale (i.e. roads further afield).

Operational Phase

- 14.139 Noise from the operation of the Proposed Development (including mechanical plant and equipment associated with residential and commercial buildings), servicing movement noise, and airborne noise between adjoining walls of the residential and commercial uses, could potentially generate noise impacts. This can lead to direct effects in the form of annoyance and disturbance of long-term duration and are confined to the local scale (i.e. surrounding receptors).
- 14.140 A change in the levels of road traffic due to the Proposed Development could potentially generate noise impact. This can lead to direct and temporary effects in the form of annoyance and disturbance of short to medium duration, then potentially lead to effects of long-term duration and are generally confined to the local scale (i.e. surrounding roads) but has the potential to give rise to effects on a district scale (i.e. roads further afield).

Assessment of Likely Significant Effects

Construction Phase

Embedded Mitigation Measures

Construction Noise and Vibration

- 14.141 Impacts during the noisiest periods should be considered and addressed in terms of “Best Practicable Means” (BPM) and controlled and managed through the Section 61 process of the Control of Pollution Act 1974.
- 14.142 BS 5228 does not state criteria for acceptable levels of construction noise; therefore, the preferred approach is to reduce noise levels where possible, but with due regard to practicability. Sometimes, a higher noise level may be acceptable if the overall construction time, and therefore length of disruption, is reduced.
- 14.143 BPM as defined in BS 5228 will be implemented through the CEMP by the contractor during construction, which will act as the means for delivering the mitigation described below. An outline CEMP can be found in **Appendix 4.2**. General construction noise and vibration mitigation measures include, but are not limited to, the following:
- unnecessary revving of engines should be avoided, and equipment switched off when not in use;
 - internal haul routes should be kept well maintained;
 - drop heights of materials should be minimised;
 - plant and vehicles should be sequentially started up rather than all at once;
 - as far as reasonably practicable, sources of significant noise should be enclosed;
 - plant should always be used in accordance with manufacturer’s instructions;
 - care should be taken to position equipment away from noise-sensitive areas;

- where possible, loading and unloading should also be carried out away from such areas; and
- regular and effective maintenance by trained personnel should be undertaken to keep plant and equipment working to manufacturer's specifications.

14.144 Screening such as noise barriers (in the form of site hoarding) will be used around the Site where necessary and practicable.

14.145 Prior warning and explanation should be given to residents who are likely to be impacted by vibration from construction activities.

Construction Off-Site Traffic Noise

14.146 The Construction Logistics Plan will form part of the CEMP and will be implemented to manage vehicle routing, access to Site, on site management and vehicle movements and working hours.

14.147 Provision should be made, wherever possible, to ensure that unloading of vehicles will be carried out on-site rather than on the adjacent roads. All construction traffic entering and leaving the Site should be closely controlled. Vehicles making deliveries or removing spoil from the Site should travel via designated traffic routes previously agreed with local authorities and interested parties. Construction traffic should be controlled by means of a vehicle arrival and departure management plan to achieve an even spread of vehicle movements during the working day. Access and egress for construction vehicles may vary according to the particular stage or phase of the works.

14.148 As a matter of good practice, measures designed to reduce the number of vehicle trips attributable to workforce commutes will be implemented, as part of the Construction Logistics Plan, by facilitating modal shift, discouraging the use of private vehicles for trips to and from the Site, particularly as a single occupant and encouraging walking, cycling, public transport and/or car sharing. Appropriate measures include: the provision of up-to-date public transport information (i.e. timetables, bus maps and routes, etc.) to site workers during toolbox talks, inductions or similar and keeping information updated on a site noticeboard in a prominent location.

Anticipated Effects

Construction Noise

14.149 The assessment of construction impacts was undertaken with regard to potential noise impacts at the nearest receptors to the Site.

14.150 Predictions of noise levels associated with enabling and substructure activities listed in the indicative construction programme, outlined in **Appendix 14.1** have been undertaken at 1 m from the façade of the noise sensitive receptors identified in **Table 14.16**.

14.151 Calculations have been carried out in accordance with BS 5228: Part 1. The assessment includes activity plant items based on BS 5228 and likely percentage operational times for the construction plant.

14.152 **Table 14.18** and **Table 14.19** present the predicted typical case $L_{Aeq,10hr}$ façade levels for a working day ($L_{Aeq,5hr}$ for Saturdays) at each receptor during enabling and substructure of the Proposed Development.

Table 14.18: Predicted Typical Case $L_{Aeq,T}$ at Receptors during Enabling and Substructure Works

PROGRAMME	DURATION		PREDICTED TYPICAL CONSTRUCTION NOISE LEVEL AT DISTANCE REPRESENTATIVE OF THE CLOSEST RECEPTOR LAEQ,10HR (LAEQ,5HR FOR SATURDAYS) (DB)									
			R1 80M	R2 135M	R3 60M	R4 70M	R5 150M	R6 20M	R7 20M	R8 20M	R9 60M	R10 20M
Enabling works	03/04/23	31/08/23	54	50	55	55	54	n/a	57	58	55	56
Enabling works and Phase 1	31/08/23	02/11/23	56	50	60	59	56	n/a	63	59	57	60
Phase 1 and 2	02/11/23	01/04/24	58	55	61	58	54	n/a	64	54	55	64
Phase 1, 2 and 3	01/04/24	07/04/25	61	57	61	59	55	n/a	64	57	61	65
Phase 1, 2, 3 and 4	07/04/25	28/08/25	61	58	62	61	57	n/a	65	61	62	65
Phase 2, 3 and 4	28/08/25	06/10/25	61	58	59	58	55	n/a	62	60	61	64
Phase 2, 3, 4 and 5	06/10/25	05/12/25	62	59	61	60	57	n/a	63	61	62	65
Phase 3, 4 and 5	05/12/25	02/10/26	60	56	60	59	56	n/a	61	60	62	61
Phase 4 and 5	02/10/26	10/11/27	56	54	59	59	55	77	59	59	58	59
Phase 4	10/11/27	19/11/27	52	50	53	57	53	74	53	58	56	52

Table 14.19: Predicted Typical Impact Magnitude at Receptors during Enabling and Substructure Works with Overlapping Phases

PROGRAMME	DURATION		IMPACT MAGNITUDE									
			R1 80M	R2 135M	R3 60M	R4 70M	R5 150M	R6 20M	R7 20M	R8 20M	R9 60M	R10 20M
Enabling works	03/04/23	31/08/23	minor adverse	negligible	minor adverse	minor adverse	minor adverse	n/a	minor adverse	minor adverse	minor adverse	minor adverse
Enabling works and Phase 1	31/08/23	02/11/23	minor adverse	negligible	minor adverse	minor adverse	minor adverse	n/a	minor adverse	minor adverse	minor adverse	minor adverse
Phase 1 and 2	02/11/23	01/04/24	minor adverse	minor adverse	minor adverse	minor adverse	minor adverse	n/a	minor adverse	minor adverse	minor adverse	minor adverse
Phase 1, 2 and 3	01/04/24	07/04/25	minor adverse	minor adverse	minor adverse	minor adverse	minor adverse	n/a	minor adverse	minor adverse	minor adverse	minor adverse

PROGRAMME	DURATION		IMPACT MAGNITUDE										
			R1 80M	R2 135M	R3 60M	R4 70M	R5 150M	R6 20M	R7 20M	R8 20M	R9 60M	R10 20M	
Phase 1, 2, 3 and 4	07/04/25	28/08/25	minor adverse	minor adverse	minor adverse	minor adverse	minor adverse	minor adverse	n/a	minor adverse	minor adverse	minor adverse	minor adverse
Phase 2, 3 and 4	28/08/25	06/10/25	minor adverse	minor adverse	minor adverse	minor adverse	minor adverse	minor adverse	n/a	minor adverse	minor adverse	minor adverse	minor adverse
Phase 2, 3, 4 and 5	06/10/25	05/12/25	minor adverse	minor adverse	minor adverse	minor adverse	minor adverse	minor adverse	n/a	minor adverse	minor adverse	minor adverse	minor adverse
Phase 3, 4 and 5	05/12/25	02/10/26	minor adverse	minor adverse	minor adverse	minor adverse	minor adverse	minor adverse	n/a	minor adverse	minor adverse	minor adverse	minor adverse
Phase 4 and 5	02/10/26	10/11/27	minor adverse	minor adverse	minor adverse	minor adverse	minor adverse	minor adverse	major adverse	minor adverse	minor adverse	minor adverse	minor adverse
Phase 4	10/11/27	19/11/27	minor adverse	negligible	minor adverse	minor adverse	minor adverse	minor adverse	major adverse	minor adverse	minor adverse	minor adverse	minor adverse

14.153 Based on **Table 14.18** and **Table 14.19**, the assessment indicates that, with the loudest activities (enabling and substructure works) and any overlapping between the phases, the predicted noise levels would have **short term minor adverse effects** at neighbouring sensitive receptors (i.e. Dwellings on Discovery Way (R1), Dwellings on Long Reach / Bourne / Fairbairn Road (R2), Sunningdale Caravan Park (R3), Southgate’s Caravan Park (R4), Dwellings on Grange Park / Sandy Lane (R5), Novotel Hotel (R7), Cambridge Commercial Park (R8), Cambridge Business Park (R9), and One Cambridge Square (R10)). It should be noted that for short periods of time, when plant is closest to the Site boundary, the noise levels could be 10-15 dB higher than those predicted, which would lead to a moderate impact in some cases. However, due to the short duration, this is not considered likely to give rise to a significant effect.

14.154 There is a likely significant effect due to **short term major adverse effects** at the future receptors (i.e. future residents of the Residential Quarter of the Proposed Development (R6)). These adverse effects are likely to occur on the units facing Phase 4 and 5 of the Development; effects on other facades facing away from the Proposed Development are likely to be minor. It should be noted that the assessment assumes worst case substructure works ongoing at Phase 4 and 5 at the time when the Residential Quarter becomes occupied. Should this not be the case, and other works would be taking place at the time when the Residential Quarter becomes occupied, e.g. superstructure or fit-out works, the effects of these works would likely be **short term moderate adverse effects**, which would still be significant. Details of the calculations are presented in **Appendix 14.1**.

14.155 The nature of the construction works means that the conservative situation predicted may only exist for a matter of days, or even hours. There would be regular periods, even during a single day, when the assumed plant would not be in operation, for example during breaks or changes of working routine. As discussed earlier, all works would be undertaken in accordance with best practice, and appropriate mitigation adopted where applicable.

Construction Vibration

14.156 As per the outline CEMP in **Appendix 4.2**, both vibratory piling (sheet piling) and continuous flight auger (CFA) piles are expected to be used for enabling and substructure works respectively, but a duration for piling works has not been stated. It has been assumed that the

piling works will be undertaken at the early stage of each phase of works. Indicative vibration levels for CFA piling methods (sourced from BS5228) are presented in **Table 14.20**.

Table 14.20: BS5228 Construction CFA Piling Vibration Levels

BS5228	GROUND CONDITIONS	DISTANCE, M	PPV, MM/S
Table D.6 – Augering 1050mm dia - ref. 101	Fill/dense ballast/ London clay	20	0.05
Table D.6 - Augering 900mm dia - ref. 102	Fill/wet sand/clay	9	0.20
Table D.6 - Augering 350mm dia - ref. 103	Fill clay	10	0.38
Table D.6 - Augering 350mm dia - ref. 103	Fill clay	20	0.30
Table D.6 - Augering 500mm dia - ref. 104	Fill/sand/clay	10	0.40
Table D.6 - Augering 500mm dia - ref. 104	Fill/sand/clay	15	0.10

- 14.157 The BS5228 data indicates that typical vibration levels from CFA piling are unlikely to be perceptible in residential environments at distances greater than 20 m. The impact from piling depends on the type of piling, ground conditions, and receptor distance.
- 14.158 The minimum activity to existing residential receptor distance for CFA piling is circa 60 m. The assessment indicates that there will be a **negligible** effect at all existing receptors.
- 14.159 For sheet piling, based on assumptions of a reasonable worst-case scaling factor, free-field resultant PPVs have been calculated from the following equation from Table E.1 from BS 5228: Part 2 ‘Vibratory Piling’. Details of the calculations are presented in **Appendix 14.1**.
- 14.160 The calculated resultant peak particle velocities for steady state operation and start up and run down at a minimum distance to closest existing receptors of 20 m and 60 m are shown in **Table 14.21**.

Table 14.21: Estimated Free-Field Vibratory Piling PPVs

DISTANCE BETWEEN RECEPTOR AND VIBRATORY PILING, M	OPERATION OF THE PILING EQUIPMENT	RESULTANT PEAK PARTICLE VELOCITY (MM/S)
20	Steady state: $\delta = 1.4$	1.9
20	Start up and run down: $\delta = 1.2$	3.5
60	Steady state: $\delta = 1.4$	0.4
60	Start up and run down: $\delta = 1.2$	0.9

- 14.161 The calculated PPVs suggest that, at a distance of 20 m, the vibratory piling could generate PPVs up to 3.5 mm/s on start up and run down and up to 1.9 mm/s during steady state operations. At a distance of 60 m, the vibratory piling could generate PPVs up to 0.9 mm/s on start up and run down and up to 0.4 mm/s during steady state operations This suggests there is a risk of vibration to have **short term moderate adverse effects** at the nearest receptors to the Site, which is significant, and **short term minor adverse effects** at the receptors further afield, which are not significant.

14.162 This potential vibration impact will be managed via planning for vibration activities to take place, where possible, during periods when occupants of the surrounding buildings are least likely to be sensitive to the construction vibration.

14.163 Vibration levels generated during all construction works would be significantly below the levels that may cause cosmetic damage to properties.

Construction Off-Site Traffic Noise

14.164 **Table 14.22** presents the predicted change in noise level associated with increased construction traffic on the surrounding road network during peak construction year 2024. Full details of calculations, including roads links with no change are presented in **Appendix 14.1**.

Table 14.22: Peak Construction Road Traffic Noise Assessment

ROAD	PREDICTED CHANGE IN TRAFFIC NOISE LEVEL, $L_{A10,18HR}$ DB	SHORT-TERM IMPACT LEVEL
Cowley Road	1.4	Minor
A14 EB on slip (near B1049)	1.5	Minor
A14 WB off slip (near B1049)	1.2	Minor

14.165 The assessment shows that changes in road traffic noise due to the Proposed Development during the 2024 peak construction year are predicted to be **minor** in the short term for Cowley Road, the A14 EB on slip (near B1049) and the A14 WB off slip (near B1049), which is not significant. Changes on all other road links are expected to be **negligible**.

Operational Phase

Embedded Mitigation Measures

Operational Mechanical Plant

14.166 In order to comply with proposed design limits specified in **Table 14.15** the design of the plant noise control measures, such as selection of plant, enclosure and/or screening, etc., have been assumed as embedded mitigation in the assessment of operational noise effects. No likely significant effects are to occur if these limits are complied with.

Operational traffic noise

14.167 Appropriate measures are set out in the Framework Travel Plan (**Appendix 17.2**) and are intended to facilitate modal shift by discouraging the use of driving and by encouraging active modes of travel such as walking, cycling, use of public transport and/or car sharing. The benefits of the Travel Plan have the potential to promote a healthier, more productive workforce and residents, cost savings to staff and residents, reduced demand for on-site parking and less congestion on local roads.

Anticipated Effects

Mechanical Plant Noise

14.168 **Table 14.23** identifies recommended operational noise limits based on the noise survey results.

14.169 The operational noise limit is the rating level measured at the relevant receptor as defined in BS4142:2014. The limit applies to the measured or calculated total combined rating noise level from the plant or equipment, associated with the mechanical units, at 1 m from the closest

window of the relevant sensitive property during that stated time period. Should the noise from the plant contain any impulsive or tonal characteristics, the rating level should include the appropriate acoustic character correction as specified in BS4142:2014.

Table 14.23: Recommended Operational Noise Limit Rating Levels

RECEPTOR	DAY (07:00-23:00)		NIGHT (23:00-07:00)	
	TYPICAL LOWEST BACKGROUND SOUND LEVEL, L_{A90} DB	OPERATIONAL NOISE LIMIT RATING LEVEL DB	TYPICAL LOWEST BACKGROUND SOUND LEVEL, L_{A90} DB	OPERATIONAL NOISE LIMIT RATING LEVEL DB
All Receptors	42	42	37	37

14.170 All plant to be installed on, or as part of, the Proposed Development will be subject to the above criteria. The collective sum of all plant operating under worst case conditions will achieve the above limits with careful selection of plant items and appropriate attenuation (enclosures, attenuation packages, induct silencers, etc.) of air source heat pumps and the atmosphere terminations of ventilation plant. Plant items should be located as far as practicable or not overlooking any residential premises.

14.171 For plot S4 the assessment indicate that noise will need to be controlled through the careful selection of units and in-duct attenuation. The air source heat pumps to achieve the proposed design limits will need to be housed within an acoustic enclosure and acoustically screened around the southern and eastern plant boundary at the height of the equipment (including attenuation packages and anti-vibration mounts) to obstruct any direct line of sight between neighbouring noise sensitive receptors. The inner face of any solid screen should be lined with a class A absorber to minimise reflections towards the north. The worst-case specific noise levels predicted at the plot boundaries and nearest noise sensitive façades during the day and night are presented in **Table 14.24**.

Table 14.24: Predicted Rating Levels for Normally Operating Plant for Plot S8 - S9

TIME	PREDICTED RATING SOUND LEVELS AT ASSESSMENT LOCATIONS (DB $L_{AR,TR}$)				
	PLANT NOISE LIMIT L_{A90} DB	PLOT BOUNDARIES	RESIDENTIAL RECEPTORS TO THE NORTH	OFFICES TO THE EAST	OFFICES TO THE SOUTH
Day (07:00-23:00)	42	31	38	33	40
Night (23:00-07:00)	37	30	37	-*	-*

**Only residential receptors to the north are considered noise sensitive during the night time.*

14.172 For plot S6 – S7 the assessment indicate that noise will need to be controlled through the careful selection of units and in-duct attenuation. The air source heat pumps to achieve the proposed design limits will need to be housed within an acoustic enclosure. The worst-case specific noise levels predicted at the plot boundaries and nearest noise sensitive façades during the day and night are presented in **Table 14.25**

Table 14.25: Predicted Rating Levels for Normally Operating Plant for Plot S8 - S9

TIME	PREDICTED RATING SOUND LEVELS AT ASSESSMENT LOCATIONS (DB L _{AR,TR})			
	PLANT NOISE LIMIT L _{A90} DB	PLOT BOUNDARIES	PLOT S8 – S9	SUNNINGDALE CARAVAN PARK (R3)
Day (07:00- 23:00)	42	33	41	26
Night (23:00- 07:00)	37	33	-*	26

*Only residential receptors to the east are considered noise sensitive during the night time.

- 14.173 For plot S8 – S9 and plot S11 – S21 (Residential Quarter) the detailed plant proposals for the buildings are still to be finalised but all plant to be installed on, or as part of, the development will be subject to the above criteria.
- 14.174 Consideration has also been given to the potential for noise associated with the proposed retail units and roof terrace to disturb neighbouring residential uses. Tenants for the retail units are not yet confirmed given the early stage of the project. However, clauses will be included in the tenants’ leases to control noise from their operation such that it does not negatively affect nearby existing and future residential buildings and their external amenity areas. Such clauses will be in line with local policy requirements.
- 14.175 It is envisaged that the roof terrace of plot S9 will be used as an informal break out space and amenity space for users of the development and noise will be limited to speech. An operational management plan to reduce the impact of noise to a practicable minimum will be developed as part of the detailed design proposals.
- 14.176 Based on the above, no significant adverse effects as a result of mechanical plant noise are anticipated.
- 14.177 As the design progresses, assessment of any proposed mechanical services plant should be undertaken, to demonstrate that the limits in **Table 14.23** will be achieved.

Operational Off-Site Road Traffic Noise

- 14.178 **Table 14.26** presents the predicted change in noise levels associated with increased development traffic on the surrounding road network during operational year 2027 with the Proposed Development. Details of the calculations are presented in **Appendix 14.1**.

Table 14.26: Operational Off-Site Road Traffic Noise Assessment

ROAD	PREDICTED CHANGE IN TRAFFIC NOISE LEVEL, L _{A10,18HR} DB	SHORT TERM IMPACT LEVEL	LONG TERM IMPACT LEVEL
Milton Road	0.2	Negligible	Negligible
A1134 Elizabeth Way	0.2	Negligible	Negligible
A1303 Newmarket Road	0.2	Negligible	Negligible
Cowley Road	3.0	Moderate	Minor

ROAD	PREDICTED CHANGE IN TRAFFIC NOISE LEVEL, $L_{A10,18HR}$ DB	SHORT TERM IMPACT LEVEL	LONG TERM IMPACT LEVEL
A14 west of A1309	0.1	Negligible	Negligible
A14 EB off slip road (near A1309)	0.1	Negligible	Negligible
A14 WB off slip road (near A1309)	0.1	Negligible	Negligible
A14 WB on slip road (near A1309)	0.1	Negligible	Negligible

14.179 The assessment shows that changes in road traffic noise due to the Proposed Development only during the operational phase year 2027 are likely to be **moderate** in the **short term** and **minor** in the **long term** at Cowley Road. This change in noise level is likely to affect receptors along Cowley Road such as the offices in Cambridge Commercial / Business Park to some extent. However, given the presence of other road traffic noise in the environment, it is unlikely that those receptors will experience the full 3dB change in noise level and therefore **short-term minor** or **long-term negligible** effects are expected, which are not significant. For all other links, the assessment indicates that changes in road traffic noise due to the Proposed Development during operational phase year 2027 will be negligible in the short term and the long term.

Site Suitability

Site Suitability, Residential Quarter

14.180 Noise exposure from existing sources at the proposed Residential Quarter can lead to noise impacts due to elevated internal noise levels in habitable rooms (such as living rooms and bedrooms). This can lead to effects such as annoyance, speech interference, disturbance and, during the night-time, sleep disturbance.

14.181 Noise survey results have been used to calculate the noise contribution from each surrounding road and rail line on the worst-affected receptors within the Residential Quarter. CadnaA noise modelling software has been used to carry out the prediction and calculation of road traffic and rail noise from surrounding existing road and rail sources.

14.182 **Table 14.27** presents a summary of the worst-case noise exposure levels identified for the Residential Quarter. The typical $L_{Aeq,16hr}$ and $L_{Aeq,8hr}$ noise exposure levels have been derived from the noise model. The $L_{AFmax,T}$ has been derived from the baseline survey data at UN2.

Table 14.27: Summary of Worst Case Noise Exposure at Proposed Residential Development

FAÇADE	TYPICAL PREDICTED DAY LAEQ,16HR DB 0700-2300	TYPICAL PREDICTED NIGHT LAEQ,8HR DB 2300-0700	10TH HIGHEST NIGHT LAMAX,8HR DB 2300-0700
North	55	45	64
East	59	53	64
South	55	49	64
West	51	56	64

- 14.183 The guideline indoor noise levels which would be targeted are 35 dB $L_{Aeq,16hr}$ during the day in living rooms and 30 dB $L_{Aeq,8hr}$ and 45 dB L_{AFmax} during the night in bedrooms. Where development is considered necessary or desirable, these may be relaxed (increased) by up to 5 dB.
- 14.184 ProPG states that open windows typically reduce the sound insulation performance to no more than 10 to 15 dB(A), so windows would need to be closed to achieve the guideline indoor noise levels.
- 14.185 External noise ingress calculations have been undertaken and indicate that it is feasible to meet the internal noise level criteria outlined in BS 8233 at the most exposed facades using glazing with minimum weighted sound reduction index of 25 dB $R_w + C_{tr}$; this may typically be achieved using glazing with a 4/6/4 configuration, and typical sound insulation for walls and ventilation.
- 14.186 On the facades facing the inner courtyard, lower levels of sound insulation façade elements will be acceptable.
- 14.187 **Table 14.28** presents a summary of outline guidance on the required facade sound insulation to meet the BS 8233 level at the various buildings in the Proposed Development. However, this can vary depending on room sizes and types, window sizes, wall construction and ventilation strategy.

Table 14.28: Summary of Required Façade Sound Insulation

FAÇADE/ ELEVATION	ROOM TYPE	OUTLINE GUIDANCE ON THE REQUIRED FAÇADE SOUND INSULATION TO ACHIEVE BS 8223:2014 & WHO GUIDELINES FOR COMMUNITY NOISE, $R_w + C_{TR}$, DB	
		DAY	NIGHT
North	Living Room	20	-
	Bedroom	20	19
East	Living Room	24	-
	Bedroom	24	23
South	Living Room	20	-
	Bedroom	20	19
West	Living Room	16	-
	Bedroom	16	19

- 14.188 The Site is also exposed to industrial noise from the Tarmac Cambridge Asphalt facility and Cowley Road Industrial estate. However, noise from these facilities was not prevalent during the attended survey, so the assessment is based on traffic and rail noise only. Sound insulation measures to control traffic noise, as well as separation distance from Tarmac Cambridge Asphalt facility and Cowley Road Industrial estate, would also have the effect of minimising the industrial noise.
- 14.189 Specific calculated assessment of the sound insulation for all elements of the building envelope will be completed prior to construction, to demonstrate that the guideline internal noise levels can be met with the proposed design.

Noise During Overheating Conditions

14.190 **Table 14.29** show the results of the initial ADO and AVO Guide assessment to determine where acceptable internal noise levels can be achieved when mitigating overheating by means of openable windows.

14.191 For the purposes of the assessment, it is assumed that a partially open window will provide an outside-to-inside level difference of 13 dB. This level difference is considered representative of typical domestic rooms with simple façade openings of around 2% of the floor area. The daytime assessment has assumed that the overheating condition occurs ‘rarely to some of the time’. The assessment also considers L_{Amax} levels during the night-time in line with criteria in ADO.

Table 14.29: ADO/AVO Guide Overheating Assessment

RECEPTOR	EXTERNAL NOISE LEVELS			ADO ASSESSMENT			AVO LEVEL 1 ASSESSMENT (IN LINE WITH TABLE 3-2 OF AVO GUIDE)
	FAÇADE/ ELEVATION	PREDICTED DAY $L_{AEQ,16HR}$ DB	PREDICTED NIGHT $L_{AEQ,8HR}$ DB	10 TH HIGHEST $L_{AFMAX, 2300}$ -0700	EXCEEDANCE OF 40 DB $L_{AEQ,8HR}$ CRITERIA	EXCEEDANCE OF 55 DB $L_{AMAX,8HR}$ DB CRITERIA [NOT EXCEED MORE THAN 10 TIMES PER NIGHT]	
North	55	45	64	-8	-4	Yes	LOW
East	59	53	64	0	-4	Yes	MEDIUM
South	55	49	64	-4	-4	Yes	LOW
West	51	46	64	-7	-4	Yes	NEGLIGIBLE

14.192 The assessment indicates that the internal levels are likely to achieve ADO reasonable conditions if overheating control is provided by means of partially open windows. There is a low to medium risk, according to AVO Level 1 assessment, at the most exposed facades, that the use of opening windows as primary means of mitigating overheating may result in an adverse effect depending on the duration of the overheating condition.

14.193 A Level 2 detailed assessment may optionally be carried out during the detailed design stage to demonstrate that the potential noise impacts at worst case facades during the overheating condition can be mitigated.

14.194 The inner courtyard facades of the Residential Quarter that are screened from road and rail noise are at a lower risk of adverse effects and opening windows as a means to control overheating is likely to be acceptable.

Plant Noise

14.195 Mechanical heating, ventilating and air conditioning (HVAC) systems can contribute to noise disturbance; therefore, where possible fixed plant should be positioned away from any noise sensitive receptors. In addition, acoustic enclosures, acoustic louvers and additional barriers would be provided if required to ensure that the criteria for fixed plant are achieved.

14.196 Without mitigation measures, HVAC Systems could provide substantial noise nuisance to local receptors. At this stage in the design process, the exact location, make, model and number of HVAC units associated with the Proposed Development has not yet been determined.

14.197 When detailed information is available, a comprehensive assessment will be undertaken to comply with South Cambridgeshire District Council requirements.

External Amenity Areas Noise Levels

14.198 It is desirable that the external noise level in amenity spaces such as private gardens does not exceed 50 dB $L_{Aeq,16hr}$ with an upper guideline value of 55 dB $L_{Aeq,16hr}$ which would be acceptable in noisier environments.

14.199 The assessment of external noise levels to BS 8233 and WHO guideline levels indicates that the guideline level of 50 dB $L_{Aeq,16hr}$ would be achieved for the majority of the Residential Quarter, with the spaces between the blocks facing Milton Avenue and facades facing Cambridgeshire guided busway achieving the upper guideline value, as they have a direct line of site to Milton Avenue and the busway, and do not benefit from any screening. External facing facades on Milton Avenue are unlikely to achieve guideline noise levels for external amenity areas.

14.200 As described above, while some facades are likely to be exposed to noise levels above the 55 dB $L_{Aeq,16hr}$ upper guideline limit, BS 8233 recognises that although these are ideal target levels, they are not always achievable in noisier areas (such as built-up urban areas) where development is desirable. Higher noise levels need to be balanced against other considerations such as the benefit of living in these central areas.

14.201 Furthermore, the Planning Practice Guidance advises that noise impacts may be partially off-set if the residents of those dwellings affected by high noise levels have access to:

- a relatively quiet, protected, nearby external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings, and/or;
- a relatively quiet, protected, external publicly accessible amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within a 5 minutes walking distance).

14.202 There are relatively quieter outdoor amenity spaces within the Proposed Development in the courtyards which are screened from the road and rail noise and are available to all residents.

Site Vibration Exposure

14.203 Vibration exposure was measured during an attended survey at the Proposed Development in February 2022. The vibration exposure measured at the Site was used to derive the VDV's for daytime and night-time periods based on the typical number of trains and guided buses throughout day and night-time periods during a typical operating timetable.

14.204 The resultant VDV levels indicate that adverse comments are not expected based on assessment against criteria stated in BS 6472. The assessment indicates that the criteria can be met for all uses and therefore no significant effects are likely. The risk of disturbance from environmental vibration is considered to be sufficiently low so as to omit the need for a detailed assessment.

14.205 Vibration may adversely impact the operation of particularly sensitive laboratory equipment in proximity to the railway line which runs alongside the proposed two commercial office / laboratory buildings occupying plots S6 and S7 or give rise to structure-borne noise which may

be disturbing to some users. The developer may wish to design to more onerous criteria, but this is considered to be a commercial decision for the detailed design and has therefore been excluded from the scope of the planning assessment.

Office / Laboratory and Retail

- 14.206 In line with adopted guidance on internal noise levels specified in BS 8233 and British Council for Office’s Guide to Specification 2019 presented in **Table 14.13**, the minimum recommended noise insulation performances for façade elements have been determined based on the data from the environmental noise survey and the latest architectural drawings. The buildings are expected to be mechanically ventilated and cooled so users will not be reliant on open windows or trickle vents. As a result, any openings in the façade have been excluded from the evaluation.
- 14.207 A summary of minimum sound insulation performances recommended for the façade elements are presented in **Table 14.30**.

Table 14.30: Minimum Recommended Noise Insulation Performances for Façade Elements

ELEMENT	SOUND REDUCTION INDICES (R DB) AT OCTAVE BAND CENTRE FREQUENCY (HZ)								R _w + C _{TR} , DB
	63	125	250	500	1000	2000	4000	8000 ²¹	
Solid elements (walls) and roof	34	41	45	48	56	65	65	65	50
Glazing (windows and external doors) and spandrel panels	24	24	21	29	40	38	37	37	29

- 14.208 Based on the results of the external noise ingress calculations, it is feasible to meet the internal noise level criteria outlined in **Table 14.13** with a typical masonry construction supplemented internally with a plasterboard lining. Lightweight façade systems may also be appropriate but will most likely require additional boards and resilient fixings. Lightweight rainscreen cladding systems may also be acceptable if appropriate internal linings and sheathing boards are used to provide additional mass.
- 14.209 A ≥200 mm in-situ concrete slab roof will achieve the airborne sound insulation requirements for environmental noise ingress. In addition to noise ingress from existing environmental sources, the level of noise break-in from rooftop plant items must be considered. The roof will be designed to adequately control plant noise break-in while maintaining the internal sound levels specified in **Table 14.13**.
- 14.210 For glazed areas such as windows and any external glazed doors, noise ingress calculations indicate that it is feasible to meet the internal noise level criteria with minimum weighted sound reduction index of 29 dB R_w + C_{tr}; this will be achieved using glazing with a 4/12/6 configuration.
- 14.211 Lightweight spandrel panels used on plot S4, consisting of an external metal panel supplemented with mineral wool insulation and internal boards, are expected to meet the recommended sound insulation performance. Enhancing the internal linings will need to be considered in order to address the internal sound insulation performance between floors.

21 Test data is not typically available at this frequency and so the performance at 4000 Hz has been adopted

- 14.212 As the design progresses, the façade system selections will be reviewed to ensure that the recommended internal sound levels in **Table 14.13** are met.

Scope for Additional Mitigation Measures

Construction Phase

Construction Noise and Vibration

- 14.213 Since BS5228 does not state criteria for acceptable levels of construction noise, the preferred approach is to reduce noise levels where possible, but with due regard to practicability. Sometimes a greater noise level may be acceptable if the overall construction time, and therefore length of disruption, is reduced.
- 14.214 A risk assessment identifying the probability of vibration from piling and excavation activities will also be carried out, prior to commencement of construction activities, to determine the need for periodic or continuous vibration monitoring. The contractor will be required to use techniques least likely to cause vibration or impact damage to the surrounding properties. The adoption of press-in ('Giken') sheet piling is likely to reduce any impact from piling and from piling noise at the nearest receptors to the Site.

Construction Off-Site Traffic Noise

- 14.215 No additional mitigation measures are proposed for construction off-site traffic noise.

Operational Phase

Operational Mechanical Plant Noise

- 14.216 No additional mitigation measures are proposed for operational mechanical plant noise.

Operational Off-Site Road Traffic Noise

- 14.217 No additional measures are proposed for operational road traffic noise.

Likely Effectiveness of Additional Mitigation Measures

Construction Phase

Construction Noise

- 14.218 With the additional mitigation measures listed above, minor to moderate adverse effects are still likely at the closest sensitive receptors surrounding the Site, together with the new residential receptors on the Proposed Development. However, they will be minimised as far as is practicable and, in some cases, reduced to negligible effects.

Construction Vibration

- 14.219 With the additional mitigation measures listed above like the adoption of press-in ('Giken') sheet piling, effects from construction vibration are likely to be negligible.

Construction Off-Site Traffic Noise

- 14.220 Since no additional measures are proposed, the effects are likely to remain unchanged.

Operational Noise

Operational Mechanical Plant Noise

- 14.221 No additional mitigation is proposed, since the effect of mechanical plant noise is likely to be negligible with embedded mitigation measures.

Operational Off-Site Road Traffic Noise

14.222 No additional mitigation measures are proposed for operational road traffic noise.

Residual Effects

14.223 **Table 14.31** provides a summary of the residual effects resulting from the Proposed Development after effective implementation of the embedded and additional mitigation measures proposed above.

Table 14.31: Residual Effects

PHASE	RESOURCE OR RECEPTOR AFFECTED	RESIDUAL EFFECT
Construction	Existing noise sensitive receptors (Dwellings on Discovery Way (R1), Dwellings on Long Reach / Bourne / Fairbairn Road (R2), Sunningdale Caravan Park (R3), Southgate's Caravan Park (R4), Dwellings on Grange Park / Sandy Lane (R5))	Temporary minor adverse effect from construction noise due to the phased construction.
	Future residents of the Residential Quarter of the Proposed Development (R6)	Temporary moderate adverse effect from construction noise during phases 4 and 5.
	Existing noise sensitive receptors (Novotel Hotel (R7), Cambridge Commercial Park (R8), Cambridge Business Park (R9), and One Cambridge Square (R10))	Temporary minor adverse effect from construction noise due to the phased construction.
	Existing and future sensitive residential receptors (Dwellings on Discovery Way (R1), Dwellings on Long Reach / Bourne / Fairbairn Road (R2), Sunningdale Caravan Park (R3), Southgate's Caravan Park (R4), Dwellings on Grange Park / Sandy Lane (R5), Residential Quarter of the Proposed Development (R6))	Negligible effect from construction vibration due to the phased construction.
	Existing sensitive receptors (Novotel Hotel (R7), Cambridge Commercial Park (R8), Cambridge Business Park (R9), and One Cambridge Square (R10))	Negligible effect from construction vibration due to the phased construction.
	All noise sensitive receptors	Temporary minor effect from construction off-site traffic noise.

PHASE	RESOURCE OR RECEPTOR AFFECTED	RESIDUAL EFFECT
Operation	All existing and future noise sensitive receptors	Negligible effect from operational mechanical plant.
	All existing and future noise sensitive receptors	There would be a minor short-term and negligible long-term adverse (not significant) effect on receptors along Cowley Road from increased road traffic during operation. On all other roads there would be negligible effect from operational traffic noise.

Cumulative Effects

14.224 Cumulative effects are the combined effects of several development schemes (in conjunction with the Proposed Development) which may, on an individual basis be insignificant but, cumulatively, have a significant effect.

14.225 The ES has given consideration to ‘Cumulative ‘Effects’ for committed developments located within 200 m radius from the boundary of the Site. These committed developments have been listed in **Chapter 20: Cumulative Effects** and are as follows:

- **20/03524/FUL** Upgrade to existing access roads and Cowley Road (as part of a wider proposal **20/03523/FUL** for the erection of a 5-storey building and a 6 storey building for commercial/business purposes, erection of a transport hub, gymnasium, surface parking, landscaping and associated infrastructure including demolition of the existing building (St John’s House) and associated structures); and
- **21/04640/SCOP** Request for a Formal Scoping Opinion for an Order granting Development Consent for the Cambridge Wastewater Treatment Plant Relocation.

Construction

Noise and Vibration

14.226 Detailed assessments of construction noise are not available for the other schemes, so it is not possible to undertake a quantitative assessment of the cumulative noise effects. However, due to the distance of the other development schemes, circa 200 m away from the Site, and the fact that the industrial estate along Cowley Road provides separation, cumulative construction impacts are unlikely to occur.

Off-Site Traffic Noise

14.227 Cumulative noise from construction traffic from planned committed developments are unlikely to give rise to any additional adverse effects. The contractors on each scheme will liaise with South Cambridgeshire District Council to establish a traffic management plan to minimise potential for effects of cumulative construction traffic noise along surrounding roads.

Operational Phase

Mechanical Plant Noise

14.228 It is expected that building services noise from the committed developments will be designed to achieve appropriate operational noise limits.

14.229 Due to the distances between the committed developments and the nearest existing receptors, it is considered that the operational noise limits advised in the noise assessments for each scheme would not be exceeded with all developments in operation.

14.230 Overall, it is considered that cumulative building services noise would be of negligible significance.

Traffic Noise

14.231 The change in noise associated with committed developments and Proposed Development traffic on the surrounding road network has been predicted and is presented in **Table 14.26**.

14.232 The cumulative impact of committed developments and Proposed Development traffic on road traffic noise would be of minor significance.

Conclusions and Summary of Effects

14.233 The assessment has been based on environmental surveys, prediction and calculation undertaken for the Site.

14.234 The main sources of noise incident on the Site and surrounding receptors were road traffic noise (including the Cambridgeshire Guided Busway) and rail noise. Other noise sources contributing to a lesser degree included construction noise from One Cambridge Square and distant aircraft noise.

14.235 The impact of noise and vibration during construction of the Proposed Development has been predicted and assessed in accordance with BS 5228. Impacts from construction activities are predicted at the closest noise sensitive receptors to the works. Temporary minor to moderate adverse effects have been predicted at the closest receptors to the Proposed Development as a result of construction works, with short periods of noise levels leading to major impact. Best practicable means measures have been recommended to minimise noise and vibration from the construction Site, which when implemented are capable of ensuring that the impact of noise and vibration during the construction is reduced.

14.236 It is predicted that off-site traffic, as a result of construction activities will have a minor effect on Cowley Road, the A14 EB on slip (near B1049) and A14 WB off slip (near B1049) and will result in negligible change on other roads in the surrounding road network.

14.237 As currently there is no detailed information on the proposed noise generating plant to be used on Site once operational, South Cambridgeshire District Council will require the Site to comply with noise limits set out in this chapter. It is assumed that sufficient embedded mitigation is employed so that the limits are complied with. No significant effects are likely to occur if these limits are complied with.

14.238 Operational road traffic has been assessed in terms of a change in noise associated with the operation of the Proposed Development. Minor short-term and negligible long-term effects during full operation of the Proposed Development have been predicted for Cowley Road. Negligible short and long-term effects during full operation of the Proposed Development have been predicted for Milton Road, A1134 Elizabeth Way, A1303 Newmarket Road, A14 west of A1309, A14 EB off slip road (near A1309), A14 WB off slip road (near A1309) and A14 WB on slip road (near A1309). No change has been predicted on all other roads.

- 14.239 A site suitability assessment has been completed. A noise model has been used to predict road traffic noise levels at the proposed façades and external spaces of sensitive receptors within the Proposed Development when operational. It is likely to be feasible to meet the BS 8233 and WHO guideline internal noise levels using the following practical design approach for the building façade and avoid adverse effects for future residents:
- specific calculated assessment required of sound insulation for all elements of the building envelope;
 - standard performance double glazing (up to 25 dB $R_w + C_{tr}$; for example, 4/6/4 configuration); and
 - standard sound insulation for walls, roof, and ventilation.
- 14.240 Guideline external noise levels are likely to be met for the majority of residential amenity areas within the Proposed Development such as Courtyards. External balconies overlooking the roads will be exposed to noise levels above the upper guideline of 55 dB $L_{Aeq,T}$. Where the noise level requirements are not met, suitable alternative quieter areas are available.
- 14.241 Vibration exposure from the guided busway and rail sources were measured during an attended survey to derive the vibration dose value during the daytime and night-time. The levels measured indicate that no adverse comments are expected.
- 14.242 Based on the results of the external noise ingress calculations for commercial buildings, it is feasible to meet the internal noise level criteria and avoid adverse effects for future applications using a typical masonry construction supplemented internally with a plasterboard lining. Lightweight façade systems may also be appropriate but will most likely require additional boards and resilient fixings. Lightweight rainscreen cladding systems may also be acceptable if appropriate internal linings and sheathing boards are used to provide additional mass. A 200 mm in-situ concrete slab roof and moderate performance double glazing for areas such as windows and any external glazed doors (up to 29 dB $R_w + C_{tr}$, for example, 4/12/6 configuration) will meet the airborne sound insulation requirements for environmental noise ingress. Lightweight spandrel panels used on plot S4, consisting of an external metal panel supplemented with mineral wool insulation and internal boards, are also expected to meet the recommended sound insulation performance.
- 14.243 Schemes that are located within approximately 200 m of the identified sensitive receptors can give rise to a potential cumulative noise and vibration impacts should construction works take place simultaneously on all sites. Due to the distance of the other development schemes, circa 200 m away to the Site and the fact that the industrial estate along Cowley Road provides separation, cumulative construction impacts are unlikely to occur.
- 14.244 It is expected that building services noise from the committed developments will be designed to achieve appropriate operational noise limits. Due to the distances between the committed developments and the nearest receptors, it is considered that the operational noise limits advised in the noise assessments for each scheme would not be exceeded with all developments in operation. Overall, it is considered that cumulative building services noise would be of negligible significance.
- 14.245 A summary of effects is presented in **Table 14.32**.

Table 14.32: Summary of Residual Effects

RECEPTOR/ AFFECTED GROUP	VALUE OR SENSITIVITY (SIGNIFICANCE) OF RECEPTOR	ACTIVITY OR IMPACT	EMBEDDED DESIGN MITIGATION	MAGNITUDE/ SPATIAL EXTENT/ DURATION/ LIKELIHOOD OF OCCURRENCE	SIGNIFICANCE OF EFFECT	ADDITIONAL MITIGATION	RESIDUAL MAGNITUDE OF IMPACT	SIGNIFICANCE OF RESIDUAL EFFECT
Construction								
Existing noise sensitive receptors (Dwellings on Discovery Way (R1), Dwellings on Long Reach / Bourne / Fairbairn Road (R2), Sunningdale Caravan Park (R3), Southgate's Caravan Park (R4), Dwellings on Grange Park / Sandy Lane (R5))	High	Construction Noise	BPM, Screening, S61	Moderate	Moderate adverse	Engagement and prior warning to local receptors.	Minor	Minor adverse
				Direct				
				Local				
				Temporary				
Likely								
Existing noise sensitive receptors (Novotel Hotel (R7), Cambridge Commercial Park (R8), Cambridge Business Park (R9), and One Cambridge Square (R10))	High	Construction Noise	BPM, Screening, S61	Minor	Minor adverse	Engagement and prior warning to local receptors.	Minor	Minor adverse
				Direct				
				Local				
				Temporary				
Likely								
Future residents of the Residential Quarter of the Proposed Development (R6)	High	Construction Noise	BPM, Screening, S61	Major	Major adverse	Engagement and prior warning to local receptors.	Moderate	Moderate adverse
				Direct				
				Local				
				Temporary				
Likely								

RECEPTOR/ AFFECTED GROUP	VALUE OR SENSITIVITY (SIGNIFICANCE) OF RECEPTOR	ACTIVITY OR IMPACT	EMBEDDED DESIGN MITIGATION	MAGNITUDE/ SPATIAL EXTENT/ DURATION/ LIKELIHOOD OF OCCURRENCE	SIGNIFICANCE OF EFFECT	ADDITIONAL MITIGATION	RESIDUAL MAGNITUDE OF IMPACT	SIGNIFICANCE OF RESIDUAL EFFECT
Existing and future sensitive residential receptors (Dwellings on Discovery Way (R1), Dwellings on Long Reach / Bourne / Fairbairn Road (R2), Sunningdale Caravan Park (R3), Southgate's Caravan Park (R4), Dwellings on Grange Park / Sandy Lane (R5), Residential Quarter of the Proposed Development (R6), Cambridge Business Park (R9))	High	Construction Vibration	BPM, Screening, S61	Minor	Minor adverse	Engagement and prior warning to local receptors.	Minor	Minor adverse
				Direct				
				Local				
				Temporary				
				Likely				
Existing sensitive receptors (Novotel Hotel (R7), Cambridge Commercial Park (R8), and One Cambridge Square (R10))	High	Construction Vibration	BPM, Screening, S61	Moderate	Moderate adverse	Engagement and prior warning to local receptors.	Minor	Minor adverse
				Direct				
				Local				
				Temporary				
				Likely				
All existing and future noise sensitive receptors	High	Construction Traffic	Construction traffic management plan	Minor	Minor adverse	None	Minor	Minor adverse
				Direct				
				Local				
				Temporary				
				Likely				

RECEPTOR/ AFFECTED GROUP	VALUE OR SENSITIVITY (SIGNIFICANCE) OF RECEPTOR	ACTIVITY OR IMPACT	EMBEDDED DESIGN MITIGATION	MAGNITUDE/ SPATIAL EXTENT/ DURATION/ LIKELIHOOD OF OCCURRENCE	SIGNIFICANCE OF EFFECT	ADDITIONAL MITIGATION	RESIDUAL MAGNITUDE OF IMPACT	SIGNIFICANCE OF RESIDUAL EFFECT
Operation								
All existing and future noise sensitive receptors	High	Operational mechanical plant	Plant noise limits	Negligible	Negligible	None	Negligible	Negligible
				Direct				
				Local				
				Permanent				
All existing and future noise sensitive receptors	High	Operational traffic noise	Provision of cycle parking. Pedestrian connections across the Site. Travel plan, recommendations for vehicle movements using site	Likely	Minor adverse	None	Minor	Minor adverse
				Minor				
				Direct				
				Local				
Cumulative Effects - Construction								
No cumulative effects likely.								
Cumulative Effects – Operation								
No cumulative effects likely.								

Table 14.33: Summary of Impacts: Noise and Vibration

DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION	IMPACT AFTER MITIGATION (RESIDUAL)			
				ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE		ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE
Construction												
Construction noise - Existing noise sensitive receptors (Dwellings on Discovery Way (R1), Dwellings on Long Reach / Bourne / Fairbairn Road (R2), Sunningdale Caravan Park (R3), Southgate's Caravan Park (R4), Dwellings on Grange Park / Sandy Lane (R5))	Loc	High	Mod	Adv	Rev	ST	Mod Adv	Best practice, CEMP	Adv	Rev	ST	Min Adv
Construction noise - Existing noise sensitive receptors (Novotel Hotel (R7, Cambridge Commercial Park (R8), Cambridge Business Park (R9), and One Cambridge Square (R10))	Loc	High	Min	Adv	Rev	ST	Min Adv	Best practice, CEMP	Adv	Rev	ST	Min Adv
Construction noise - Future residents of the Residential Quarter of the Proposed Development (R6)	Loc	High	Min	Adv	Rev	ST	Minor Adv	Best practice, CEMP	Adv	Rev	ST	Min Adv
Construction vibration - Existing and future sensitive residential receptors (Dwellings on Discovery Way (R1), Dwellings on Long Reach / Bourne / Fairbairn Road (R2), Sunningdale Caravan Park (R3), Southgate's Caravan Park (R4), Dwellings on Grange Park / Sandy Lane (R5), Residential Quarter of the Proposed Development (R6), Cambridge Business Park (R9))	Loc	High	Min	Adv	Rev	ST	Min Adv	Best practice, CEMP	Adv	Rev	ST	Min Adv

DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION				IMPACT AFTER MITIGATION (RESIDUAL)				
				ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE	ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE	ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE	
Construction Vibration - Existing sensitive receptors (Novotel Hotel (R7), Cambridge Commercial Park (R8), and One Cambridge Square (R10))	Loc	High	Mod	Adv	Rev	ST	Mod adv	Best practice, CEMP	Adv	Rev	ST	Min Adv	Adv	Rev	ST	Min Adv
Construction Traffic - All existing and future noise sensitive receptors	Loc	High	Min	Adv	Rev	ST	Min Adv	Construction Traffic Management Plan outlined in CEMP	Adv	Rev	ST	Min Adv	Adv	Rev	ST	Min Adv
Operation																
Operational mechanical plant – all existing and future noise sensitive receptors	Loc	High	Neg	Adv	Irrev	LT	Neg	Plant Noise Limits	Adv	Irrev	LT	Neg	Adv	Irrev	LT	Neg
Operational traffic noise – all existing and future noise sensitive receptors	Loc	High	Min	Adv	Irrev	LT	Min Adv	None	Adv	Irrev	LT	Min Adv	Adv	Irrev	LT	Min Adv

Key:

Loc: Local Min: Minor Irrev: Irreversible Adv: Adverse ST: Short Term
 Mod: Moderate Neg: Negligible Rev: Reversible LT: Long Term

Socio-Economics

15

15.0 Socio-Economics

Introduction

- 15.1 This chapter has been prepared by Bidwells LLP and addresses the likely significant socio-economic impacts of the Proposed Development.

Potential Sources of Impact

- 15.2 The potentially significant socio-economic impacts identified at the scoping stage (see Scoping Request at **Appendix 2.1** and Scoping Opinion at **Appendix 2.2**) and assessed in this Chapter comprise:
- Changes in the local population profile;
 - Need for housing;
 - Need for schools and nurseries;
 - Need for public open space, including children’s play space; and
 - Construction and operational employment supported by the Proposed Development.

Methodology

The National Planning Policy Framework

- 15.3 Paragraph 8 of the National Planning Policy Framework (NPPF)¹ explains that to achieve sustainable development, the planning system has three interdependent objectives:
- a) an economic objective – to help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right type is available in the right places and at the right time to support growth, innovation and improved productivity; and by identifying and coordinating the provision of infrastructure;
 - b) a social objective – to support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations; and by fostering a well-designed and safe built environment, with accessible services and open spaces that reflect current and future needs and support communities’ health, social and cultural well-being; and
 - c) an environmental objective – to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.
- 15.4 Consequently, paragraph 38 states that Local Planning Authorities (LPAs) should:
- “...work proactively with applicants to secure developments that will improve the economic, social and environmental conditions of the area. Decision-makers at every level should seek to approve applications for sustainable development where possible..”*
- 15.5 The NPPF continues with sections on specific aspects affecting sustainable development. Those relevant to this assessment comprise:

1

[MHCLG. \(July 2021\). National Planning Policy Framework.](#)

5. Delivering a Sufficient Supply of Homes, in particular paragraph 60: *“To support the Government’s objective of significantly boosting the supply of homes, it is important that a sufficient amount and variety of land can come forward where it is needed, that the needs of groups with specific housing requirements are addressed and that land with permission is developed without unnecessary delay.”*

6. Building a Strong, Competitive Economy, in particular paragraph 81:

“Planning policies and decisions should help create the conditions in which businesses can invest, expand and adapt. Significant weight should be placed on the need to support economic growth and productivity, taking into account both local business needs and wider opportunities for development. The approach taken should allow each area to build on its strengths, counter any weaknesses and address the challenges of the future. This is particularly important where Britain can be a global leader in driving innovation⁴², and in areas with high levels of productivity, which should be able to capitalise on their performance and potential.”

Footnote 42 states that:

“The Government’s Industrial Strategy sets out a vision to drive productivity improvements across the UK, identifies a number of Grand Challenges facing all nations, and sets out a delivery programme to make the UK a leader in four of these: artificial intelligence and big data; clean growth; future mobility; and catering for an ageing society. HM Government (2017) Industrial Strategy: Building a Britain fit for the future.”

8. Promoting Healthy and Safe Communities, in particular paragraph 93:

“To provide the social, recreational and cultural facilities and services the community needs, planning policies and decisions should:

- a) plan positively for the provision and use of shared spaces, community facilities (such as local shops, meeting places, sports venues, open space, cultural buildings, public houses and places of worship) and other local services to enhance the sustainability of communities and residential environments;
- b) take into account and support the delivery of local strategies to improve health, social and cultural well-being for all sections of the community;
- c) guard against the unnecessary loss of valued facilities and services, particularly where this would reduce the community’s ability to meet its day-to-day needs;
- d) ensure that established shops, facilities and services are able to develop and modernise, and are retained for the benefit of the community; and
- e) ensure an integrated approach to considering the location of housing, economic uses and community facilities and services.”

15.6 Most elements of the NPPF have a corresponding section in the Planning Practice Guidance (PPG)², which provides further interpretation of how individual policies should be implemented. These will be discussed as appropriate throughout the assessment.

The Development Plan

15.7 The development plan for the Site comprises the South Cambridgeshire Local Plan (adopted September 2018). The Proposed Development site is allocated for employment uses in Policy SS/4, which states that:

“1. The Cambridge Northern Fringe East and Cambridge North railway station will enable the creation of a revitalised, employment focussed area centred on a new transport interchange.

2

[MHCLG. \(Live Document\). Planning Practice Guidance.](#)

2. The area, shown on the Policies Map, and illustrated in Figure 6, is allocated for high quality mixed-use development, primarily for employment within Use Classes B1, B2 and B8 as well as a range of supporting uses, commercial, retail, leisure and residential uses (subject to acceptable environmental conditions)....”

15.8 Other policies relevant to this assessment are:

- S/5: Provision of New Jobs and Homes;
- SC/4: Meeting Community Needs;
- SC/6: Indoor Community Facilities; and
- SC/7: Outdoor Play Space, Informal Open Space and New Developments.

15.9 The emerging North East Cambridge Area Action Plan (NECAAP) is intended to facilitate Policy SS/4, once it is adopted. This covers a substantial area of brownfield land that covers, in addition to the Proposed Development Site, the Cambridge Science Park, Cambridge Regional College and the Cambridge Waste Water Treatment Plant.

15.10 The latter is expected to relocate and thereby allowing for the comprehensive redevelopment of the NECAAP area, but this has been delayed and therefore progress towards adoption of the NECAAP has stalled. It is probable therefore that the NECAAP will not progress further during the determination of this planning application and is therefore can only be given negligible weight in the planning balance.

The Study Area

15.11 Two Study Areas are used in this assessment:

15.12 The first Study Area is based on the Office for National Statistics' (ONS) Lower Super Output Areas (LSOA). LSOAs are built up from the smaller Output Areas (OAs) which, in England and Wales, are designed to have similar population sizes and be as socially homogeneous as possible based on household tenure and dwelling type³. LSOAs are preferred because a greater range of statistics are available when compared to OAs due to concerns over confidentiality at the smaller level.

15.13 LSOAs are coterminous, i.e. they cover the entire country with no gaps. Consequently, on the edge of settlements, LSOA boundaries often appear odd as they can include large areas of countryside. To ensure the study area includes the correct LSOAs, it is therefore necessary to consider where the resident population is located within the boundary and not simply exclude an LSOA because of its shape.

15.14 This 'Local Study Area' is intended to reflect the area in which the future residents of the Proposed Development will most often interact with and therefore where most effects will be felt. Notwithstanding this, it is inevitable that there will be wider effects, particularly in terms of secondary school provision and employment. For these effects, larger or different areas are used as appropriate.

15.15 For this assessment, the following LSOAs are used, see **Figure 15.1**:

- In South Cambridgeshire (blue): 7A, 7B and 7C; and
- In Cambridge (red): 1A, 1B, 1C, 1F, 3B, 3C and 3E.

3

For further details see <https://www.ons.gov.uk/methodology/geography/ukgeographies/censusgeography#super-output-area-soa>

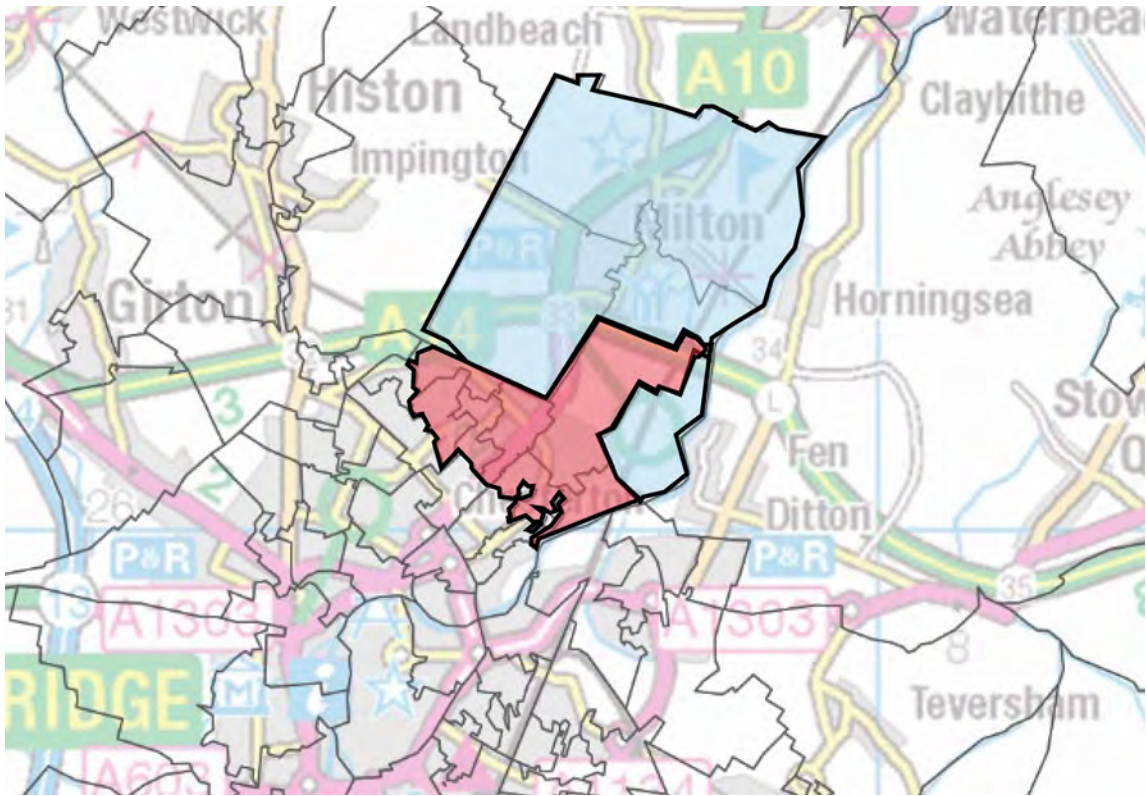


Figure 15.1: The Local Study Area

15.16 The second Study Area is used for assessing employment impacts, which covers the local authority areas of Cambridge and South Cambridgeshire, known as Greater Cambridge.

Sources of Evidence

15.17 The considerable data that might be useful to a socio-economic assessment is publicly available. It is therefore fundamental that the evidence is scoped carefully to ensure that the potentially significant impacts are sufficiently characterised without unnecessary detail. **Table 15.1** provides an outline of the sources used for each potentially significant impact.

Table 15.1: Sources of Evidence

POTENTIALLY SIGNIFICANT IMPACT	DATA TO COLLECT
Population	
Change in population size and profile	ONS Mid-Year Population Estimates (MYPE) ONS Sub National Population Projections (SNPP)
HOUSING	
Change in housing types and tenure	ONS 2011 Census Strategic Housing Market Assessment (SHMA) (where available) 5YHLS Annual Monitoring Reports (where available)
EDUCATION	
Implications of highest levels of qualifications	ONS 2011 Census

POTENTIALLY SIGNIFICANT IMPACT	DATA TO COLLECT
Capacity at local schools	DfE websites
PUBLIC OPEN SPACE	
Capacity of existing public open space	Local leisure and/or open space strategies (where available) Aerial photographs and maps, and site visits
EMPLOYMENT	
Implications of current levels of supply and demand	ONS 2011 Census (at the time of writing the 2021 Census had not been published) ONS Annual Population Survey (APS) ONS Business Register and Employment Survey (BRES)

Assessment Criteria

15.18 Baseline sensitivity is described using the criteria in **Table 15.2**. The sensitivity attributed is based on a detailed review of the baseline conditions and informed by professional judgement.

Table 15.2: Baseline Sensitivity and Value Criteria

SENSITIVITY	SOCIAL VALUE	ECONOMIC VALUE
Very High to High	The area of assessment suffers from severe issues with capacity and quality of the type of infrastructure being assessed. These issues are likely to have directly contributed to associated social deprivation and inequality in the area of assessment.	The area of assessment suffers from high levels of economic deprivation where the labour market is under stress, business is struggling to stay viable and economic growth is unlikely. Unemployment is often high and wages below average, particularly amongst young adults. Economic inactivity is also often high.
Medium	The area of assessment suffers from some issues of capacity and/or quality of the type of infrastructure being assessed. These issues are likely to influence associated social deprivation and inequality in the area of assessment.	The area of assessment is comparable to regional and national averages in terms of economic activity, employment rates and economic growth. Economic deprivation might be present amongst some parts of the usual resident population, which need particular policy intervention. Existing businesses are generally viable.
Very Low to Low	The area of assessment has no capacity issues in the infrastructure being assessed and is of a good quality. Furthermore, there is little evidence of associated social deprivation and inequality in the area of assessment.	The area of assessment has a strong vibrant economy with low levels of economic inactivity and unemployment, including amongst components of the usual resident population that are statistically more likely to be economically disadvantaged.

15.19 The overall impact of the Proposed Development on particular social infrastructure in an area is assessed collectively, as individual impacts (such as providing new open space but also introducing an employment population that is likely to use it) will inevitably interact. Again, the level attributed is based on a detailed review of the baseline conditions and informed by professional judgement (**Table 15.3**).

15.20 The overall economic impact of the Proposed Development on an area is assessed collectively, as individual impacts (such as job creation and increased labour supply) will also inevitably interact. Again, the level attributed is based on a detailed review of the baseline conditions and informed by professional judgement.

Table 15.3: Magnitude of Change Criteria

MAGNITUDE	CHARACTERISTICS OF CHANGE	
	SOCIETY	ECONOMY
Major beneficial	The Proposed Development would directly address known capacity and quality issues of the type of infrastructure being assessed in the area of assessment and is likely to contribute to reduced social deprivation and inequality.	The Proposed Development would directly address known economic and employment issues in the area of assessment and is likely to contribute to an improved long-term economic outlook of the area.
Moderate beneficial	The Proposed Development would improve capacity and/or quality of the type of infrastructure being assessed in the area of assessment and could contribute to reducing social deprivation and inequality.	The Proposed Development would create economic and employment opportunities in the area of assessment and could assist in an improved long-term economic outlook for the area.
Minor beneficial	The Proposed Development would make some contribution to capacity and/or quality issues of the infrastructure being assessed in the area of assessment but is unlikely to make a material difference to the overall level of social deprivation and inequality in the area.	The Proposed Development would make some economic and employment contribution to the area but is unlikely to make a material difference to the overall economic outlook of the area.
Neutral	The Proposed Development would not result in any meaningful change to the area of assessment.	The Proposed Development would not result in any meaningful economic change to the area of assessment.
Minor adverse	The Proposed Development would likely reduce capacity and/or quality of the infrastructure being assessed in the area of assessment but is unlikely to make a material difference to the overall level of social deprivation or inequality in the area.	The Proposed Development would likely reduce economic and employment activity in the area of assessment but is unlikely to make a material difference to the overall economic outlook of the area.
Moderate adverse	The Proposed Development would reduce capacity and/or quality of the infrastructure being assessed in the area of assessment and is likely to make a difference to the overall level of social deprivation and inequality in the area.	The Proposed Development would reduce economic and employment activity in the area of assessment and is likely to detract from the long-term economic outlook of the area.
Major adverse	The Proposed Development would undermine the capacity and quality of the infrastructure being assessed in the area of assessment and is likely to directly lead to a notable worsening in social deprivation and inequality in the area.	The Proposed Development would undermine the economic and employment strengths of the area of assessment and is likely to directly lead to a notable worsening of the long-term economic outlook of the area.

15.21 The sensitivity of the baseline and the magnitude of effect are then combined to determine the significance of effect using the matrix in **Table 15.4**.

Table 15.4: Significance of Effect Criteria

		BASELINE SENSITIVITY				
		VERY HIGH	HIGH	MEDIUM	LOW	VERY LOW
MAGNITUDE OF CHANGE	MAJOR BENEFICIAL	Major Beneficial	Major-Moderate Beneficial	Moderate Beneficial	Moderate-Minor Beneficial	Minor Beneficial
	MODERATE BENEFICIAL	Major-Moderate Beneficial	Moderate Beneficial	Moderate-Minor Beneficial	Minor Beneficial	Minor Beneficial
	MINOR BENEFICIAL	Moderate Beneficial	Moderate-Minor Beneficial	Minor Beneficial	Minor Beneficial	Negligible
	NEUTRAL	Negligible	Negligible	Negligible	Negligible	Negligible
	MINOR ADVERSE	Moderate Adverse	Moderate-Minor Adverse	Minor Adverse	Minor Adverse	Negligible
	MODERATE ADVERSE	Major-Moderate Adverse	Moderate Adverse	Moderate-Minor Adverse	Minor Adverse	Minor Adverse
	MAJOR ADVERSE	Major Adverse	Major-Moderate Adverse	Moderate Adverse	Moderate-Minor Adverse	Minor Adverse

Main Uncertainties and Limitations of the Assessment

- 15.22 This assessment is based on the most recent and accurate data that is publicly available. However, there are undoubtedly small errors within this, either through sampling errors or intentional data swapping to ensure individual privacy.
- 15.23 Any estimates of residential population or employment generation are based on best practice multipliers. However, these represent average yields from similar development within which there might be some variation. As such, the effects identified are considered the most probable based on the information available.

Baseline Conditions

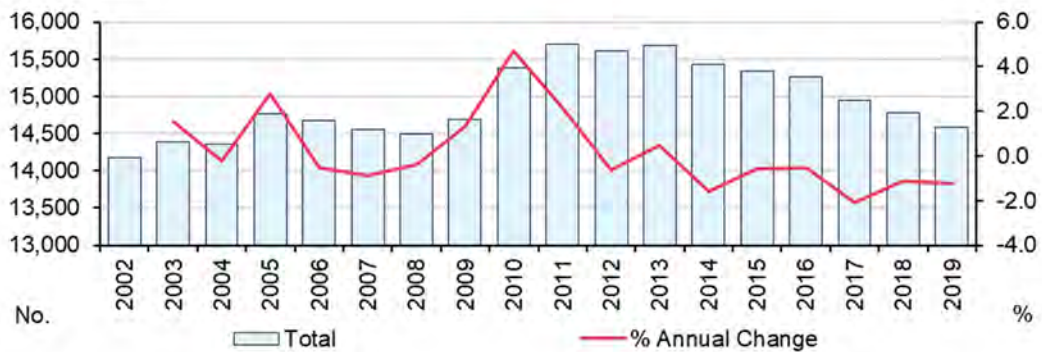
The Proposed Development Site

- 15.24 The Site itself is largely vacant with the exception of temporary car parking associated with the Cambridge North Railway Station located immediately to the south. There is no other public access and the Site does not currently support any employment other than that associated with the car park, which is very low.

Population

- 15.25 The population of Greater Cambridge has increased at an average rate of 1% per year over the last 17 years (**Figure 15.2**). However, the general trend has been a decline in the rate of growth over the last five years averaging just 0.5%. By contrast, the local study area has seen a decline in population since 2014.

Local Study Area



Greater Cambridge

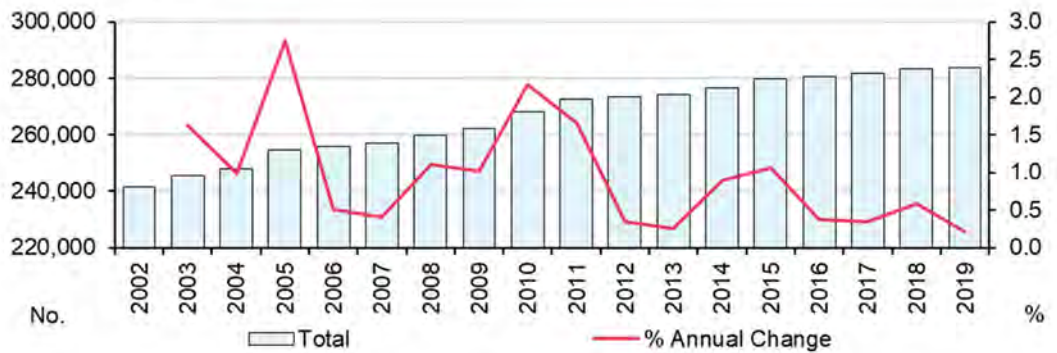


Figure 15.2: Population Change

Source: ONS Mid-Year Population Estimates (MYPE)

- 15.26 **Figure 15.3** sets out how the population profile has changed over the same period. It shows that much of the decline in the local study area is amongst those aged 25-49. Similarly, there is limited growth amongst this age group across Greater Cambridge. The most growth is seen in the older population at both geographies.
- 15.27 Since older populations generally occupy housing at lower densities, as a population ages it results in fewer people per household. Therefore, even with housing development continuing at broadly the same rate, the rate of population growth has stalled. However, it could also be that the official population estimates are incorrect. As identified in a recent evidence report for the emerging Greater Cambridge Local Plan, there are significant differences between the official population estimates for Cambridge, which suggest 1.7% change between 2011 and 2019, and the NHS patient register, which suggests 30.2% change⁴.
- 15.28 The difference can be explained by the transient nature of the student population, who may register at a doctor in the City but then fail to inform the NHS when they move away, particularly if abroad. However, it is also likely that many of these students are only recorded on the patient register and not on other Government databases (for example, council tax, the electoral roll and various benefits) the ONS use to create their population estimates. It is therefore likely that the official population estimates are incorrect for students, primarily those aged 20-29, and that the true level of population growth will not be understood until the 2021 Census is published.

4

[GL Hearn. \(November 2020\). Greater Cambridge Local Plan: Housing and Employment Relationships.](#)

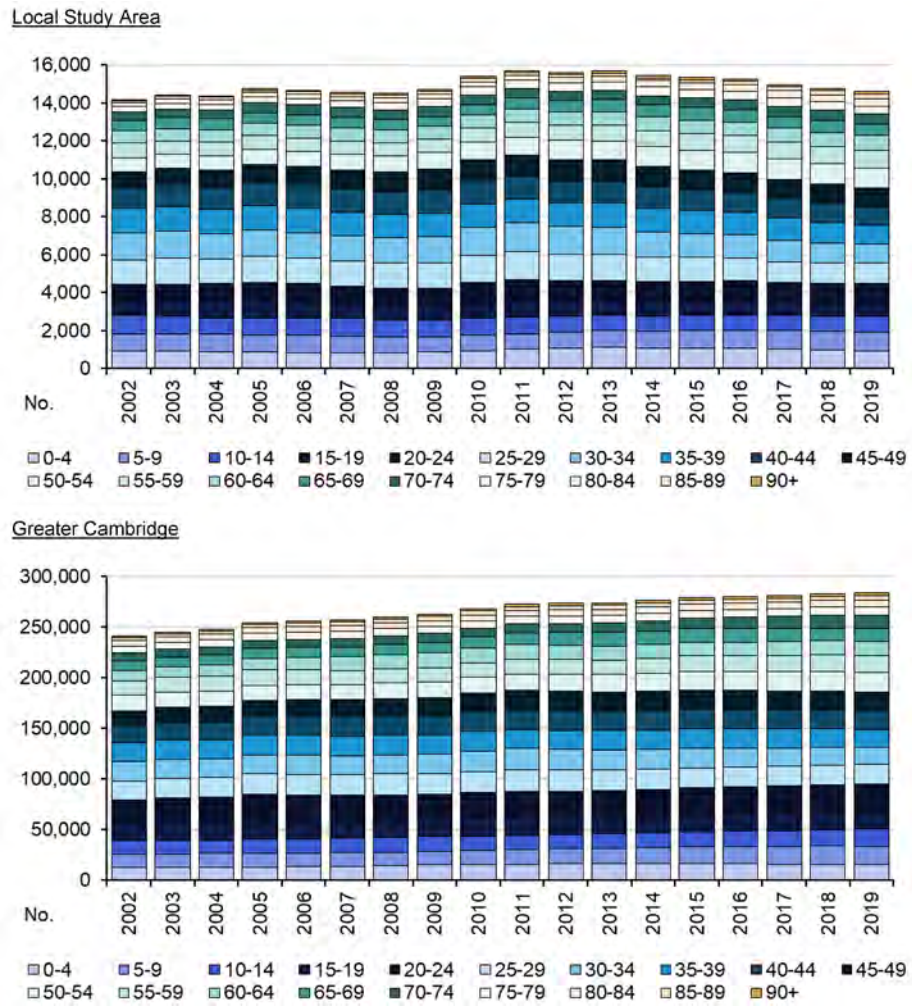


Figure 15.3: Changing Population Profile in Greater Cambridge

Source: ONS Mid-Year Population Estimates (MYPE)

15.29

Figure 15.4 sets out the latest population projections for Cambridge and South Cambridgeshire. In both cases the projections suggest that population growth is likely to be significantly less than seen in previous years.

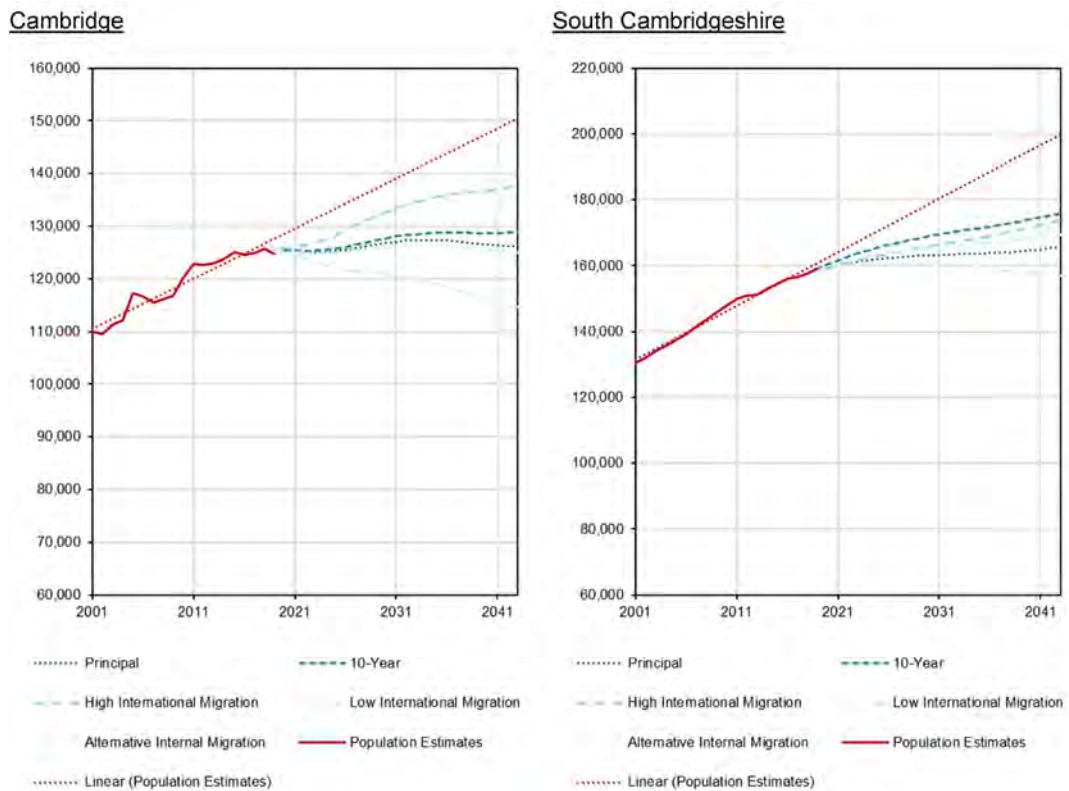


Figure 15.4: Population Projections for Cambridge and South Cambridgeshire

Source: ONS 2018-based Sub National Population Projections

- 15.30 This is not unusual for areas where population growth is dictated by job growth rather than demographic growth on which these projections are based. If job growth was limited, it is likely that population growth would reflect these projections. But this is highly unlikely and as such it is equally highly unlikely that these projections properly reflect future population growth. It is more likely therefore that future population growth will be closer to the linear trend.
- 15.31 However, it could also be because the official population estimates on which it is based are incorrect. Again, it will be for the 2021 Census to determine the actual level of growth to date and then facilitate workable projections.

Housing and Households

- 15.32 The 2011 Census records 6,700 dwellings in the study area of which 2.6% had no usual residents. These are likely to be a mixture of second homes, holiday homes and some vacant dwellings.
- 15.33 The Department for Business, Energy and Industrial Strategy (DBEIS) publishes a detailed breakdown of electricity and gas connections at the LSOA level each year⁵. The electricity data is a far more accurate measure of households, particularly in rural areas, as not all households have a gas connection. For 2011, this data shows the local study area as having 6,600 meters, which is largely consistent with the 2011 Census.

5 <https://www.gov.uk/government/statistics/lower-and-middle-super-output-areas-electricity-consumption#history>

- 15.34 The most recent data, for 2020, indicates that there are now 6,900 meters in the local study area, indicating that only 210 net additional connections have been made over that nine-year period. It is most likely that this represents 210 additional dwellings in the study area (an increase of 3.2%), but it might also be a result of some shared households, or even the sub-division of a house into apartments. Across Greater Cambridge, the DBEIS data suggests 12,600 additional dwellings over the nine-year period, equating to growth of 11.3%. Consequently, it is likely that the 2011 Census is still likely to best characterise the housing stock in the local study area and Greater Cambridge until the 2021 Census is published.
- 15.35 Typical of many suburban areas, **Figure 15.5** shows that in the local study area dwellings are generally semi-detached or terraced with two or three bedrooms. Generally, occupancy ratings are better than those seen across Greater Cambridge and there is no suggestion of significant overcrowding. While owner occupation dominates, there are high proportions of social and privately rented dwellings compared to Greater Cambridge as a whole.
- 15.36 The most significant issue facing householders in both the Local Study Area and Greater Cambridge as a whole is rising house prices relative to earnings, see **Figure 15.6**. Residence-based earnings refer to the area in which the employee lives, while workplace-based earnings refer to the earnings recorded for the area in which the employee works. The latter therefore measures the extent to which employees could afford to live where they work, which is not necessarily where they already live.
- 15.37 This shows that while house prices (both median and lower quartile) have increased by over 150% since 2002 in both local authorities, earnings in Cambridge have only risen by about 70%. In South Cambridgeshire the situation is not quite as significant in terms of the residential-based earnings but significantly worse in terms of workplace earnings, which have only risen by 50% since 2002. Therefore, the prospect of people working in Greater Cambridge owning their own home is has been diminishing year on year. As such the housing baseline sensitivity is considered to be **High**. This is recognised in the emerging NECAAP Housing Topic Paper (November 2021).

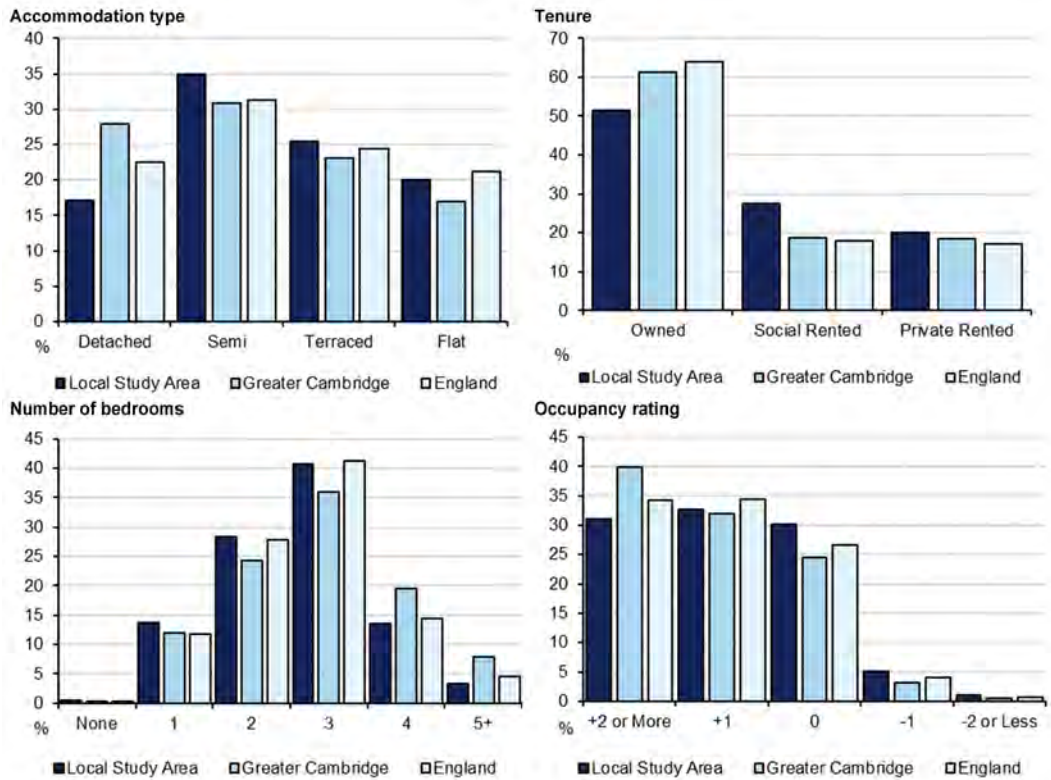


Figure 15.5: Household Characteristics, 2011

Source: [ONS 2011 Census](#)

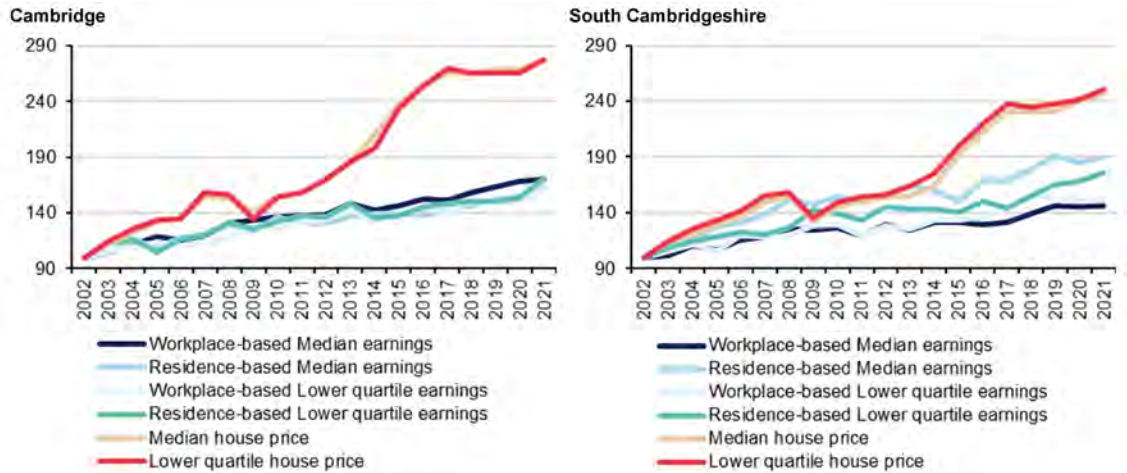


Figure 15.6: Indexed Change in Gross Annual Earnings and House Prices (2002=100)

Source: [ONS Housing Affordability Ratios](#)

Education

- 15.38 The Proposed Development site is located close to two nursery schools, **Figure 15.7**:
- King's Hedges Nursery (1): currently has a good Ofsted rating. It currently has 52 pupils (March 2022).
 - Colleges Nursery (2): currently has an outstanding Ofsted rating. It currently has 76 pupils (March 2022).
- 15.39 In addition, there is one private nursery:
- Cambridge Science Park Day Nursery and Preschool (3): currently has a good Ofsted rating. According to the latest Ofsted report (May 2017) identifies that it has 148 spaces with 111 pupils.
- 15.40 Provision appears relatively sufficient and of good quality. Therefore, the pre-school and nursery baseline is considered to have **Low** sensitivity.

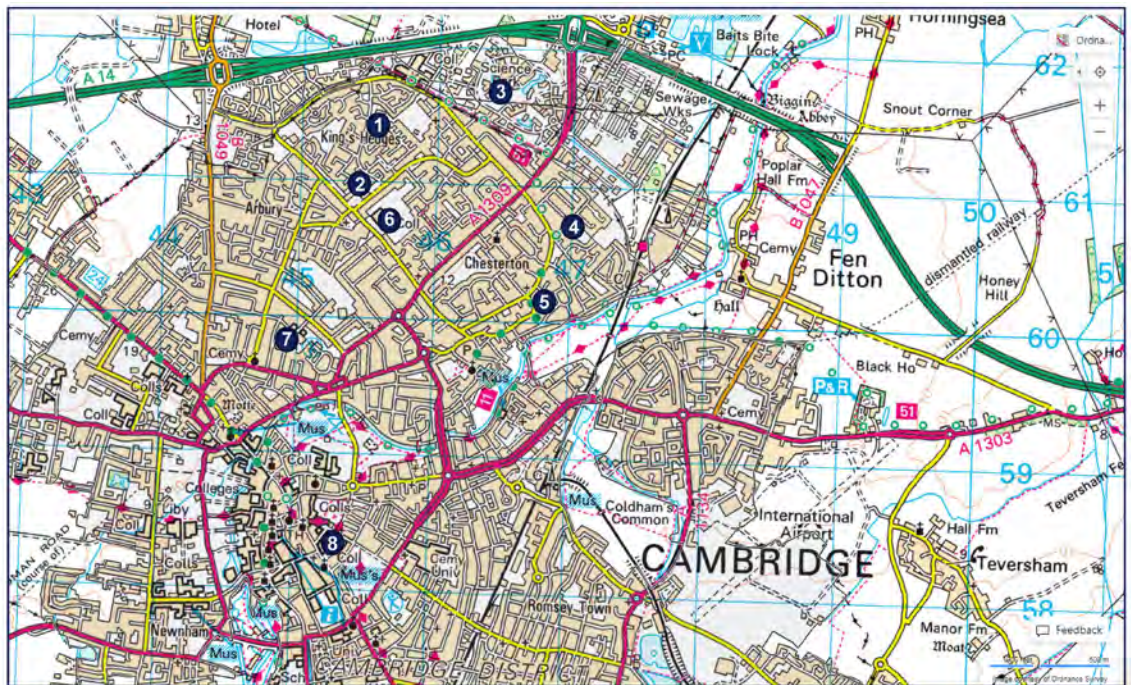


Figure 15.7: Education Facilities

- 15.41 The Proposed Development site is located close to two primary schools:
- Shirley Community Primary School (4): currently has a good Ofsted rating. It is a 2FE school with 420 spaces and 362 pupils (March 2022). Therefore, there is currently 58 spaces (13.8%) available.
 - Chesterton Primary School (5): currently has a good Ofsted rating. It is a 1FE school with 210 spaces and 174 pupils (March 2022). Therefore, there is currently 36 spaces (17.1%) available.
- 15.42 With 94 spaces currently available within a relatively small area, the primary education baseline is considered to have **Low** sensitivity.

- 15.43 The Proposed Development site is ringed by three secondary schools:
- North Cambridge Academy (6): currently has a good Ofsted rating. It is a 5FE school with 750 spaces and 544 pupils (April 2022). Therefore, there is currently 206 spaces (27.5%) available.
 - Chesterton Community College (7): currently has an outstanding Ofsted rating. It is a 6FE school with 900 spaces and 993 pupils (April 2022). Therefore, it is currently oversubscribed by 93 spaces (10.3%).
 - Parkside Community College (8): currently has an outstanding Ofsted rating. It is a 4FE school with 600 spaces and 694 pupils (April 2022). Therefore, it is currently oversubscribed by 94 spaces (15.7%).

15.44 With 19 spaces currently available in the secondary schools that serve the north of the City, the secondary education baseline is considered to have a **Medium** sensitivity. However, it should be noted that secondary schools are currently being affected by the high demand resulting from particularly high birth rates seen in the previous decade. There are currently fewer children currently in the primary school cohorts which suggests that this period of high demand should start to diminish in the near future, increasing the number of available spaces.

15.45 It is noted that the emerging NECAAP Education Topic Paper (November 2021) states that across the NECAAP area there is likely to be a need for additional education facilities. These relate to the land made available through the relocation of the Cambridge Waste Water Treatment Plan and the housing that is likely to be delivered there. As such this will also be the most suitable location to provide the additional education facilities to ensure they are within suitable walking catchments of the new housing.

Public Open Space

15.46 Natural England have produced a GIS database of Green Infrastructure, including that which is currently accessible to the public, **Figure 15.8**, further detail is provided in the NECAAP Open Space and Recreation Topic Paper (November 2021). Around Milton to the north, the largest area of accessible greenspace is the Country Park, which covers over 35ha. All of the remaining areas in Milton are either playing fields or children's play areas. In total, these cover 8.56ha. There are no accessible areas between the A14 and guided busway, which isn't surprising given that most is within private ownership.

15.47 Further south the amount of accessible greenspace is less, reflecting the urban nature of the area. Immediately to the west of Cambridge North railway station is an area of woodland linked to Bramblefields Local Nature Reserve (LNR) and the large area to the south is Stourbridge Common. The remaining areas shown on **Figure 15.8** are playing fields and children's play areas.

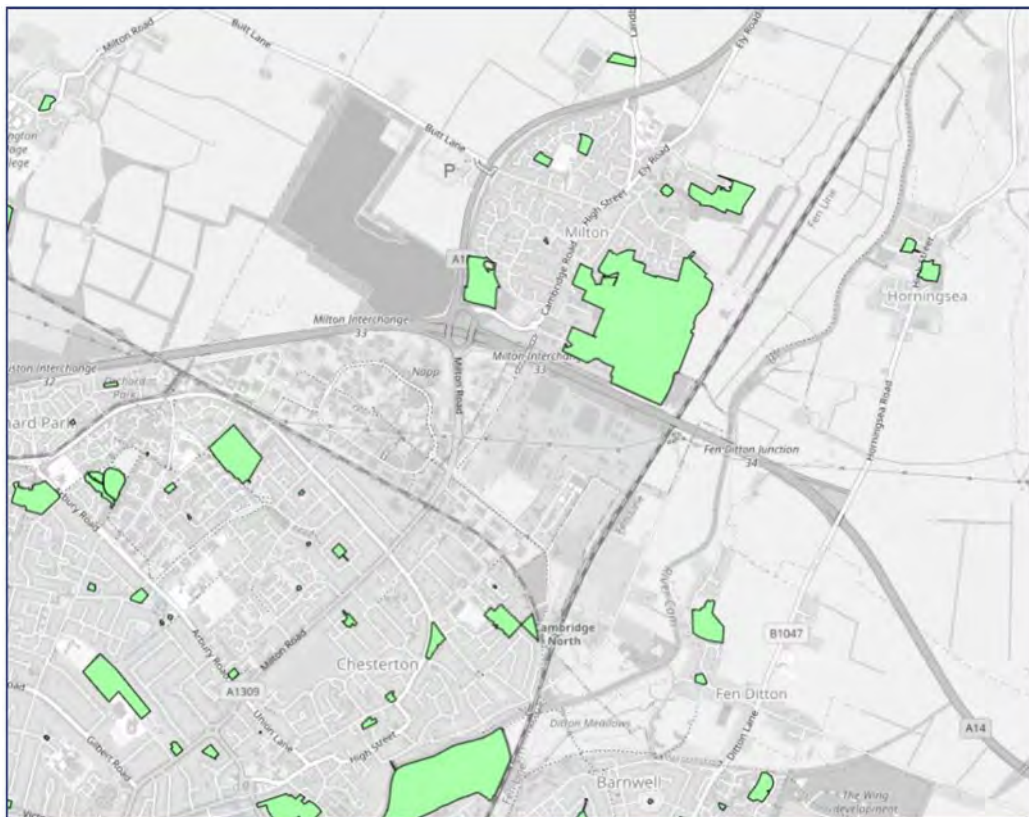


Figure 15.8: Accessible Green Infrastructure

Source: Natural England

15.48 For the purposes of the Greater Cambridge Playing Pitch Strategy (PPS, 2016), the Proposed Development site falls within the North Area. This includes 14 football pitches, all secured for community use. The PPS states that:

“There is an over-supply of adult 11 v 11 pitch. This can be remarked as a junior pitch that is required and the requirement for an extra 9 v 9 pitch can be met by placing this on a 3G rubber crumb pitch.”

15.49 Provision for cricket and rugby also appears to be sufficient.

15.50 Overall therefore the public open space baseline is considered to have a **Low** sensitivity.

15.51 As with education, the NECAAP topic paper identifies the need for additional open space based on the substantial housing likely to be delivered on the Cambridge Waste Water Treatment Plant site. This is also likely to be the most appropriate location for much of the additional provision to ensure that it is within walking distance of the new housing.

Economic Activity and Employment

15.52 The adopted Local Plan has targets of 19,500 net additional dwellings and 22,000 new jobs between 2011 and 2031. According to ONS job density data, the number of jobs in South Cambridgeshire increased from 80,000 in 2011 to 94,000 in 2018, an increase of 14,000 over seven years, or an average of 2,000 net additional jobs per year. This would suggest that the Council are on track to achieve their target. Similarly, the number of jobs in Cambridge

increased from 98,000 jobs in 2011 to 122,000 jobs in 2018, which equates to approximately 3,500 net additional jobs per year.

- 15.53 However, job growth is never linear, and Cambridge's unique economy is highly dependent on the strength of the global economy. Since the 2008 global recession, it is not surprising that the Cambridge economy has seen sustained growth. But any economy will see periods of recession as well as growth and it is probable that the current Covid-19 restrictions will have had a significant effect on the Cambridge economy as has been seen nationally. Trade restrictions following Brexit, particularly on the service sector, may also have an effect. Consequently, this level of job growth is unlikely to be sustained in the short term. In the medium term, it is highly likely that with the right investment the Cambridge economy will return to growth, but it is unclear what this will mean for achieving the Local Plan job target.
- 15.54 The Proposed Development is identified in the adopted Local Plan as an allocation necessary to achieve that job target. It is one of the larger employment allocations and therefore can be considered essential to achieving the job target. This is also apparent from the emerging NECAAP Employment Topic Paper (November 2021).
- 15.55 Briefly, the ONS Annual Population Survey and 2011 Census show that economic activity is high in Greater Cambridge compared to the national average while unemployment is low (notwithstanding the effects of the current Covid-19 restrictions). Job growth in the area is not required to meet the needs of the population. Instead, it is the growth in businesses clustered in and around Cambridge that dictate job growth. The Proposed Development is allocated to meet this future demand for employment floorspace, with the anticipation that the resident population will increase through in-migration to provide the necessary labour force. The housing required for this incoming population is also allocated in the Local Plan. Consequently, there is no requirement to study in detail the current labour market and the baseline is considered to have a **Very Low** sensitivity.

Future Baseline Conditions

- 15.56 Without the Proposed Development, it will be difficult for South Cambridgeshire to achieve its job target. This is likely to have long term implications with businesses considering if they need to relocate outside of Greater Cambridge in order to expand. While this is unlikely to be of a scale to materially affect the integrity of the Cambridge science and technology cluster, it would dampen growth and investment. The Greater Cambridge economic baseline is therefore considered to be of medium sensitivity.
- 15.57 In terms of housing, education and public open space there are not anticipated to be any significant changes in the future baseline conditions other than the continued ageing of the population, which will likely result in a continued decline in the population in the Local Study Area and small improvements in the number of available secondary school spaces.

Predicted Effects

Population

- 15.58 **Table 15.5** below sets out the estimated population profile of the residential element of the Proposed Development using standard multipliers for Cambridgeshire derived from the 2011 Census. This population is shown by broad age ranges that relate to specific life stages that can be used to assess the Proposed Development's impact on infrastructure. Note that these are not used for the purposes of calculating open space provision as this is subject to different multipliers set out in the Open Space in New Developments SPD (January 2009).

Table 15.5: Estimated Population Profile of the Proposed Development

		BTR	SALE	AFFORDABLE/ SHARED OWNERSHIP	TOTAL
0-2	Nursery	18	6	6	30
3-4	Pre-school/nursery	6	2	3	11
5-11	Primary (R-Y6)	11	5	4	20
12-16	Secondary (Y7-11)	6	3	2	11
17-18	Sixth Form (Y12-13)/ Economically Active	5	2	2	9
19-24	University/Economically Active	80	21	10	112
25-34	Economically Active	191	55	17	262
35-49	Economically Active	89	32	18	139
50-64	Economically Active	39	19	15	73
65+	Economically Active/Retired	21	22	21	64
All	Total	468	166	98	732

15.59 An increase in the population of the Local Study Area by 732 people will return it to a level seen in 2013. However, it is likely that the population in the existing housing stock will continue to age and therefore numbers will continue to decrease. This trend is however unlikely to affect the Proposed Development for two reasons. First, the predominance of private rented accommodation would suggest that many residents will likely live here for a relatively short period (typically 2-10 years) when compared to older owner occupiers who may have lived in the same house for several decades. This regular turnover in the population is likely to maintain a younger population. Second, the size of the units proposed are most likely to appeal to young individuals or families who are likely to seek bigger accommodation as the family increases in age and/or size. It is for this reason that there are anticipated to be considerably fewer children aged 3-4 compared to those aged 0-2.

Housing and Households

15.60 The inclusion of 425 dwellings comprising a very different offer in terms of unit sizes and tenures to existing stock in the Local Study Area is a positive contribution to the local housing market. In particular, the inclusion of private rented, shared ownership and other affordable housing tenures will benefit those young families that cannot currently afford their own home in an area suffering from acute housing affordability issues.

15.61 Within the Local Study Area therefore, the Proposed Development can be considered to have a **Major beneficial** magnitude effect. Combined with the **High** baseline sensitivity, this would indicate a **Significant Major-Moderate Beneficial Impact**.

15.62 For Greater Cambridge as a whole, however, the Proposed Development is not of the scale of the new settlements and urban extensions currently being developed, and as such its overall proportional contribution of the housing land supply is relatively small. Within this context the Proposed Development can be considered to have a **Moderate beneficial** magnitude effect. Combined with the **High** baseline sensitivity, this would indicate a **Significant Moderate Beneficial Impact**.

Education

- 15.63 Due to the nature of the Proposed Development, comprising small apartments, most of which will be private rented, the child yield is considerably smaller than that expected for larger houses.
- 15.64 The Proposed Development is anticipated to accommodate in the region of 41 children aged 0-4. Some of these will require nursery and/or pre-school provision depending on parental choice. There is certainly some existing capacity in the Local Study Area and the Proposed Development does include floorspace that could be used as a nursery and/or pre-school should there be the demand for it.
- 15.65 As such, the Proposed Development can be considered to have a **Neutral** magnitude effect on nursery and pre-school provision. Combined with a **Low** baseline sensitivity, this would indicate a **Negligible Impact**.
- 15.66 The Proposed Development is also anticipated to accommodate in the region of 20 children aged 5-11. The majority of these will require state primary school provision, although some may be taught at home or attend private schools.
- 15.67 Usually the introduction of additional demand on social infrastructure is considered a detrimental effect of residential development. However, in established residential areas that are seeing declining populations, due to an ageing population and/or decreasing births rates, the additional demand can be positive. This is because schools are generally funded on a per-child basis, but in many circumstances, schools have fixed costs irrespective of the number of children attending. As such, as school rolls decline, they become increasingly more expensive to run.
- 15.68 While the current level of surplus spaces in the two local schools does not appear to be currently a cause for concern, the continued ageing of the population would suggest that school rolls could continue fall in the future. Therefore, the Proposed Development is likely to make a positive contribution, in particular because the nature of the private rented housing means that it will not be affected by an ageing population in the same way as the existing housing stock of the Local Study Area.
- 15.69 As such, the Proposed Development can be considered to have a **Neutral** magnitude effect on primary school provision. Combined with a **Low** baseline sensitivity, this would indicate a **Negligible Impact**.
- 15.70 The Proposed Development is also anticipated to accommodate in the region of 11 children aged 12-16. The majority of these will require state secondary school provision, although some may be taught at home or attend private schools. This is a very small addition to the current levels of secondary school demand seen in the area. In addition, the anticipated decline in secondary school rolls in the future is likely to mean that by the time the Proposed Development is occupied there is likely to be sufficient capacity available.
- 15.71 As such, the Proposed Development can be considered to have a **Neutral** magnitude effect on secondary school provision. Combined with a **Medium** baseline sensitivity, this would indicate a **Negligible Impact**.

Public Open Space

- 15.72 Local Plan Policy SC/7 states that:

“1. All housing developments will contribute towards Outdoor Playing Space (including children’s play space and formal outdoor sports facilities), and Informal Open Space to meet the need generated by the development in accordance with the following minimum standards:

a. Outdoor play space, informal open space and allotments and community allotments: 3.2 hectares per 1,000 people comprising:

i. Outdoor Sport	1.6ha. per 1,000 people
ii. Open Space	1.2ha. per 1,000 people
iii. Allotments and community orchards	0.4ha. per 1,000 people

b. Subject to the needs of the development the open space requirement will consist of:

iv. Formal Children’s Play Space	0.4ha. per 1,000 people
v. Informal Children’s Play Space	0.4ha. per 1,000 people
vi. Informal Open Space	0.4ha. per 1,000 people”

- 15.73 The Proposed Development includes several key open spaces, which have been designed by Robert Myers Associates with regard to the SPD referred to above. These spaces include:
- The Wild Park on an area of land that is currently not accessible to the public. This will act as informal open space with areas for natural play.
 - Chesterton Gardens, within the residential area itself. This will include various informal open space areas, complimented to both formal and informal children’s play space.
 - Chesterton Square, within the employment element of the Proposed Development.
 - The Piazza at the southern end of the Proposed Development site, which provides a connection through to the Cambridge North railway station.

15.74 Overall therefore the Proposed Development provides considerable open space that it broadly consistent with the Council’s standards. In this respect therefore the Proposed Development can be considered to have a **Neutral** magnitude effect on public open space provision. Combined with a **Low** baseline sensitivity, this would indicate a **Negligible Impact**.

15.75 The Proposed Development, however, does not provide any outdoor sport space or any allotments and community orchards. This is considered to be a **Minor Adverse** magnitude effect on each. Combined with a **Low** baseline sensitivity, this would indicate a **Minor Adverse Impact**. The mitigation of this impact is discussed further later in this chapter.

Economic Activity and Employment

Construction Economic Effects

- 15.76 The Applicant has estimated the total construction build cost to be in the region of £380m and would take approximately five years to complete.
- 15.77 Since the Proposed Development is not a continuous and permanent expenditure stream into the economy, direct construction employment is measured in ‘job years’. This accords with Treasury Guidance. Direct employment is calculated by dividing the estimated capital cost of the project by the average gross output per construction industry employee derived from the ONS Annual Business Survey (ABS).
- 15.78 The ABS indicates that the construction industry had a total expenditure on goods and services of £181,345m in 2018 (the latest data) and had a labour force of 1.534m people. This would suggest a gross output per construction industry employee of £188,050.

15.79 By dividing the total construction cost of the Proposed Development by this gross output, it is estimated that the Proposed Development would support 2,020 job years over the five-year construction period. Based on the convention adopted by the Treasury that 10 job years of employment can be taken as equivalent to one permanent full-time job created, it is estimated that there will be the equivalent of 202 full time construction jobs supported by the Proposed Development.

15.80 This is considered to be a **Moderate Beneficial** magnitude effect. Combined with a **Very Low** baseline sensitivity, this would indicate a **Minor Beneficial Impact**.

Operational Economic Effects

15.81 While much of the floorspace will have permission for a variety of uses, there are several elements that will realistically be only used for specific uses. For example, several of the buildings are designed with laboratories in mind, and given the acute demand for such floorspace within Greater Cambridge can be reasonably assumed to all be used as such. In other circumstances, certain uses are simply unlikely, such as retail being located on upper floors. On this basis the following assumptions are made:

- Buildings S6 and S7 are anticipated to be exclusively used for R&D with some mixed uses (offices, retail, restaurants/cafes and community uses) on the ground floor.
- Building S5 is the multi storey car park (MSCP), which includes small area on the ground floor that is most likely to be used for mixed uses.
- The ground floors of buildings S4, S8 and S9 will include a small amount of mixed-use space on the ground floor. Upper floors are likely to be primarily offices with some R&D in Building S9.
- Buildings S11 – S21 (the residential buildings) are also most likely to have mixed uses on the ground floor, possibly including a nursery.

15.82 The number of workplaces provided in a development can be calculated by using employment density multipliers derived from various sources. For the exclusively office and R&D floorspace, employment densities are derived from the Greater Cambridge Local Plan evidence base⁶. This suggests:

- For offices, 11m² GEA per employee.
- For R&D, 28m² GEA per employee.

15.83 For the more mixed use areas, blended employment density multipliers are used derived from the Homes England (HE, also known as the Homes and Communities Agency (HCA)) guidance⁷ and other sources^{8,9,10,11}. Most of this mixed use floorspace is likely to be used for various types of retail and restaurants/cafes, which typically have densities of approximately 21m² per employee NIA¹². Small offices typically have densities that are almost twice that, while most community uses (including nurseries) have considerably lower densities. As such it is considered reasonable to assume a blended density of 21m² for the purposes of this assessment.

6 [GL Hearn. \(November 2020\). Greater Cambridge Employment Land and Economic Development Evidence Study.](#)

7 HCA. (November 2015). Employment Density Guide, 3rd Edition.

8 HCA. (February 2010). Employment Densities Guide 2nd Edition.

9 EP. (July 2007). Employment Densities.

10 DTZ. (May 2004). Use of Business Space and Changing Working Practices in the South East.

11 BCO. (September 2013). Occupier Density Study 2013.

12 Note that for the purposes of this assessment 'employees' is used rather than FTEs as used to calculate construction employment. The HCA guidance refers to FTEs and have been converted to employee densities by using a ratio of 1 FTE to 0.85 employees to reflect the 30% of the workforce in Cambridgeshire that are part time.

15.84 Overall therefore the Proposed Development is anticipated to support approximately 4,300 employees, see **Table 15.6**.

15.85 Even in an economy as large as Greater Cambridge, this is a considerable amount of additional employment and as such is considered a **Major Beneficial** magnitude effect. Combined with a **Very Low** baseline sensitivity, this would indicate a **Minor Beneficial Impact**.

Table 15.6: Summary of Employment Generation by Phase

PHASE	BUILDING	FLOORSPACE (M2)	GEA/GIA/NIA	TYPE	MULTIPLIER (M2)	EMPLOYEES
1	Mobility Hub	207	NIA	Mixed	21	10
	S6 & S7 ground floor (part)	1,168	NIA	Mixed	21	56
	S6 & S7 ground floor (part) & upper floors	21,169	GEA	R&D	28	756
	Total					822
2	S11-21	1,006	NIA	Mixed	21	48
	Total					48
3	S9 ground floor	1,808	NIA	Mixed	21	86
	S9 upper floors (part)	11,025	GEA	Office	11	1,002
	S9 upper floors (part)	4,725	GEA	R&D	28	169
	Total					1,257
4	S4 ground floor (part)	67	NIA	Mixed	21	3
	S4 ground floor (part) & upper floors	13,693	GEA	Office	11	1,245
	Total					1,248
5	S8 ground floor	1,569	NIA	Mixed	21	74
	S8 upper floors	9,305	GEA	Office	11	846
	Total					919
GRAND TOTAL						4,296

Mitigation

15.86 The only adverse effects identified are in relation to outdoor sport space and allotments. Both appear to have a small oversupply in the Local Study Area and therefore this is not a significant impact. Notwithstanding this, and in accordance with planning policy, it is proposed that a financial contribution secured by legal agreement is made towards the improvement of the existing outdoor sport space and allotments in the Local Study Area.

Residual Effects

15.87 As a result of the mitigation set out above, the Proposed Development will have the following residual effects:

- Provision of housing in the Local Study Area is considered to be a **Significant Major-Moderate Beneficial Impact**.
- Provision of housing in Greater Cambridge is considered to be a **Significant Moderate Beneficial Impact**.
- The impact on nursery and pre-school provision is considered to be **Negligible**.
- The impact on primary school provision is considered to be **Negligible**.
- The impact on secondary school provision is considered to be **Negligible**.
- The impact on public open space (including children's play space) is considered to be **Negligible**.
- The impact on outdoor sport space, following mitigation, is considered to be **Negligible**.
- The impact on allotment space, following mitigation, is considered to be **Negligible**.
- The provision of construction employment opportunities is considered to be a **Minor Beneficial Impact**.
- The provision of operational employment opportunities is considered to be a **Minor Beneficial Impact**.

Monitoring

15.88 No monitoring is required for the effects assessed in this chapter.

Cumulative Effects

15.89 No significant cumulative socio-economic effects are anticipated between the Proposed Development and the two sites outside of the NECAAP area set out in the EIA Scoping Opinion (**Appendix 2.2**). This is because they are sufficiently distant that they are unlikely to share the same social infrastructure and will require their own measures to meet their own addition demands on education and open space.

15.90 As already discussed, much of the identified need for education and open space identified in the topic papers supporting the emerging NECAAP will relate to the Cambridge Waste Water Treatment Plant site. This will introduce residential uses to an area that is separated from existing residential areas and will therefore need to provide much of its own social infrastructure to ensure that it is within appropriate walking distances. This is different from the Proposed Development that does fall within suitable walking distances to existing social infrastructure and can therefore reasonably make use of any spare capacity, much of which is increasing as the ageing population leads to a decline in the overall residential population in the area.

Conclusions and Summary of Effects

15.91 Overall the Proposed Development is not predicted to result in any significant adverse socio-economic impacts.

- 15.92 The Local Study Area appears to have had a declining population in recent years, most likely a result of an ageing population and limited additional housing development. The Proposed Development will introduce a new population that will help to stabilise this, particularly given that the private rented element will likely continue to regularly replenish the number of younger households in the area.
- 15.93 The assessment found that there is an acute housing need in Greater Cambridge, evidenced by increasing affordability constraints with house price inflation over the last twenty years being considerably greater than growth in earnings. As such the provision of a mixed tenure residential development that is most likely to appeal to younger households is particularly beneficial.
- 15.94 In terms of education, the assessment found that there was sufficient capacity in primary schools and nurseries in the local area to meet the needs of the Proposed Development. Capacity in secondary schools is currently limited but this is expected to change in the future falling school rolls anticipated as the lower birth rates seen in the past decade start to have an impact. Overall therefore the Proposed Development is not predicted to have an adverse impact of local schools.
- 15.95 In terms of open space provision, the Proposed Development will provide high quality formal and informal children's play space and other informal open spaces to meet its own needs. The Proposed Development does not include any outdoor sport space or allotments but there is evidence of an oversupply of these in the local area. Consequently, it is proposed to provide financial contributions towards their improvement rather than providing additional facilities.
- 15.96 The assessment found that there are high rates of employment in Greater Cambridge and the need for the Proposed Development is instead market-led. As such, despite providing considerable employment opportunities, these are considered to be of only benefit in socio-economic terms.

Table 15.7: Summary of Impacts: Socio-Economics

DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION				IMPACT AFTER MITIGATION (RESIDUAL)				
				ADVERSE/BENEFICIAL	IRREVERSIBLE/REVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE	ADVERSE/BENEFICIAL	IRREVERSIBLE/REVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE	ADVERSE/BENEFICIAL	IRREVERSIBLE/REVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE	
Provision of housing	Loc	High	Maj	Ben	Irrev	LT	Maj-Mod	None	Ben	Irrev	LT	Maj-Mod	Ben	Irrev	LT	Maj-Mod
Provision of housing	Gt Camb	High	Mod	Ben	Irrev	LT	Mod	None	Ben	Irrev	LT	Mod	Ben	Irrev	LT	Mod
Impact of nursery and pre-school provision	Loc	Low	Neu	Neu	Irrev	LT	Neg	None	Neu	Irrev	LT	Neg	Neu	Irrev	LT	Neg
Impact on primary school provision	Loc	Low	Neu	Neu	Irrev	LT	Neg	None	Neu	Irrev	LT	Neg	Neu	Irrev	LT	Neg
Impact on secondary school provision	Loc	Med	Neu	Neu	Irrev	LT	Neg	None	Neu	Irrev	LT	Neg	Neu	Irrev	LT	Neg
Impact on public open space (including children's play space)	Loc	Low	Neu	Neu	Irrev	LT	Neg	None	Neu	Irrev	LT	Neg	Neu	Irrev	LT	Neg
Impact on outdoor sport space	Loc	Low	Min	Adv	Irrev	LT	Min	Financial contribution towards improvements of existing facilities.	Neu	Irrev	LT	Neg	Neu	Irrev	LT	Neg
Impact on allotment space	Loc	Low	Min	Adv	Irrev	LT	Min	Financial contribution towards improvements of existing facilities.	Neu	Irrev	LT	Neg	Neu	Irrev	LT	Neg
Provision of construction employment opportunities	Gt Camb	V Low	Mod	Ben	Irrev	ST	Min	None	Ben	Irrev	ST	Min	Ben	Irrev	ST	Min
Provision of operational employment opportunities	Gt Camb	V Low	Maj	Ben	Irrev	LT	Min	None	Ben	Irrev	LT	Min	Ben	Irrev	LT	Min

Key:

Loc: Local
 Min: Minor
 Maj: Major
 Mod: Moderate
 Ben: Beneficial
 Neu: Neutral
 Irrev: Irreversible
 Neg: Negligible
 Adv: Adverse
 LT: Long Term
 ST: Short Term

Soils and Groundwater

16

16.0 Soils and Groundwater

Introduction

- 16.1 This chapter addresses the soils and groundwater impacts of the Proposed Development.
- 16.2 Consideration is given to the potential physical effects of the Proposed Development such as changes in ground stability and soil erosion, effects on geology as a valuable resource, effects associated with existing soil and groundwater contamination, effects associated with the introduction of new contaminative substances and/or migration pathways and effects associated with re-use of soils and generation of waste soils.
- 16.3 A Phase 1 geo-environmental desk study is included as **Appendix 16.1** in support of this chapter. This represents the first stage of land contamination assessment and addresses the initial phase of work referred to in Paragraph 110 of the Scoping Opinion. **Appendix 16.2** comprises definitions of probability, consequence and risk. **Appendix 16.3** presents criteria for determining sensitivity of receptors, magnitude of impact and significance of effects. **Appendix 16.4** presents the baseline, construction phase and operation phase conceptual site models.

Legislation, Policy and Guidance

Legislation

- 16.4 The following legislation is applicable to the soils and groundwater topic:
- The Environmental Protection Act 1990;
 - Contaminated Land Statutory Guidance, Department of Food and Rural Affairs (DEFRA), 2012;
 - Land Contamination Risk Management, Environment Agency (2020);
 - The Water Resources Act (WRA) 1991 (as amended);
 - Water Framework Directive (WFD);
 - Waste Management Regulations 2016 (as amended);
 - Environmental Permitting Guidance: Core Guidance for the Environmental Permitting (England and Wales) Regulations 2016 (as amended); and
 - Contaminated Land Strategy, South Cambridgeshire District Council (2001).

Policy

- 16.5 The following planning policy documents apply:
- National Planning Policy Framework (NPPF);
 - South Cambridgeshire District Council District Design Guide: High Quality and Sustainable Development in South Cambridgeshire Supplementary Planning Document, Adopted March 2010;
 - South Cambridgeshire Local Plan 2011-2031, Adopted September 2018; and
 - Cambridgeshire and Peterborough Minerals and Waste Local Plan 2036, Adopted 2021.

Guidance

- 16.6 Relevant guidance includes:

- The Government's Good Practice Guide for Environmental Impact Assessment (EIA), 2006 (withdrawn but still considered relevant);
- R and D Publication 66: Guidance for the Safe Development of Housing on Land Affected by Contamination, Environment Agency, 2008;
- C552 Contaminated Land Risk Assessment - A Guide to Good Practice, CIRIA, 2001; and
- Land Contamination: Risk Management, Environment Agency, 2020.

Potential Sources of Impact

Construction

16.7 Potential impacts which may arise during construction of the Proposed Development are associated with:

- erosion or loss of soil which may be associated with vegetation clearance, increased surface water run-off on bare ground, movement of construction plant around the Site, earthworks, and construction of hardstanding;
- disturbance and mobilisation of existing soil and groundwater contamination, for example via generation of soil-derived dust and run-off from stockpiles and open excavations;
- remediation of legacy soil and/or groundwater contamination from current and historical uses of the Site;
- creation of new migration pathways between sources of contamination and receptors, for example during foundation works and service installation;
- introduction of new sources of contamination such as fuels and oils associated with mechanical plant used for construction of the Proposed Development which may be released to ground via spills or leaks; and
- generation of soil arisings which may not be suitable for reuse within the Proposed Development or for which there may be no scope for reuse.

Operation

16.8 Potential impacts and effects which may arise during the operation phase of the Proposed Development are associated with:

- the presence of predominantly hardstanding in the Proposed Development which will reduce the potential for surface water infiltration and mobilisation of residual contamination at the Site, and minimise the potential for generation of soil-derived dust; and
- sterilisation of sand and gravel in the MSA.

Methodology

Scope of the Assessment

16.9 The following potential environmental effects have been considered:

- a) Physical effects of the Proposed Development; e.g. changes in topography, soil compaction, soil erosion, ground stability, etc.
- b) Effects on geology as a valuable resource; e.g. mineral resource sterilisation, loss or damage to local geological sites (LGS), geological Sites of Special Scientific Interest (SSSI), etc.
- c) Effects on soil as a valuable resource; e.g. loss or damage to soil of good agricultural quality.

- d) Effects associated with ground contamination that may already exist on Site; e.g. introducing / changing pathways and receptors.
- e) Effects associated with the potential for polluting substance used (during construction/operation) to cause new ground contamination issues on Site; e.g. introducing/changing the source of contamination and/or pathways.
- f) Effects associated with re-use of soils and generation of waste soils; e.g. re-use of site-sourced materials on-site or off-site, disposal of Site-sourced materials off-site, importation of materials to the Site, etc.

16.10 The relevant environmental effects are considered to be those relating to: the physical effects of the development (a) effects on geology as a valuable resource (b) effects associated with existing contamination and contamination which may be introduced to the Site (d, e), and effects associated with reuse of soils and generation of waste soils (f). For the purposes of the Soils and Groundwater chapter, hydrogeology has been considered only in terms of a pathway and receptor for contamination. Non-contaminative impacts on the hydrogeological regime are covered in more detail in Chapter 10.

Effects Not Considered within the Scope

16.11 Effects on soil as a valuable resource have been scoped out of the assessment in line with the Scoping Opinion (**Appendix 2.2**). Whilst topsoil may be present locally in vegetated areas of the Site, the Site is not in agricultural use and surface cover is predominantly anticipated to comprise Made Ground based on the Site's previous use.

Extent of the Study Area

16.12 Effects have been assessed within the Site boundary and a surrounding area extending up to a distance of 500m, in accordance with professional judgement and taking into account current industry practice.

16.13 The study area for the purposes of assessing physical effects of the Proposed Development, effects on geology as a valuable resource, and reuse of soils and generation of waste soils is the area within the Site boundary.

16.14 For the purposes of assessing effects associated with ground contamination that may already exist on Site and effects associated with the potential for the Proposed Development to cause new ground contamination at the Site, the study area comprises the area within the Site boundary and adjacent land to a distance of 500m, in accordance with professional judgement and taking into account current industry practice. A larger study area is required for assessing ground contamination effects to allow for consideration of migration pathways from on-site and off-site sources of contamination to the identified receptors.

Assessment Methodology

Physical Effects of the Proposed Development

16.15 Physical effects can include changes in topography, soil compaction, soil erosion and ground stability. A qualitative approach has been used for the assessment of physical effects, assessing the potential impact on the baseline conditions as a result of earthworks, foundation solutions, and construction methods associated with the Proposed Development.

Effects on Geology as a Valuable Resource

16.16 Effects on geology as a valuable resource may include the sterilisation of mineral resources and loss of or damage to geological SSSIs or LGSs. The impact assessment has followed

a qualitative approach based on the type and distribution of geological resource and its associated value, and the extent to which it could be sterilised, lost or damaged as a result of the Proposed Development.

Effects Associated with Contamination

- 16.17 Effects associated with existing residual soil and groundwater contamination, potential contamination associated with the Proposed Development and re-use of soil/generation of waste soil have been assessed using a two-stage risk-based approach. The risk-based approach is in accordance with industry guidance set out in Land Contamination: Risk Management¹. For the purposes of the Soils and Groundwater chapter, hydrogeology is considered only as a receptor to and pathway for the migration of contamination, rather than as a resource.
- 16.18 The first stage typically comprises a land contamination risk assessment. A Phase 1 geo-environmental desk study has been completed to determine the baseline ground conditions at the Site, identifying plausible sources of contamination, receptors to contamination and pathways between the two. The sources, pathways and receptors have been presented in a Preliminary Conceptual Site Model with a qualitative risk assessment of each potential contaminant linkage which forms the baseline land contamination risk assessment. Available laboratory analytical data has been used to inform the baseline land contamination risk assessment. The Phase 1 geo-environmental desk study is presented in **Appendix 16.1**.
- 16.19 The qualitative risk assessment is based on consideration of probability and consequence and the associated risk matrix presented in **Table 16.1**, in accordance with CIRIA C552² and R&D 66³.

Table 16.1: Estimation of the Level of Risk Based on Probability and Consequence

		CONSEQUENCE			
		SEVERE	MEDIUM	MILD	MINOR
PROBABILITY	HIGH LIKELIHOOD	Very high risk	High risk	Moderate risk	Moderate/low risk
	LIKELY	High risk	Moderate risk	Moderate/low risk	Low risk
	LOW LIKELIHOOD	Moderate risk	Moderate/low risk	Low risk	Very low risk
	UNLIKELY	Moderate/low risk	Low risk	Very low risk	Very low risk

- 16.20 Definitions of probability, consequence and risk, as specified in CIRIA C552, are presented in **Appendix 16.2**.
- 16.21 The second stage comprises the impact assessment. Land contamination risk assessments have been completed for the construction phase and the operation phase, using the same qualitative risk assessment approach as at baseline. The baseline land contamination risk assessment has then been compared with the construction phase land contamination risk assessment and with the occupation phase land contamination risk assessment to enable changes in risk to be determined as a result of construction and operation of the Proposed

1 Land Contamination: Risk Management, Environment Agency, 2020
 2 C552 Contaminated Land Risk Assessment. A Guide to Good Practice, CIRIA, 2001
 3 Research & Development Publication 66 Guidance for the Safe Development of Housing on Land Affected by Contamination, NHBC, Environment Agency and CIEH, 2008

Development. This has allowed for impacts to be identified which range from major to minor beneficial, major to minor adverse, or neutral.

Significance Criteria

16.22 The impact assessment requires consideration of the sensitivity or value of the identified receptors for physical effects, geology as a valuable resource, ground contamination, soil reuse and waste soil arisings. The criteria for determining the sensitivity of receptors are presented in **Appendix 16.3**. The magnitude of impacts is also relevant, and the criteria used are presented in **Appendix 16.3**.

16.23 Significance of effects ranging from major to minor, beneficial or adverse, and neutral have been determined based on the sensitivity or importance of the receptor and the nature of potential impact. The classification of significance of effects in presented in **Appendix 16.3**. Effects that are deemed to be significant for the purposes of this assessment are those that are described as moderate and major beneficial or adverse.

Assumptions/Information Gaps

16.24 Ground investigation has not been carried out as part of this assessment. However, there is existing ground investigation information available for approximately half of the Site which has been used to inform the baseline environment and the levels of residual contamination at the Site. The baseline land contamination risk assessment is based on a reasonably likely worst case scenario when considering the residual sources of contamination and the plausibility of migration pathways to identified receptors.

Baseline Conditions

16.25 A summary of the baseline ground conditions reported in the Phase 1 geo-environmental desk study is presented below. The Phase 1 geo-environmental desk study is presented in **Appendix 16.1**. Consideration has also been given to the Phase 1 Geo-environmental Desk Study prepared in 2021 for the wider North East Cambridge area which includes the Site⁴.

Topography

16.26 The Site is generally flat at an elevation of approximately 8 metres above Ordnance Datum (mAOD).

Geology

16.27 A review of published British Geological Survey (BGS) mapping shows that Made Ground is not formally recorded at the Site. However, consistent with the Site's historical use as railway sidings, Made Ground is known to be present.

16.28 Published geological mapping indicates the majority of the Site is underlain by River Terrace Deposits described as 'sand and gravel, locally with lenses of silt, clay or peat'. Superficial Deposits are indicated to be absent from the northern and eastern extents of the Site.

16.29 Bedrock of the Gault Formation underlies the entirety of the Site and is generally described by the BGS as 'pale to dark grey or blue-grey clay mudstone, glauconitic in part, with a sandy base'.

Site History

16.30 Freely available historical maps indicate that the Site predominantly comprised fields before being developed as railway sidings in the early 20th Century. Ballast pits were present in the

4

North East Cambridge Area Phase 1 Geo-environmental Desk Study, EPS, November 2021

north eastern part of the Site at this time, extending off-site to the north. The sidings were extended across the Site during the 20th Century and a series of buildings was constructed along the sidings. The sidings within the Site boundary were no longer in use by 2017.

- 16.31 The surrounding area is shown as fields on the earliest available maps, with the railway present to the east and south west of the Site, various pits surrounding the Site and a sewage works to the north of the Site. Industrial estates, works and factories had been constructed to the west and south west of the Site by the 1960s. By the 1990s, various depots and works extended north east from the Site boundary, off Cowley Road and an industrial estate had been constructed to the south east of the Site beyond the railway line. At the present day, the sewage works is still present to the north west of the Site and an industrial estate is present to the west of the Site. Cambridge Business Park has been developed to the north west of the Site. Cambridge North Station, Cambridge North Novotel and an office development (One Cambridge Square) have been constructed to the south of the Site.

Ground Stability

- 16.32 The Landmark Envirocheck Report included in the Phase 1 geo-environmental desk study presents the following geological hazard potential within the Site boundary:

- Potential for Collapsible Ground Stability Hazards: Very low hazard potential;
- Potential for Compressible Ground Stability Hazards: No hazard;
- Potential for Ground Dissolution Stability Hazards: No hazard;
- Potential for Landslide Ground Stability Hazards: Very low hazard potential;
- Potential for Running Sand Ground Stability Hazards: Very low hazard potential to no hazard; and
- Potential for Shrinking or Swelling Clay Ground Stability Hazards: Moderate hazard potential.

Minerals Resources

- 16.33 The Cambridgeshire and Peterborough Minerals and Waste Local Plan 2016 (adopted July 2021) indicates that River Terrace Deposits underlying the Site are designated as a sand and gravel MSA.
- 16.34 An aggregates railhead extends northwards from the northern site boundary. The Cambridgeshire and Peterborough Minerals and Waste Local Plan 2036 (adopted July 2021) classifies the existing railhead as a Consultation Area.

Geological SSSI and Local Geological Sites

- 16.35 Open source government data does not identify any geological SSSI, any regionally or locally important geological sites or non-designated outcrops/features of interest within 500m of the Site.

Hydrogeology

- 16.36 The River Terrace Deposits are classified by the Environment Agency as a Secondary A Aquifer and the Gault Formation is classified as an Unproductive Strata.
- 16.37 The Environment Agency defines Secondary A Aquifers as '*permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.*'

16.38 The Site is not located in a groundwater source protection zone.

Hydrology

16.39 The nearest surface water feature is the 'First Public Drain' drain that adjoins the north western boundary of the Site. The River Cam is located approximately 500m to the east of the Site at its closest point.

Previous Ground Investigations

16.40 A ground investigation scoped by Mott MacDonald was undertaken by Socotec in August 2017 on part of the Site and in the wider area. Six cable percussion boreholes and 13 dynamic windowless samples were located in the western half of the Site, with no coverage across the eastern half of the Site.

16.41 Based on exploratory hole locations within the Site boundary, geology beneath the Site comprised Made Ground underlain by River Terrace Deposits (gravelly sands and clays) and Gault Formation (clay). Made Ground was encountered in all exploratory hole locations to depths of between 0.45m and 3.20m as black, occasionally reddish-brown gravelly ash, sand, and occasional clay. Gravels included mudstone, flint, chert, quartzite, coal and slate and anthropogenic materials such as railway ballast, clinker, glass, metal, macadam, concrete, brick, timber, ceramic, rubber and fabric.

16.42 River Terrace Deposits were encountered underlying Made Ground in all but one exploratory hole location, at thicknesses ranging from 0.2m to 2.0m. Bedrock of the Gault Formation was encountered to a maximum depth of 30.35m, although the base of the formation was not proven.

16.43 Water strikes were encountered between 0.80m and 2.60m in Made Ground and River Terrace Deposits.

16.44 The exploratory hole logs indicate that visual or olfactory evidence of contamination was generally absent, except for a faint hydrocarbon odour observed towards the base of the Made Ground and a maximum photo-ionisation detector reading of 1.1 parts per million in Made Ground, both in boreholes located in the south west of the former rail sidings.

16.45 Contaminant concentrations were not recorded above human health generic assessment criteria for a commercial end use in the soil samples analysed. Single exceedances were recorded of the lead and dibenzo(a,h)anthracene GAC for a residential without consumption of homegrown produce end use in the proposed residential Site area. No asbestos was identified during laboratory analysis of soil samples.

16.46 Metals, phenol and Polycyclic Aromatic Hydrocarbon (PAH) compounds were recorded at concentrations above the respective Environmental Quality Standards (EQS) in soil samples selected for soil leachate laboratory analysis. Metals and PAH were recorded at concentrations above the respective EQS in groundwater samples. Benzo(a)pyrene was recorded locally above Drinking Water Standards in soil leachate and groundwater.

16.47 Available gas monitoring data for eight of the eleven exploratory holes within the Site boundary indicates hazardous gas flow rates (Q_{hg}) of between 0.0001 l/hr and 0.039 l/hr for carbon dioxide and between 0.0001 l/hr and 0.0009 l/hr for methane, in accordance with BS 8485:2015+A1:2019. These equate to a Characteristic Situation 1, although with carbon dioxide recorded at concentrations above 5%, at a maximum of 13%, BS 8485:2015+A1:2019 suggests considering an increase to Characteristic Situation 2. Guidance in BS8485:2015+A1:2019

recommends that ground gas protection measures are designed **into** buildings at sites with a ground gas regime classified as Characteristic Situation 2, the design of which is dependent upon the type and proposed end use of the buildings.

Potentially Contaminative Land Uses

- 16.48 On-Site potential sources of (mainly historical) contamination are considered to comprise:
- Operation of mechanical plant and equipment associated with the materials depot, railway sidings and travelling cranes.
 - Made Ground of unknown provenance associated with the development of the railway sidings and backfill of historical ballast pits in the north east of the Site.
 - Transformer oils associated with the historical electricity substation in the centre of the Site.
 - Existing highways, the guided busway and a car park associated with the Cambridge North Railway station which are sources of potentially contaminated surface run-off.
- 16.49 As a result of these land uses, it is possible that soil and groundwater at the Site may be contaminated with a range of contaminants including metals, sulphates, fuels, oils and grease (Total Petroleum Hydrocarbons [TPH]), PAH, phenols, and polychlorinated biphenyls (PCB) if uncontrolled releases to ground have occurred.
- 16.50 Asbestos may have been used in the structures formerly located on Site, and may be present in soils at the Site as a result of historical maintenance or demolition works.
- 16.51 The generation of methane, carbon dioxide and other gases may be ongoing if putrescible materials are present in Made Ground associated with the historical development and use of the Site including backfilled ballast pits, railway sidings and a material depot.
- 16.52 The key off-Site potential sources of contamination are considered to comprise:
- Aggregates facility extending northwards from the Site which utilises mechanical plant and equipment.
 - Historical Sewage Farm including filter beds, now Cambridge Water Recycling Centre.
 - Historical/current depots, works, light industrial units, engineering and garage facilities.
 - Railway line parallel to the eastern site boundary and Cambridge North railway station to the south of the Site.
 - Former Agricultural Machinery Market located to the north west of the Site which is assumed to have historically stored mechanical plant and equipment. This area is now in use as a golf driving range.
 - Former gravel pits and ponds, located 40m from the Site at the closest point, which may have been infilled with materials of unknown provenance.
 - Licensed waste transfer and treatment facilities, reported to handle household, commercial and industrial waste.
- 16.53 Potential contaminants associated with these off-site land uses could include metals, sulphates, TPH, PAH, solvents and phenols if uncontrolled releases to ground have occurred.
- 16.54 The former sewage farm and current sewage works is a potential source of metals, other inorganics, pathogens, TPH and gases.

16.55 The generation of methane, carbon dioxide and other gases may be ongoing if putrescible materials are present in Made Ground associated with infilled pits and ponds.

Radon

16.56 The Landmark Envirocheck Report indicates that the Site lies within a lower probability radon area as less than 1% of homes are estimated to be at or above the Action Level. No radon protective measures are necessary in the construction of new dwellings or extensions.

Unexploded Ordnance

16.57 Unexploded ordnance (UXO) risk maps published by Zetica indicate the Site is in a low risk zone.

Sensitive Receptors

16.58 The adopted criteria for categorising the sensitivity of features/receptors are presented in **Appendix 16.3**.

16.59 The current ground conditions at the Site, comprising the topography, soil condition and ground stability, have the potential to affect and be affected by the Proposed Development. There is assessed to be a moderate to low sensitivity associated with ground stability at the Site, a moderate sensitivity associated with soil condition, and a low sensitivity associated with topography.

16.60 The mineral safeguarding area for sand and gravel which extends across the Site represents a geological resource, some of which may have historically undergone excavation for use as ballast. Geology as a valuable resource is assessed to be of overall moderate sensitivity.

16.61 The identified receptors associated with ground contamination and soil reuse and waste soil arisings, and their respective sensitivities are summarised in **Table 16.2**.

Table 16.2: Identified Receptors Relevant to Contamination

RECEPTOR TYPE	DESCRIPTION	SENSITIVITY
Human	Future residents of on-Site and current occupants of off-Site residential properties	High
	Current users of open air car park and future workers at and visitors to on-Site commercial properties.	Moderate
	Occupants of and visitors to off-Site commercial properties	Moderate
	Members of the public using off-Site areas of open space	Moderate
	Construction and maintenance workers.	Moderate
Controlled Waters	Groundwater in Secondary A Aquifer	Moderate
	Surface water in the First Public Drain and the River Cam and future on-Site drainage features.	Moderate
Property	Current and future on-Site buildings, foundations and services	Moderate
	Current and future off-Site buildings, foundations and services	Moderate

16.62 Construction and maintenance workers are not considered further as a receptor for the purposes of this chapter because the impact assessment relates to long-term (chronic) exposure to contamination rather than short-term (acute) exposure which is characteristic of these types of receptor. Risks associated with short-term (acute) exposure are instead

assessed and mitigated via the framework of the Control of Substances Hazardous to Health Regulations.

- 16.63 The baseline conceptual site model (CSM) is presented in **Appendix 16.4**.

Future Baseline Conditions

- 16.64 Without implementation of the development, the baseline ground conditions are likely to remain largely unchanged. Residual contamination associated with the Site's historical use may attenuate over time as a result of naturally occurring processes such as biodegradation.

Assessment of Predicted Effects

Construction Effects

Physical Effects of the Proposed Development

- 16.65 Topography of the Site is generally flat at an elevation of approximately 8 mAOD. Excavations will be required during construction to form basements which will represent a change from the current topography of the Site and surrounding area. There is considered to be a low sensitivity associated with topography, and the impact magnitude during construction is assessed as minor adverse. The effects associated with topography during construction of the Proposed Development are assessed to be of temporary minor/negligible adverse significance.
- 16.66 There is at most a very low potential for ground stability hazards associated with collapsible ground, running sand and landslide at the Site based on the Envirocheck Report. There is no potential for compressible ground or ground dissolution hazards at the Site. With a low sensitivity, and an impact magnitude assessed as neutral, the effects associated with collapsible ground, running sand, landslide, compressible ground and ground dissolution during construction of the Proposed Development are assessed to be of permanent negligible significance.
- 16.67 The Envirocheck Report, appended to the Phase 1 geo-environmental desk study presented in **Appendix 16.1**, indicates that there is up to a moderate potential for shrinking/swelling clay ground hazards at the Site. There is considered to be a moderate Site sensitivity associated with shrinking/swelling clay ground stability hazards and the magnitude of impact is assessed to be moderate adverse. Therefore, without mitigation, the effects during construction associated with shrinking/swelling clay are assessed to be of permanent moderate/minor adverse significance.
- 16.68 Without mitigation, it is considered likely that soil erosion and compaction will occur during construction. The sensitivity of the Site in relation to soil erosion and compaction is considered to be moderate and the magnitude of impact during construction is assessed to be minor adverse. There is therefore predicted to be an effect of permanent minor adverse significance.

Effects on Geology as a Valuable Resource

- 16.69 River Terrace Deposits underlying the Site form part of a regionally extensive sand and gravel MSA. Basements forming part of the Proposed Development will allow for some excavation of the sand and gravel forming part of this MSA.
- 16.70 The sensitivity of geology as a valuable resource is considered to be moderate. The magnitude of impact of construction of the Proposed Development is considered to be minor beneficial and the overall effect of construction of the Proposed Development on geology as a valuable resource is assessed to be of permanent minor beneficial significance.

Effects Associated with Contamination, Reuse of Soil, Generation of Waste Soil Arisings

- 16.71 Without mitigation, construction of the Proposed Development has the potential to:
- disturb and mobilise existing/residual soil and groundwater contamination, for example via generation of soil-derived dust and run-off from stockpiles and open excavations;
 - create new migration pathways between sources of contamination and receptors, for example during foundation works and service installation;
 - introduce new sources of contamination such as fuels and oils associated with mechanical plant which may be released to ground via spills or leaks; and
 - generate soil arisings which may not be suitable for reuse within the Proposed Development or for which there may be no scope for reuse.
- 16.72 The construction phase assessment for contamination has been undertaken by comparing the baseline risks associated with contamination to the predicted risks during construction of the Proposed Development. The construction phase CSM, risk assessment and impact assessment are presented in **Appendix 16.4**.
- 16.73 The sensitivity of identified receptors ranges from moderate to high.
- 16.74 Without mitigation, and with reference to the risk assessment in **Appendix 16.4**, the predicted magnitude of construction impacts on on-Site and off-Site human receptors, groundwater and surface waters are minor adverse and the associated effects are of temporary minor adverse significance.
- 16.75 Without mitigation, and with reference to the risk assessment in **Appendix 16.4**, the predicted magnitude of construction impacts on property receptors are neutral and the associated effects are of temporary negligible significance.

Operational Effects

Physical Effects of the Proposed Development

- 16.76 Impacts relating to physical effects are considered to predominantly relate to the construction phase of the Proposed Development. Whilst basements will be present beneath buildings, external ground levels and the overall topography of the Site during operation of the Proposed Development will be similar to the present topography and the magnitude of impact is therefore generally assessed as neutral and the effects of permanent negligible significance.
- 16.77 Regarding ground stability, without mitigation of the ground hazard associated with shrinking/swelling clay, the associated magnitude of impact during operation is assessed as moderate adverse and the effects of permanent moderate/minor adverse significance.
- 16.78 With the presence of hardstanding and buildings as part of the Proposed Development and placement and maintenance of vegetation in areas of soft landscaping, the magnitude of impact during operation of the Proposed Development on soil erosion and compaction is considered to be minor beneficial. The sensitivity of the Site in relation to soil erosion and compaction is assessed to be moderate and the effects of permanent minor beneficial significance.

Effects on Geology as a Valuable Resource

- 16.79 The sensitivity of geology as a valuable resource is considered to be moderate. The magnitude of impact of the Proposed Development is considered to be minor adverse and the overall effect

of operation of the Proposed Development on geology as a valuable resource is assessed to be of permanent minor adverse significance.

Effects Associated with Contamination, Reuse of Soil, Generation of Waste Soil Arisings

- 16.80 The Proposed Development will be characterised by building cover, external hardstanding such as roads and pavements and areas of soft landscaping. This will reduce the potential for surface water infiltration and mobilisation of residual contamination at the Site compared to current baseline conditions. It will also minimise the potential for generation of soil-derived dust and for users of the Proposed Development to come into contact with residual contamination.
- 16.81 The Proposed Development will introduce new human receptors that are not currently present.
- 16.82 The operational phase impact assessment for contamination has been undertaken by comparing the baseline risks associated with contamination to the predicted risks during operation. The operational phase CSM, risk assessment and impact assessment are presented in **Appendix 16.4**.
- 16.83 The sensitivity of identified receptors ranges from moderate to high.
- 16.84 Without mitigation, and with reference to the risk assessment in **Appendix 16.4**, the predicted magnitude of operational impacts on human and controlled waters receptors is minor adverse and the associated effects are of permanent minor adverse significance.
- 16.85 Without mitigation, and with reference to the risk assessment in **Appendix 16.4**, there is predicted to be no change in the risks to property receptors from contamination by the time of operation. The predicted magnitude of operation impacts on these receptors is negligible and the associated effects are of permanent negligible significance.

Mitigation

- 16.86 Mitigation measures will be implemented during design and construction of the Proposed Development to reduce adverse effects. The mitigation measures are generally considered to be classed as 'foreseeable' and 'tertiary' mitigation.

Detailed Design

- 16.87 Ground investigation, gas monitoring and groundwater sampling will be undertaken in accordance with BS5930:2015+A1:2020, BS10175:2011+A2:2017 to establish the contaminant regime at the Site. This addresses the comments in paragraph 110 of the Scoping Opinion regarding the requirement for intrusive site investigation. The scope of investigative works will be agreed with the SCDC Environmental Health Officer and the Environment Agency, if required, to support planning condition discharge.
- 16.88 Ground investigation findings will inform a generic quantitative risk assessment for human health and preliminary controlled waters risk assessment.
- 16.89 A quantitative ground gas risk assessment will be carried out using monitoring data to identify the Characteristic Situation and to determine the potential requirement for gas protection measures within buildings in the Proposed Development.
- 16.90 If required, detailed quantitative risk assessment will be carried out or a remediation strategy will be prepared to address potentially unacceptable risks.

- 16.91 Ground investigation will also be used in the proposed areas of development to confirm the published and recorded geological sequence, to characterise the geotechnical and engineering properties of the ground and to identify ground stability or ground engineering constraints which need to be considered in the design of the Proposed Development (e.g. to inform suitable foundation solutions).
- 16.92 The generation of soil arisings will be minimised. Reuse of soils will be maximised and informed by the findings of the ground investigation.
- 16.93 The design of the Sustainable Drainage System (SuDS) features will seek to minimise the risk of mobilising residual soil and groundwater contamination at the Site and will incorporate the requirement for lining where residual contamination is anticipated.
- 16.94 It is assumed that the necessary ground investigation, human health risk assessment, controlled waters risk assessment and remediation (if required) will be carried out by the Applicant's geo-environmental consultant to support the discharge of relevant planning conditions. Detailed design of the Proposed Development will minimise the potential effects of contamination so that no unacceptable risks remain, and will maximise the potential for reuse of soils within the Proposed Development whilst minimising the generation of waste soil arisings.
- 16.95 Landscape design and tree planting proposals will take account of the shrinking/swelling clay hazard associated with the Gault Formation.

Construction

- 16.96 The earthworks phase of construction will include the completion of remediation and verification such as source removal of contamination hotspots, if required. It is assumed that verification of construction-phase remediation of this nature will be carried out by the future plot developers' geo-environmental consultants to support the discharge of relevant planning conditions.
- 16.97 Excavation of sand and gravel in the MSA will be carried out to form basements within the Proposed Development.
- 16.98 Earthworks to prepare development plots will be completed and validated in accordance with a suitable specification to achieve the required design parameters, such as Series 600 of the Specification for Highway Works.
- 16.99 Consideration will be given to the potential for drainage features to be formed early in the construction phase to aid in the management of surface water runoff.
- 16.100 A Construction Environmental Management Plan (CEMP) will be prepared for the Proposed Development to set out the comprehensive mitigation measures to be implemented during construction to reduce the potential risks to identified receptors. A framework CEMP has been prepared and is presented in **Appendix 4.2**. This will provide a template for plot-specific CEMPs, to be prepared by the developers' geo-environmental consultants to support the discharge of the relevant planning condition. It is anticipated that the CEMP will include, but not be limited to, the following requirements which relate to contamination and physical effects:
- Preparation of a materials management strategy;
 - Preparation of a protocol to be followed in the event that unexpected contamination is encountered during construction;

- Programming of earthworks to avoid periods of inclement weather, as far as possible, to reduce the potential for erosion of soils and an increase in surface water run-off with a high sediment load;
 - Use of sediment management systems at or up-gradient of surface water outfalls from the Site, if required;
 - Careful stripping and storing of topsoil, where present, away from working area to ensure the structure and integrity of the topsoil resource is preserved;
 - Limiting the duration of soil exposure and reinstating vegetation or hardstanding in a timely manner to minimise soil erosion;
 - Practicing good stockpile management, such as sealing to prevent deterioration of soils and to minimise the potential for generation of soil-derived dust;
 - Use of dust suppression across areas of bare ground in dry and/or windy weather conditions;
 - Establishing a regime of environmental monitoring which is appropriate for potential nuisance issues, such as dust, vapours and odour and setting threshold/trigger levels for further action to be taken;
 - Completion of risk assessments required under the Control of Substances Hazardous to Health (COSHH) Regulations 2002 to determine the necessary Personal Protective Equipment for construction workers;
 - Establishing a designated bunded re-fuelling area on hardstanding to reduce the potential for release of contaminants to ground and surface water in the event of a leak or spill;
 - Ensuring potentially polluting substances required during construction are stored in bunded containers away from surface waters; and
 - Deployment of drip trays and spill kits with mechanical plant in use around the Site to reduce the potential for release of contaminants to ground and surface water in the event of a leak or spill.
- 16.101 Where required, foundation works risk assessments will be completed, prior to the commencement of the build phase of construction works, to determine the potential risks to controlled waters from possible foundation solutions. It is assumed that foundation works risk assessments will be prepared by the future plot developers' geo-environmental consultants to support the discharge of the relevant planning condition.
- 16.102 The installation of any required gas/vapour protection measures in buildings and placement of clean cover soils in areas of soft landscaping will be completed and verified as part of the build phase of construction. It is assumed that verification of construction-phase remediation of this nature will be carried out by the future plot developers' geo-environmental consultants to support the discharge of relevant planning conditions.
- 16.103 Depending on the findings of ground investigation and risk assessment that will be carried out in the next stages of the planning process, and the requirement to satisfy relevant planning conditions, it may be necessary for longer term monitoring, such as gas monitoring or groundwater monitoring, to be carried out at the Site as a precautionary measure rather than as specific mitigation.
- 16.104 No construction mitigation measures are proposed in relation to changes in topography or ground stability.

Operational

- 16.105 It is assumed that all necessary mitigation will have been implemented prior to operation of the Proposed Development and no mitigation measures relevant to the operation phase have been identified.

Residual Effects

Construction

- 16.106 The impact magnitude associated with collapsible ground, running sand, landslide, ground dissolution, compressible ground and ground dissolution during construction is assessed as neutral. No specific mitigation has been identified and residual effects during construction of the Proposed Development are predicted to be of permanent negligible significance.
- 16.107 No specific mitigation has been identified in relation to topography during construction. The residual effects are therefore predicted to remain of temporary minor/negligible adverse significance.
- 16.108 With mitigation in the form of ground investigation, geotechnical laboratory testing and design of suitable foundations for the engineering properties of the ground, the magnitude of impact during construction associated with shrinking/swelling clay ground stability hazard is assessed to be neutral. Residual effects during construction associated with the shrinking/swelling clay ground stability hazard are predicted to be of permanent negligible significance.
- 16.109 With the implementation of mitigation, the magnitude of impact during construction on soil erosion and compaction is assessed to be minor adverse. The associated residual effects are predicted to be of permanent minor adverse significance.
- 16.110 The magnitude of impact of construction of the Proposed Development on geology as a valuable resource is assessed to be minor beneficial. Mitigation will take place in the form of excavation and re-use of some of the sand and gravel resource to form basements in part of the Site. Residual effects during construction of the Proposed Development are predicted to be of permanent minor beneficial significance.
- 16.111 With implementation of mitigation and with reference to the risk assessment in **Appendix 16.4**, the magnitude of impact on human, controlled waters and property receptors from contamination during construction of the Proposed Development is predicted to be neutral and the residual effects of temporary negligible significance.

Operation

- 16.112 Impacts relating to physical effects are considered to relate predominantly to the construction phase of the Proposed Development. Impacts on topography and ground stability during operation are therefore predicted to be of neutral magnitude and the residual effects of permanent negligible significance.
- 16.113 With implementation of mitigation, the magnitude of impact during operation associated with shrinking/swelling clay ground stability hazard is assessed to be neutral. Residual effects during operation are predicted to be of permanent negligible significance.
- 16.114 No mitigation during operation has been identified in relation to soil erosion and compaction beyond the intrinsic features of the Proposed Development, and the magnitude of impact during

operation is considered to be minor beneficial. Residual effects of permanent minor beneficial significance are predicted.

- 16.115 The magnitude of impact of operation of the Proposed Development on geology as a valuable resource is assessed to be minor adverse. Mitigation will take place during construction in the form of re-use of some of the sand and gravel resource during excavation to form basements in part of the Site, however, there will be local sterilisation of the mineral resource outside of basements. Residual effects during operation of the Proposed Development are predicted to be of permanent minor adverse significance.
- 16.116 With implementation of additional mitigation and with reference to the risk assessment in **Appendix 16.4**, the magnitude of impact on on-Site human receptors, controlled waters and on-Site property receptors from contamination is predicted to be minor beneficial and the residual effects of permanent minor beneficial significance.
- 16.117 With implementation of additional mitigation, and with reference to the risk assessment in **Appendix 16.4**, the magnitude of impact on off-Site human receptors, and off-Site property receptors from contamination, is predicted to be neutral and the residual effects of permanent negligible significance.

Monitoring

- 16.118 Depending on the findings of future ground investigation and associated risk assessment, and the requirement to satisfy relevant planning conditions, it may be necessary for longer term confirmatory monitoring, such as gas monitoring or groundwater monitoring and sampling, to be carried out at the Site as a precautionary measure. The purpose of this monitoring, if required, would be to confirm that contaminant levels remain within anticipated levels over the longer term such that the design of mitigation measures remains effective.

Cumulative Effects

- 16.119 Potential cumulative effects have been considered for the following potential developments in the vicinity of the Proposed Development:
- 21/02450/REM Reserved matters application 421 new homes with associated infrastructure, internal roads and open space (1.94km from site);
 - 20/03524/FUL Upgrade to existing access roads and Cowley Road (as part of a wider proposal 20/03523/FUL for the erection of a 5-storey building and a 6 storey building for commercial/business purposes, erection of a transport hub, gymnasium, surface parking, landscaping and associated infrastructure including demolition of the existing building (St John's House) and associated structures) (1.36km from site);
 - 21/04640/SCOP | Request for a Formal Scoping Opinion for an Order granting Development Consent for the Cambridge Wastewater Treatment Plant Relocation (the Proposed Development) | Cambridge Waste- Water Treatment Plant Relocation Horningsea Road Fen Ditton Cambridgeshire (0.88km from site); and
 - 17/1616/CTY | EIA Scoping Opinion | Waterbeach New Town Waterbeach Barracks and Airfield Site Waterbeach Cambridgeshire (6.36km from site).
- 16.120 By virtue of the planning process, the potential developments will be subject to the NPPF and it will be necessary under planning for appropriate mitigation to be implemented during

construction in accordance with current legislation and industry best practice to control potential impacts and effects. Potential cumulative effects during construction are therefore considered to be unlikely.

- 16.121 It is assumed that operation of the potential developments will be in accordance with any granted planning permission and the appropriate pollution prevention measures will be implemented. There is the potential for some sterilisation of sand and gravel in the MSA as a result of the potential developments if prior extraction is not undertaken. A low potential for cumulative effects is predicted during operation.

Conclusions and Summary of Effects

- 16.122 An assessment has been undertaken of the effects of the proposals on soil and groundwater in relation to physical effects, effects on geology as a valuable resource, and effects associated with contamination, reuse of soil and generation of waste soil arisings.
- 16.123 With implementation of mitigation, predicted construction effects are of permanent and temporary minor adverse to negligible significance.
- 16.124 With implementation of mitigation, predicted operation effects are of permanent minor adverse to minor beneficial significance.
- 16.125 A summary of impacts can be found in the summary of impacts table (**Table 16.3**).

Table 16.3: Summary of Impacts: Soil and Groundwater

DESCRIPTION OF IMPACT	IMPACT BEFORE MITIGATION				MITIGATION					IMPACT AFTER MITIGATION (RESIDUAL)				
	GEOSPATIAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/ LONG TERM	SIGNIFICANCE	MITIGATION	MAGNITUDE	ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/ LONG TERM	SIGNIFICANCE	
Construction														
Changes in topography	Loc	Low	Min	Adv	Irrev	ST	Min - Neg	No mitigation identified.	Min	Adv	Irrev	ST	Min - Neg	
Soil compaction and erosion	Loc	Mod	Min	Adv	Irrev	LT	Min	Implementation of CEMP.	Min	Adv	Irrev	LT	Min	
Ground stability	Loc	Mod-Low	Mod-Neu	Adv	Irrev	LT	Mod/Min - Neg	Ground investigation to characterise geotechnical engineering properties of the ground and inform detailed design. Landscaping/tree planting design to take account of shrink-swell potential of Gault Clay. Earthworks to prepare development plots to be undertaken and validated in accordance with appropriate works specification.	Neu	-	-	LT	Neg	
Geology as a Valuable Resource	Loc	Mod	Min	Ben	Irrev	LT	Min	Excavation of sand and gravel in MSA within footprints of basements.	Min	Ben	Irrev	LT	Min	
Contamination, reuse of soil, generation of waste soil arisings	Loc	Mod-High	Min-Neu	Adv	Rev	ST	Min-Neg	Ground investigation, gas monitoring and groundwater sampling; human health generic quantitative risk assessment, preliminary controlled waters risk assessment and gas risk assessment; completion of detailed risk assessment and/or remediation as required; completion of foundation works risk assessment	Neu	-	-	ST	Neg	

DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE		RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION				IMPACT AFTER MITIGATION (RESIDUAL)				
	Loc	Mod			Adv	Ben	Irrev	Reversible/ Irreversible	Short-term/ Long term	Significance	No mitigation identified.	ST: Short Term	LT: Long Term	Ben	Adv	Reversible/ Irreversible	Short-term/ Long term
Operation																	
Changes in topography	Loc	Low	Low	Neu	-	Irrev	LT	Neg	No mitigation identified.			Neu	-	-	LT	Neg	
Soil compaction and erosion	Loc	Mod	Mod	Min	Ben	Irrev	LT	Min	No mitigation identified.			Min	Ben	Irrev	LT	Min	
Ground stability	Loc	Mod-Low	Mod-Low	Mod	Adv	Irrev	LT	Mod/Min	No mitigation identified.			Neu	-	LT	Neg		
Geology as a Valuable Resource	Loc	Mod	Mod	Min	Adv	Irrev	LT	Min	No mitigation identified.			Min	Adv	Irrev	LT	Min	
Contamination, reuse of soil, generation of waste soil arisings	Loc	Mod-High	Mod-High	Min-Neu	Adv	Irrev	LT	Min - Neg	No mitigation identified.			Min - Neu	Ben	Irrev	LT	Min - Neg	

Key:

Loc: Local
 Rev: Reversible
 Mod: Moderate
 Neu: Neutral
 Irrev: Irreversible
 Neg: Negligible
 Min: Minor
 Adv: Adverse
 ST: Short Term
 LT: Long Term
 Ben: Beneficial

Transport



17.0 Transport

Introduction

- 17.1 This chapter of the Environmental Statement (ES) assesses the impacts and associated effects of the Proposed Development on traffic and transportation.
- 17.2 The assessment takes into account the baseline conditions and the potential impact on these during both the construction and operational phases of the Proposed Development.
- 17.3 The chapter should be read in conjunction with the following supporting documents:
- Appendix 17.1: Transport Assessment (TA);
 - Appendix 17.2: Framework Travel Plan (TP); and,
 - Appendix 17.3: Low Emission Strategy (LES).

Methodology

Scoping

- 17.4 A Transport Assessment scoping report was submitted to Cambridgeshire County Council (CCC) in November 2021 with comments received on 14th December 2021.
- 17.5 A further meeting was held with CCC and the Local Planning Authority (LPA) on 24th January 2022 to discuss the revised parking strategy and principles of the TA methodology. There was broad agreement to the proposed approach to the car parking provision within the Proposed Development. Similarly, CCC confirmed that the proposed approach of relating vehicle trips to car parking provision was acceptable. CCC provided a second pre-application advice note dated 10th February 2022 following up on the meeting.
- 17.6 A follow-up meeting was held with CCC on 28th March 2022 to provide an update on the development of the scheme and also to discuss further the points raised in the earlier pre-application meetings. Agreement was reached on the approach to assessing the residential development vehicle trip impacts, data sources for establishing the non-car mode trips for both the residential and commercial elements of the scheme, and the principle of sensitivity testing.
- 17.7 The Transport Assessment (**Appendix 17.1**) and Travel Plan (**Appendix 17.2**) have been prepared to be consistent with the pre-application discussions and feedback received from CCC. More detail on the pre-application engagement with CCC is set out in Section 1.3 of the TA.
- 17.8 The transport-specific scoping exercise should be viewed alongside the wider EIA Scoping exercise undertaken with the LPA.
- 17.9 The LPA Scoping Opinion (**Appendix 2.2**) included the following points which are relevant to this chapter:
- Any Transport Assessment in relation to the Strategic Road Network should be undertaken in accordance with the Department for Transport Circular 02/2013 The Strategic Road Network and the Delivery of Sustainable Development. Reference should also be made to 'The Strategic Road Network: Planning for the future (A guide to working with Highways England on planning matters) and National Planning Practice Guidance.

- It is noted that the cited Guidelines for the Environmental Assessment of Road Traffic, 1993 does not consider the impact on cyclists. Considering the high number of cyclists in Cambridge, cycling should be formally recognised as a significant mode of transport. Cyclist Severance, Cyclist Delay and Cyclist Amenity should be added to the list of relevant impacts to be assessed.
- Cambridge North railway station should be included as a location containing “High” sensitivity receptors.

Policy

- 17.10 A full review of relevant transport policy is included in Section 2 of the TA in **Appendix 17.1**.
- 17.11 The policy review includes an assessment of national, regional and local policy documents in respect of traffic and transport.
- 17.12 In terms of national policy, the preparation of a TA and TP satisfies the requirements outlined in the National Planning Policy Framework (2021) and National Planning Practice Guidance (2014) to provide an assessment of developments which will generate significant amounts of movement.
- 17.13 With regard to regional policy, the Cambridgeshire and Peterborough Combined Authority Local Transport Plan (2020), and the just-published consultation draft of the revised Local Transport and Connectivity Plan (LTCP, 2022), sets out a long-term strategy for ensuring growth is planned in a sustainable way. The TA and TP outline how the Proposed Development aligns with this.
- 17.14 The South Cambridgeshire Local Plan (2018) indicates that developments should prioritise movement by walking, cycling and public transport with permeable layouts that facilitate short trips by walking and cycling.
- 17.15 The Draft North East Cambridge Area Action Plan (NECAAP) represents emerging policy that is relevant to the Proposed Development. The NECAAP also applies to the wider North East Cambridge Area and is supported by a Transport Evidence Base (TEB) and High Level Transport Strategy. The TEB establishes the principle of a vehicular trip budget for the NECAAP area that it suggests could take place without creating a severe impact on local highway conditions. The Proposed Development is forecast to operate within its allocation of the wider NECAAP vehicular trip budget.

Potential Impacts

- 17.16 The ‘Guidelines for the Environmental Assessment of Road Traffic’ by the Institute of Environmental Assessment (now IEMA) from 1993 have been used to inform the technical scope of the assessment of traffic-related effects.
- 17.17 This IEMA guidance lists the following environmental impacts relevant to transportation that should be considered as part of an assessment:
- Noise;
 - Vibration;
 - Visual Impact;
 - Severance;

- Driver delay;
- Pedestrian delay;
- Pedestrian amenity;
- Fear and intimidation;
- Accidents and safety;
- Air pollution;
- Ecological impact;
- Heritage and conservation areas; and
- Hazardous loads.

17.18 For the Proposed Development, there are not anticipated to be any hazardous loads associated with the construction or operation of the Proposed Development. This element has therefore been scoped out of the assessment.

17.19 Noise and vibration (Chapter 14), visual impact (Chapter 12), air pollution (Chapter 6), ecological impact (Chapter 9) and heritage and conservation (Chapter 8) are covered by other chapters within the EIA and are not therefore assessed within the Transport chapter.

Study Area Methodology

17.20 The spatial scope of the assessment has been defined using the IEMA guidelines. The IEMA guidelines provide the following two broad rules-of-thumb on determining the geographical extent of assessments:

- Rule 1: Include highway links where traffic flows will increase by more than 30% (or the number of heavy goods vehicles will increase by more than 30%); and
- Rule 2: Include any other specifically sensitive areas where traffic flows will increase by 10% or more.

17.21 The extent of the study areas has been established from existing traffic flow data, with growth applied to a future base year (2027), and the forecast vehicle trip generation of the Proposed Development, both for construction vehicle trips and operational vehicle trips.

17.22 The links included in the study area assessment are any radial or key local routes close to the Proposed Development which have been included in a trip distribution study to determine the effects of the Proposed Development on the local highway network.

Sensitive Receptors

17.23 The IEMA Guidelines identify affected groups and special interests in sensitive areas which should be considered:

- People at home;
- People in workplaces;
- Sensitive groups including children, the elderly and disabled;
- Sensitive locations e.g. hospitals, churches, schools, historical buildings;
- People walking;

- People cycling;
- Open spaces, recreational sites, shopping areas;
- Sites of ecological/nature conservation value; and,
- Sites of tourist / visitor attraction.

17.24 Categories of receptor sensitivity have been defined from the principles set out in the IEMA guidelines and include the following:

- The need to identify particular groups or locations which may be sensitive to changes in traffic conditions;
- The list of affected groups and special interests set out in the guidance;
- The identification of links or locations where it is felt that specific environmental problems may occur; and
- Sensitive areas "... would include accident blackspots, conservation areas, hospitals, links with high pedestrian flows etc."

17.25 These categories have therefore been used to outline in broad terms the sensitivity of receptors to traffic for the categories of impact assessed in this chapter, although in detail each receptor assessed will have a different sensitivity to each specific impact.

17.26 Principles set out in the IEMA guidelines have been used to determine the sensitivity of the identified groups within the study area. The receptors and their corresponding sensitivity which have been used to inform the assessment are set out in **Table 17.1** below.

Table 17.1: Sensitivity Receptor Rating from IEMA, 1993

HIGH	MEDIUM	LOW
Schools, colleges and other educational institutions	Parks and recreation areas	Open space
Hospitals, surgeries and clinics	Shopping areas	Tourist / visitor attractions
Retirement or care homes for the elderly or infirm	Areas containing a combination of residential and office amenity	Historical buildings
Roads used by pedestrians with no footways	Links used by pedestrians with narrow footways	Churches
Links with high pedestrian or cycle flows		Light industrial areas
Accident blackspots		Bus only links
Conservation areas		

17.27 The shaded cells within **Table 17.1** illustrate the sensitivity receptors outlined by IEMA, that have been identified as having the potential to be affected by the proposals as part of Cambridge North.

17.28 The LPA's scoping response indicated that Cambridge North Railway Station should be included in the assessment as a location containing high sensitivity receptors.

17.29 Based on the scoping opinion and the IEMA guidance, it is therefore considered that there are two high sensitivity receptors – links with high pedestrian or cycle flows and Cambridge North Railway Station.

- 17.30 The locations and user groups relevant to the above high sensitivity receptors include pedestrians and cyclists using Cowley Road and Station Square.
- 17.31 It is considered that there is one low sensitivity receptor in the study area for Cambridge North – light industrial areas. At present Cowley Road provides access to a number of light industrial uses to the north of the road.
- 17.32 Further to the above, another local link that is both a bus only link (low sensitivity based on IEMA guidance) and a link with a high pedestrian or cycle flow (high sensitivity based on IEMA guidance) is the shared use walking and cycle track alongside the Cambridgeshire Guided Busway.
- 17.33 It was concluded that because the flows of vehicular traffic – including buses – is not anticipated to change in association with the Proposed Development, that this link would be scoped out of the assessment.

Operational

- 17.34 The study area assessment for operational trips is included in **Table 17.2** below. This assessment is based on a trip generation calculation which demonstrated that 1,653 two-way daily vehicle trips are associated with the Proposed Development.
- 17.35 The trip distribution exercise using this trip generation have been undertaken using the Average Annual Daily Traffic (AADT) and has included the following assumptions:
- All arrivals/departures to the Proposed Development route along Cowley Road;
 - The turning counts between Milton Road/ Cowley Road are based on previous traffic surveys which demonstrated that 27% of traffic routes to/from Milton Road south and 72% of traffic routes to/from Milton Road north;
 - All traffic which routes towards Milton Road south follows the ring-road (A1134 Elizabeth Way and A1303 Newmarket Road); and
 - All traffic which routes towards Milton Road north subsequently routes via the A14.

Table 17.2: Study Area – Operational Traffic Flow Assessment

LINK	AADT NO DEVELOPMENT	AADT WITH PROPOSED DEVELOPMENT	% DIFFERENCE
Cowley Road	2,462	4,115	67%
A1309 Milton Road	32,674	33,848	4%
A1134 Elizabeth Way	29,648	30,127	2%
A1303 Newmarket Road	27,091	27,570	2%
Histon Road	27,376	27,376	0%
A14 (Junction 33) – slip roads	30,870	31,497	2%

- 17.36 In reference to the IEMA Rule 2 criteria, links with high pedestrian and cycle flows are identified as sensitive receptors (as outlined in Section 17.23). Only Cowley Road exceeds the Rule 2 threshold for including within the assessment. The level of change in trips forecast on the other links falls well below the threshold of a 10% increase identified in the IEMA guidelines requiring assessment. Cambridge North Station is also identified as a location containing high sensitivity

receptors however, the operational vehicle trips associated with the Proposed Development are not expected to travel past Station Square and the station itself, instead turning off Cowley Road into the car park areas associated with the proposed uses. For this reason, Cambridge North railway station is not assessed further.

17.37 In reference to IEMA Rule 1 criteria, and based on the forecast traffic flows in **Table 17.1**, only Cowley Road exceeds the Rule 1 criteria – traffic flows increasing by at least 30% - for including within the assessment. On the other links forecast to accommodate development traffic, the level of change from the baseline flows falls well below the thresholds identified in the IEMA guidelines for including within the assessment.

17.38 This study area including Cowley Road is shown in **Figure 17.1** below, compared to the indicative site outline.

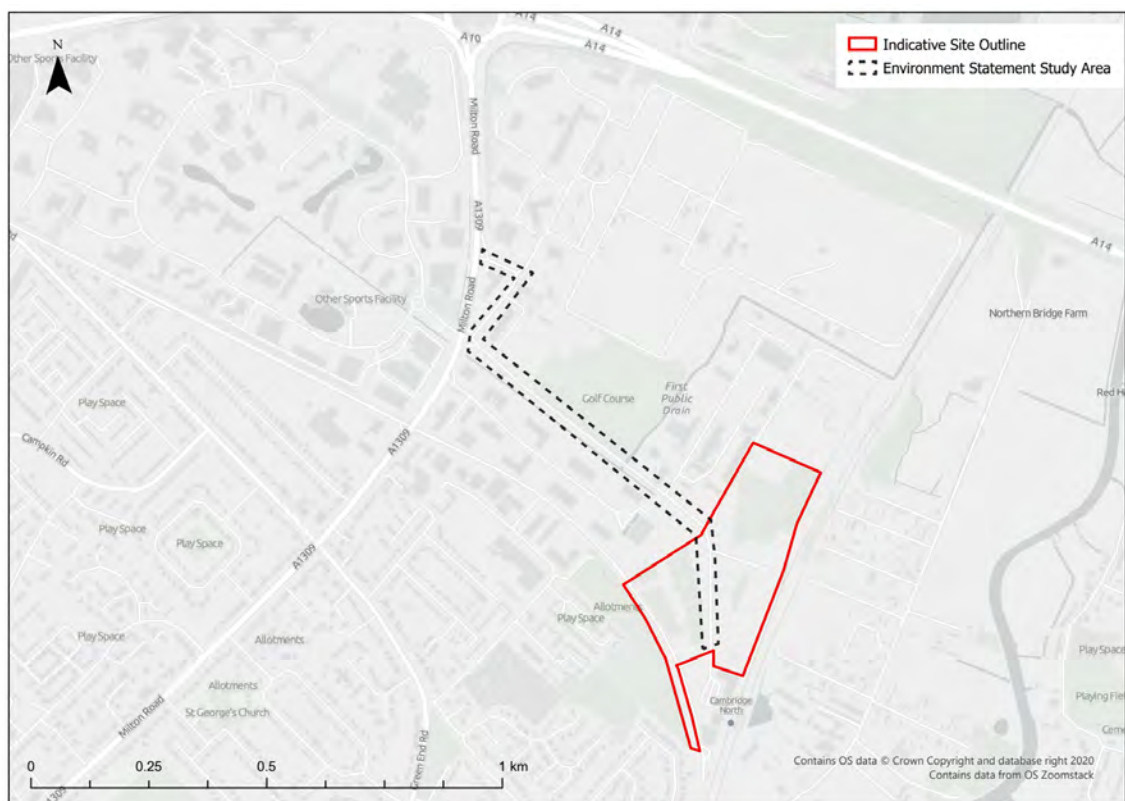


Figure 17.1: Traffic and Transport Study Area

17.39 For the purposes of this assessment, Cowley Road has been divided into sections which have been assessed individually. This is because link characteristics, and in particular the pedestrian environment, varies along the link and thus might be impacted by the Proposed Development to a different extent.

17.40 As shown in **Figure 17.2**, Cowley Road has been divided into the following four sections:

- **Section 1:** North-south link between Cambridge North station and northern boundary of the Proposed Development;
- **Section 2:** Northwest-southeast link between the northern boundary of the Proposed Development and the exit-left-only junction with Milton Road;

- **Section 3:** North-south and east-west link between the exit-left-only junction with Milton Road and a signalised T-junction with Milton Road;
- **Section 4:** North-south link providing access to St John’s Innovation Park, a number of other light industrial units and the Jane Coston Cycle Bridge.

17.41 Only sections 1-3 of Cowley Road are relevant for this study, as any vehicle routing to/from the Proposed Development will use these links. Section 4 is not relevant for this study as no vehicles would have reason to use the link. It has therefore not been included in the scope of the assessment.

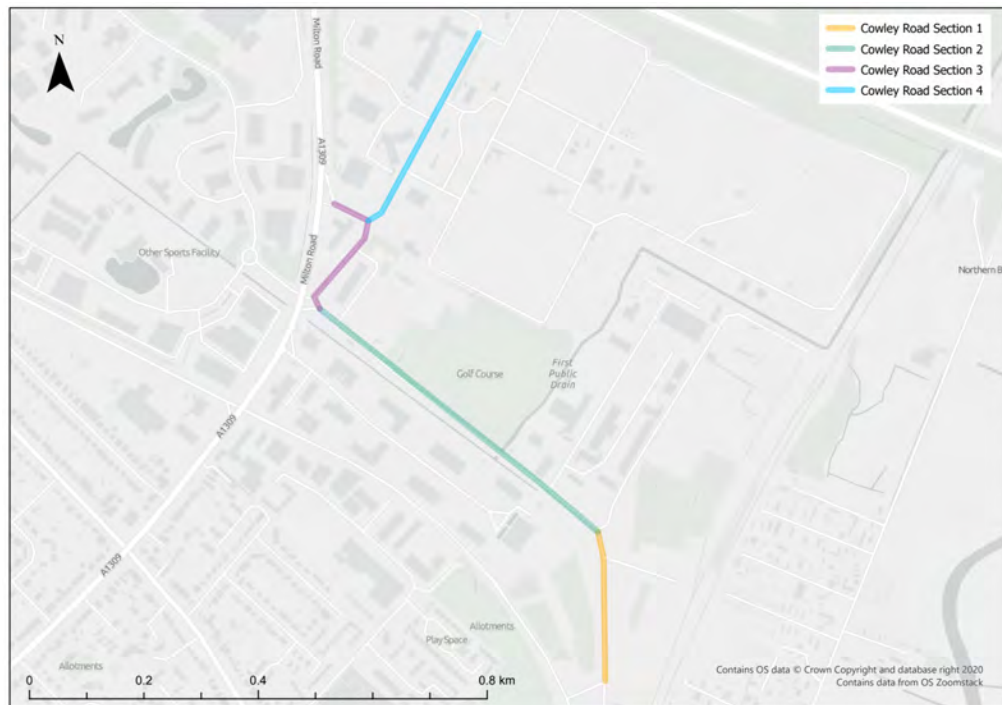


Figure 17.2: Cowley Road Study Area

Construction

17.42 The study area assessment for construction-related trips separately considers construction-related staff trips, and construction vehicles (HGV movements).

Construction Staff

17.43 The study area assessment for construction staff trips is included in **Table 17.3**, below. This assessment is based on advice from the professional team that the anticipated typical number of construction staff on site would be 100, but during peak construction periods this could increase to a peak of 250 construction staff members.

17.44 The contractors experience of similar construction operations in the area is that 75% of construction staff would travel as car drivers, and the remaining 25% travel via other means, including as car passengers, it has been estimated that the worst-case peak traffic trip generation by construction staff would be 375 two-way daily trips.

17.45 Assumptions on the distribution of these trips are in line with those set out in the operational study area assessment and give rise to the changes in flow shown in **Table 17.3**.

Table 17.3: Study Area – Construction Staff Traffic Flow Assessment

LINK	AADT NO DEVELOPMENT	AADT WITH PROPOSED DEVELOPMENT IN CONSTRUCTION	% DIFFERENCE
Cowley Road	2,462	2,837	15%
A1309 Milton Road	32,674	33,049	1%
A1134 Elizabeth Way	29,648	29749	0%
A1303 Newmarket Road	27,091	27091	0%
Histon Road	27,376	27376	0%
A14 (Junction 33) – slip roads	30,870	31,245	1%

17.46 In reference to the IEMA Rule 1 criteria, and based on the forecast traffic construction traffic flows in **Table 17.3**, the assessment demonstrates that no links within the assessment exceed the threshold to be included in the assessment.

17.47 In reference to the IEMA Rule 2 criteria, links with high pedestrian and cycle flows are identified as sensitive receptors. Only Cowley Road exceeds the Rule 2 threshold for including within the assessment. The level of change in trips forecast on the other links falls well below the threshold of a 10% increase identified in the IEMA guidelines requiring assessment. Cambridge North Station is also identified as a location containing high sensitivity receptors however, the construction staff vehicle trips are not expected to travel past Station Square and the station itself, instead turning off Cowley Road into a construction logistics area/site parcels under construction. For this reason, Cambridge North railway station is not assessed further.

Construction Vehicles

17.48 The assessment of construction vehicles takes into consideration a baseline construction vehicle daily flow and a baseline plus peak period construction vehicle daily flow. Whilst the duration of peak periods is expected to be short, for robustness purposes both have been included in this study area assessment.

17.49 It is assumed that construction vehicle trips would be subject to a Construction Traffic Management Plan which would likely contain a routeing strategy. For the purposes of this assessment, it has been assumed that any routeing strategy would direct all HGVs associated with the construction of the Proposed Development to the Strategic Road Network within the shortest possible distance. This routeing strategy would mean that 100% of HGV trips would route via Cowley Road and Milton Road to the A14 Junction 33.

17.50 The study area assessment for baseline construction vehicle trips (i.e.: the assumed baseline average trip profile) is included in **Table 17.4** below. This assessment is based on advice from the professional team that suggests there would be up to 80 two-way daily HGV construction trips in the baseline construction scenario.

Table 17.4: Study Area – HGV Baseline Traffic Flow Assessment

LINK	HGV AADT NO DEVELOPMENT	HGV AADT WITH PROPOSED DEVELOPMENT IN CONSTRUCTION	% DIFFERENCE
Cowley Road	302	382	26%
A1309 Milton Road	1628	1708	5%
A1134 Elizabeth Way	653	653	0%
A1303 Newmarket Road	818	818	0%
Histon Road	552	552	0%
A14 (Junction 33) – slip roads	3677	3757	2%

- 17.51 In reference to the IEMA Rule 1 criteria and based on the forecast traffic construction traffic flows in **Table 17.4**, no links within the assessment exceed the threshold to be included in the assessment.
- 17.52 In reference to the IEMA Rule 2 criteria, links with high pedestrian and cycle flows are identified as sensitive receptors. Only Cowley Road exceeds the Rule 2 threshold for including within the assessment. The level of change in trips forecast on the other links falls well below the threshold of a 10% increase identified in the IEMA guidelines requiring assessment. Cambridge North Station is also identified as a location containing high sensitivity receptors however, the construction vehicle trips are not expected to travel past Station Square and the station itself, instead turning off Cowley Road into a construction logistics area/site parcels under construction. For this reason, Cambridge North railway station is not assessed further.
- 17.53 The study area assessment for peak construction vehicle trips is shown in **Table 17.5** below. This assessment is based on advice from the professional team that suggests there would be up to 120 two-way daily HGV construction trips in a worst-case ‘peak construction’ scenario.

Table 17.5: Study Area – HGV Peak + Baseline Traffic Flow Assessment

LINK	HGV AADT NO DEVELOPMENT	HGV AADT WITH PROPOSED DEVELOPMENT IN CONSTRUCTION	% DIFFERENCE
Cowley Road	302	422	40%
A1309 Milton Road	1628	1748	7%
A1134 Elizabeth Way	653	653	0%
A1303 Newmarket Road	818	818	0%
Histon Road	552	552	0%
A14 (Junction 33) – slip roads	3677	3797	3%

- 17.54 In reference to the IEMA Rule 1 criteria and based on the forecast construction traffic flows in **Table 17.5**, the threshold is potentially exceeded on Cowley Road at the height of the peak construction period.
- 17.55 In reference to the IEMA Rule 2 criteria, links with high pedestrian and cycle flows are identified as sensitive receptors. Only Cowley Road exceeds the Rule 2 threshold for including within

the assessment. The level of change in trips forecast on the other links falls well below the threshold of a 10% increase identified in the IEMA guidelines requiring assessment. Cambridge North Station is also identified as a location containing high sensitivity receptors however, the construction vehicle trips are not expected to travel past Station Square and the station itself, instead turning off Cowley Road into a construction logistics area/site parcels under construction. For this reason, Cambridge North railway station is not assessed further.

Significance Criteria

- 17.56 The methodology and significance criteria utilised in this chapter reflect those contained within the IEMA guidance document.
- 17.57 The significance of potential traffic and transport effects has been determined using criteria developed from best practice techniques. The significance of effect is derived from measures of the magnitude (or scale) of the effect and the sensitivity (or importance) of the receptors affected.
- 17.58 The categories of sensitivity and magnitude are defined and assessed to determine the significance of the effect.
- 17.59 For the purposes of this assessment, cyclists have also been considered wherever pedestrians are considered. This is in response to scoping feedback from CCC which stated that “considering the high number of cyclists in Cambridge, cycling should be formally recognised as a significant mode of transport.” The following additional effects are therefore considered as part of this assessment:
 - Cyclist delay; and,
 - Cyclist amenity.

Magnitude of Impact

- 17.60 The broad principles of assessing the environmental effects are included in the IEMA Guidelines for the Environmental Assessment of Road Traffic.
- 17.61 These are summarised in **Table 17.6** below:

Table 17.6: Assessment Summary Principles

EFFECT	ASSESSMENT CRITERIA
Severance	<p>Severance is explained as the perceived division that can occur within a community when it becomes separated by a major traffic artery.</p> <p>Changes in traffic flow of 30%, 60% and 90% are regarded as producing ‘slight’ (minor change), ‘moderate’ (moderate change) and ‘substantial’ (major change) changes in severance respectively.</p> <p>Important to acknowledge that measurement and prediction of severance can be difficult and is based on specific local conditions and, in particular, the location of pedestrian routes, key local facilities and whether crossing facilities are provided.</p>
Driver Delay	<p>Driver delay is likely only to be a significant adverse effect when the traffic on the surrounding network is already at or close to capacity.</p>

EFFECT	ASSESSMENT CRITERIA
Pedestrian/ Cyclist Delay	Pedestrian delay is affected by changes to crossing facilities due to changes in the volume, composition or speed of traffic. A threshold of 40 seconds delay is suggested in the IEMA Guidelines which, for a link with no crossing facilities, equates to a two-way flow of around 1,400 vehicles per hour. The IEMA Guidelines also recommend that professional judgement be exercised in determining whether pedestrian delay is a significant impact.
Pedestrian/ Cyclist Amenity	Pedestrian and cyclist amenity refers to the relative pleasantness of a journey. This can be affected by traffic flow, traffic composition, the width of the footway and cycleway and the level of separation from traffic. A threshold for judging the significance of changes in pedestrian amenity would be traffic flow, or its HGV component, halving or doubling.
Fear and Intimidation	Fear and Intimidation refers to the impact on people from the volume of traffic, the composition of heavy vehicles, the proximity of people to traffic or the lack of protection i.e., narrow footways. There is no commonly agreed threshold for assessing fear and intimidation, so the severance criteria has been used to inform assessment of this effect.
Accidents and Safety	Based on professional judgement as to whether any local circumstances or actors might elevate or lessen the risk of accidents.

Determining the Significance of Effect

- 17.62 The effect of the Proposed Development on the sensitive receptors has been evaluated using professional judgement by combining the assessment of impact magnitude and receptor sensitivity.
- 17.63 The effects have been classified as beneficial or adverse and have adopted the following scale:
- **Major effect:** where the Proposed Scheme is likely to cause a considerable change from the baseline conditions and the receptor has limited adaptability, tolerance or recoverability or is of the highest sensitivity. This effect is considered to be ‘Significant’;
 - **Moderate effect:** where the Proposed Scheme is likely to cause either a considerable change from the baseline conditions at a receptor which has a degree of adaptability, tolerance or recoverability or a less than considerable change at a receptor that has limited adaptability, tolerance or recoverability. This effect may be ‘Significant’ but will be subject to professional judgement which could change this;
 - **Minor effect:** where the Proposed Scheme is likely to cause a small, but noticeable change from the baseline conditions on a receptor which has limited adaptability, tolerance or recoverability or is of the highest sensitivity; or where the Proposed Scheme is likely to cause a considerable change from the baseline conditions at a receptor which can adapt, is tolerant of the change or/and can recover from the change. This effect is considered less likely to be ‘Significant’ but will be subject to professional judgement; and
 - **Negligible:** where the Proposed Scheme is unlikely to cause a noticeable change at a receptor, despite its level of sensitivity or there is a considerable change at a receptor which is not considered sensitive to a change. This effect is ‘Insignificant’.
- 17.64 The assessment also considers whether each effect is **permanent** or **temporary**.

Baseline Conditions

The Site

- 17.65 The Site is predominantly brownfield with commercial, car parking, rail infrastructure and vacant hardstanding areas
- 17.66 The Site is bounded by the Novotel hotel and office building to the south, an existing estate road which forms an extension to the Cambridgeshire Guided Busway to the west, the railway to the east and former rail land to the north.
- 17.67 The location of the Proposed Development site in relation to Cambridge City Centre and the wider Cambridge area is shown in **Figure 17.3** below:

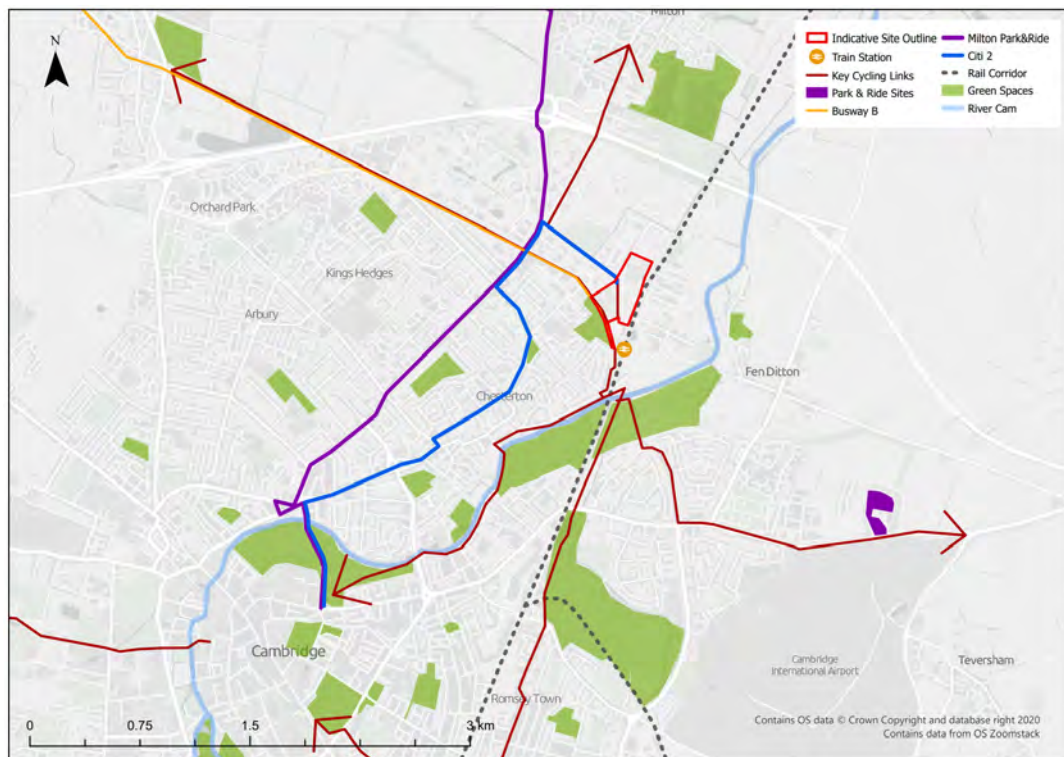


Figure 17.3: Indicative Site Location Plan

- 17.68 Works on the first phase of development at Cambridge North has already commenced. This includes a Novotel hotel located to the immediate south of the Site (which opened in 2021), Cambridge North Railway Station (which opened in 2017) and an office development known as One Cambridge Square to the northwest of the station (planning application S/4478/17) which is currently under construction.

Baseline Transport Conditions

- 17.69 The TA (**Appendix 17.1**) sets out the baseline transport conditions in the vicinity of the Site. To avoid undue repetition these are not included in detail in this chapter. However, the TA sets out baseline conditions under the following headings:
- Walking and Cycling Accessibility
 - Public Transport
 - The Local Highway Network

- Car Parking
- Highway Safety

17.70 Since motorised vehicle movements tend to give rise to the most environmental impacts, baseline conditions on the local highway network are set out in full in this chapter below.

17.71 The existing local highway network links discussed in this section are illustrated in **Figure 17.4**.

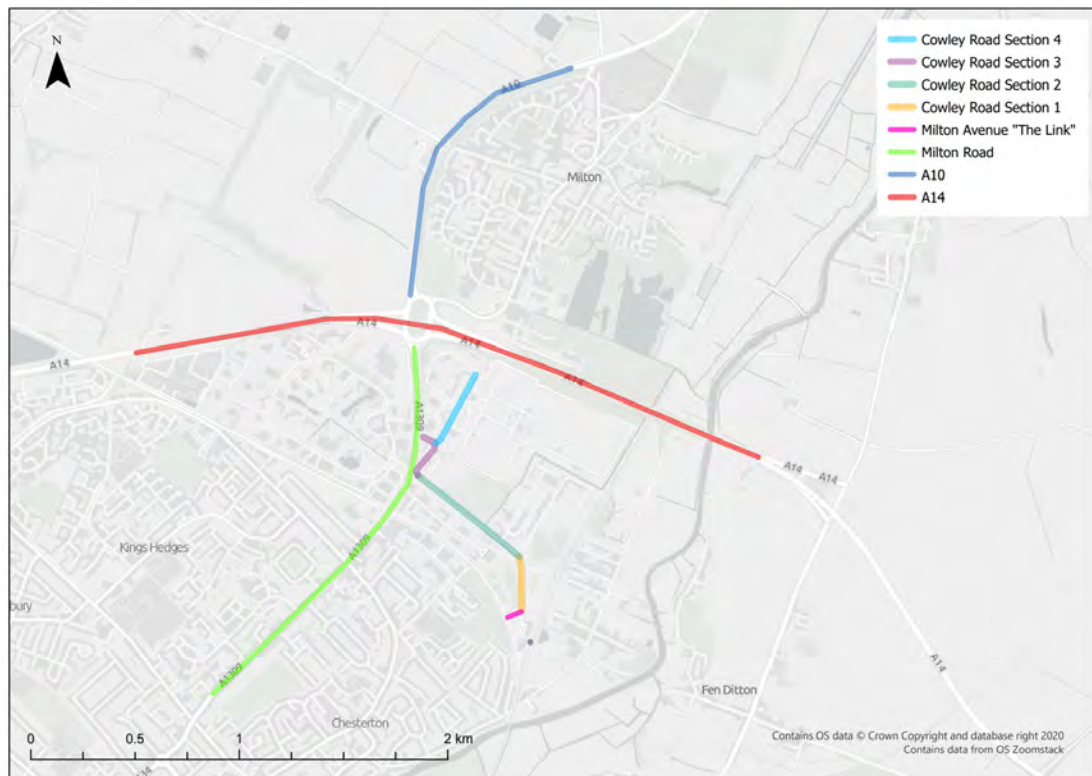


Figure 17.4: Local Highway Network

Cowley Road

17.72 As discussed above in Section 17.39, Cowley Road has been divided into four sections in this chapter.

17.73 As part of the existing development of Cambridge North Railway Station, Cowley Road has been extended to the south towards the Station through the Proposed Development site (Section 1). It is proposed in the future that this section of the road will be known as Milton Avenue once the Proposed Development is complete.

17.74 Section 2 of Cowley Road is a single carriageway link that is 7.3m in width. There are currently several access points forming priority junctions from the northern side of the carriageway. These provide access into a light industrial park, Cambridge Golf Driving Range, Veolia Waste Management Depot and the Cambridge City Council Depot. The road is subject to a 30mph speed limit. A 2m footway is provided adjacent to the carriageway on the northern side of the road, and street lighting is present.

17.75 Section 3 of Cowley Road includes two junctions with Milton Road. The recently redeveloped

southern junction permits left-turn movements from Cowley Road onto Milton Road only. Whilst the vehicle movement onto Milton Road is unsignalised, the junction does feature a staggered toucan crossing point for pedestrians and cyclists.

17.76 The northern junction, approximately 200m further north, is a signalised T-junction with all movements permitted.

17.77 Section 4 of Cowley Road interfaces with Section 3 at a priority T-junction. To the north of this junction, Cowley Road routes north-south and is a no-through road for vehicles, providing access into St John's Innovation Park and Cambridge Waste Water Treatment Works.

The Link

17.78 The Link routes northeast-southwest from between the Cambridgeshire Guided Busway and Cowley Road. The link, created as part of the wider Cambridge North works, is a single carriageway subject to a 30mph speed limit.

Milton Road

17.79 Milton Road (A1309) is a key arterial road into Cambridge City Centre from Junction 33 of the A14. The section between the A14 Junction 33 and access to the Cambridge Science Park is a dual carriageway with a 40mph speed limit.

17.80 Milton Road to the south of the Cowley Road junction is scheduled for highways improvements in late 2022. Promoted by the Greater Cambridge Partnership (GCP), the scheme includes changes to signalised junctions, implementation of bus lanes and cycling infrastructure.

The Primary Route Network: A14 and A10

17.81 The A14 is accessed from Junction 33, the Milton Interchange. This is a signalised grade-separated junction with access on/off the A14 in both directions. The A14 is a Trunk Road for which National Highways is the highway authority. It provides access east to Newmarket, Bury St Edmunds, Ipswich and Felixstowe, and west to the West Midlands and the M1 and M6 at the Catthorpe Interchange, and the A1/A1(M) at the Brampton Interchange west of Huntingdon.

17.82 West of Junction 33, the A14 is dual-3 lane standard with a lane gain/lane drop arrangement. East of Junction 33 the carriageway is of dual-2 lane standard.

17.83 The A14 Junction 33 also provides access to the A10 north, part of the Primary Route Network, which is a key corridor connecting Cambridge to Kings Lynn via Ely and providing vehicular and bus access to Milton Park & Ride.

Collision Data

17.84 An assessment of collision data for the local highway network over the latest 5-year period has been undertaken as part of the TA.

17.85 The assessment demonstrated that there are only three collisions which occurred within the ES study area on Cowley Road, with a further two collisions at the Milton Road/ Cowley Road junction.

17.86 One collision located at the junction between Milton Road and Cowley Road resulted in injury to a cyclist.

17.87 The assessment of the collisions did not indicate that there are any clusters of collisions. The

lack of pattern to the collisions and the low number of collisions within the study area has led to a conclusion that there is not a significant existing highway safety issue in the vicinity of the Site.

Summary

- 17.88 The TA (**Appendix 17.1**) provides an overview of the baseline transport conditions in the vicinity of the Proposed Development including active travel routes, public transport links and the highway network.
- 17.89 The above summary of the Proposed Development provides detail on the local highway network to the Site that was considered as part of the study area assessment in this ES.

Future Baseline Conditions

- 17.90 As required by Schedule 4 of the 2017 EIA Regulations, an ES must contain an outline of the likely evolution of the baseline conditions without implementation of the development. This needs to be “as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge.”
- 17.91 There are a number of local committed developments which will impact the future baseline scenario. These are summarised below:

Milton Road Improvements

- 17.92 The GCP is proposing a number of measures to improve Milton Road.
- 17.93 These include providing better cycling and walking links, enhancing the streetscape and providing more reliable public transport measures.
- 17.94 The finalised proposed design was presented to the GCP Executive Board in 2019 and works on site are anticipated to begin in late 2022.
- 17.95 There are no changes proposed to either Cowley Road / Milton Road junction as part of the works or the Cambridgeshire Guided Busway / Milton Road junction. However, the proposals do include a new parallel crossing point of Milton Road to the west of the Cambridgeshire Guided Busway, close to the entrance of the subway.

Cowley Road Improvements

- 17.96 A recent planning application 20/03523/FUL for a development as part of the expansion of St John’s Innovation Park was submitted which details the proposed improvements to Cowley Road.
- 17.97 The proposals include improvements to the Jane Coston Bridge interface with Cowley Road and widening the shared use walking and cycle route along Cowley Road.
- 17.98 The planning application is yet to be approved; a decision notice will be issued once the Section 106 is agreed.

Waterbeach Greenway

- 17.99 The Waterbeach Greenway – part of the wider Greater Cambridge Greenways Project – will be an active travel route to improve the journey for people walking and cycling between Waterbeach and Cambridge.

17.100 It is proposed that the Waterbeach Greenway will have two 'branches' through the study area. From the south, the route utilises the existing Chisholm Trail to Cambridge North, at which point it splits with one branch through the area of the Proposed Development and crossing the A14 at a new crossing, whilst the other routes via Cowley Road and the existing Jane Coston Bridge and through Milton Country Park.

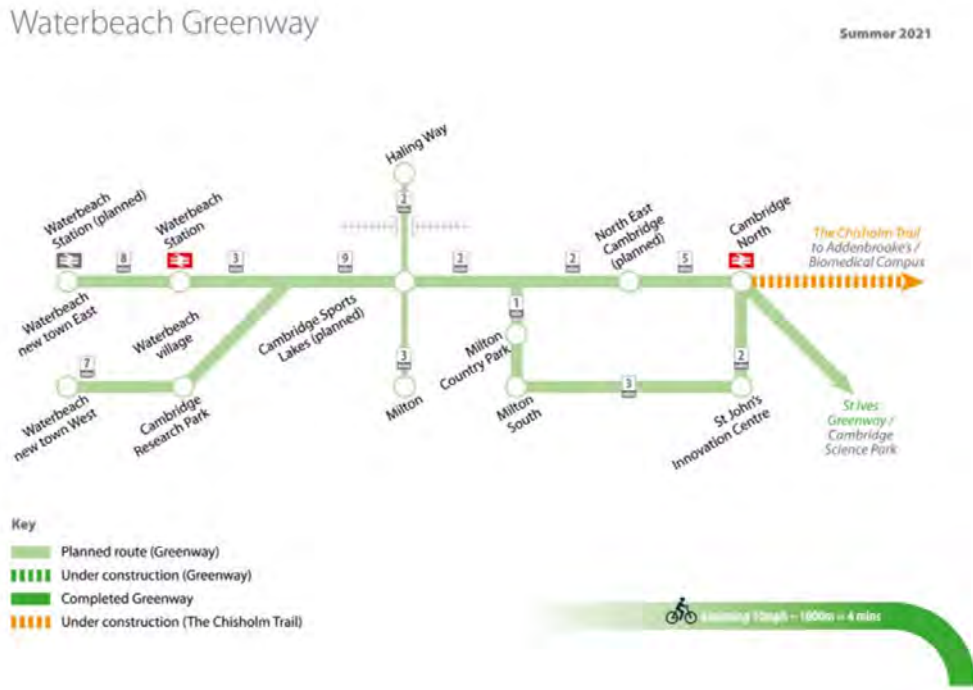


Figure 17.4: Local Highway Network

Source: Greater Cambridge Partnership

Cowley Road Crossing Points

17.101 A S106 contribution was made in connection with the One Cambridge Square office building (S/4478/17/FL) for the construction of new footway links including two bridge crossings of First Public Drain along Cowley Road. The bridges, to be delivered by CCC would provide a connection between the segregated footway/cycleway along the southern side of Cowley Road and the main carriageway, enhancing access to the land uses to the north.

Predicted Effects

17.102 This section identifies and assesses the likely significant impacts resulting from the Proposed Development and considers the impacts during the construction and operational phases.

17.103 Where any predicted impacts are identified, this section outlines:

- The source and/ or cause of the impact;
- The magnitude of the impact (major, moderate, minor or negligible);
- The receptor(s) affected (if any);
- The way in which the effect is transmitted from the source to receptor;
- The level of significance of the impact (major, moderate, minor or negligible either beneficial or adverse); and

- Potential consequences.

Assessment of Effects

Construction Effects

- 17.104 Potential construction related transport effects are caused by Heavy Goods Vehicles (HGVs) and construction staff movements to and from the Proposed Development.
- 17.105 As discussed within the study area introduction, an assessment was undertaken to determine whether the impact of HGVs or construction staff met the threshold level to be included within this assessment.
- 17.106 It was determined that the number of construction staff-related movements is forecast to exceed the threshold to include these effects within this assessment on Cowley Road due to the presence of sensitive receptors in the form of high pedestrian and cycle flows.
- 17.107 Similarly, under the 'baseline' typical construction scenario it was also determined that HGV movements would reach the necessary threshold to include these effects within the assessment for Cowley Road only, and the threshold is forecast to be exceeded on Cowley Road during periods of peak construction.
- 17.108 Given the potential for the threshold to be reached on Cowley Road, the potential effects have been considered below.

Severance

- 17.109 IEMA Guidance suggests "that changes in traffic flow of 30%, 60% and 90% are regarded as producing slight, moderate and substantial changes in severance respectively". Severance effects are dependent on *total* vehicular flows (AADT Cowley Road 2,462). The increase in movements in the temporary construction scenario, when considering both staff and HGV trips (455 movements) is 18% of overall flow. It is therefore considered that the Proposed Development will have a **Temporary Adverse**, but **Negligible** impact.

Driver Delay

- 17.110 Transport modelling of the local highway network, including for the Cowley Road / Milton Road junctions, was undertaken during the preparation of the TEB assessment for the draft Cambridge North Area Action Plan.
- 17.111 The models demonstrated that, if development across the NEC is brought forward and is delivered within the identified vehicular trip budgets, "both total network delay and individual junction delay is similar to existing in both peak hours" (see Table 20, North East Cambridge Area Action Plan Transport Evidence Base, 20 September 2019).
- 17.112 The TA (**Appendix 17.1**) has demonstrated that the Proposed Development will operate within its allocated trip budget during the operational phase. The two-way morning and evening peak hour trip budgets allocated to this site are 356 and 274 vehicles per hour respectively. In the worst-case 'peak construction' scenario considered here, the maximum two-way vehicle generation during the construction phase has been established as 455 vehicle movements *per day*.
- 17.113 Given the above, the effect on driver delay is considered to be **Temporary Adverse** but **Negligible**.

Pedestrian and Cyclist Delay

- 17.114 In terms of pedestrian and cyclist delay, the IEMA Guidelines suggest an upper threshold of 40 second delay to pedestrians (and cyclists) at a crossing point. For a link with no crossing facilities this equates to a two-way flow of 1,400 vehicles per hour.
- 17.115 The trip distribution exercise set out in the TA (**Appendix 17.1**) indicates that the baseline traffic flow data, and traffic flows including the Proposed Development, do not exceed this threshold on Cowley Road during the *operational* phase, when the Proposed Development is assessed to generate not more than 150 additional two-way trips in the peak hour on Cowley Road.
- 17.116 In the worst-case 'peak construction' scenario considered here, the maximum two-way vehicle generation during the construction phase has been established as 455 vehicles movements *per day*. This is significantly less than assessed during the operational phase. Given this, the effect on pedestrian and cyclist delay is considered to be **Temporary Adverse** but **Negligible**.

Pedestrian and Cyclist Amenity

- 17.117 Pedestrian and cyclist amenity is affected by a range of factors such as traffic flow and composition, footway and cycleway width and separation from traffic. In respect of pedestrian amenity, the IEMA Guidelines suggest a doubling or halving of traffic flow, or its HGV component, as a threshold for judging the significance of changes.
- 17.118 The short-term temporary increase in peak HGV movements associated with construction of the Proposed Development, against the baseline level of HGV movements on Cowley Road, is predicted to be approximately 40%. If, however, these temporary peak HGV movements are compared with *total* AADT flows on Cowley Road, the change is less than 5%. The overall change in vehicle movements during the 'peak construction' scenario (455 vehicle movements) equates to an 18% increase.
- 17.119 These changes are significantly less than the doubling/halving thresholds identified above. Given this, the effect on pedestrian and cyclist amenity is considered to be **Temporary Adverse** but **Negligible**.

Accidents and Safety

- 17.120 A detailed analysis of the collision record over the latest available five-year period has been undertaken in the baseline assessment. The records show that two collisions have occurred on the section of Cowley Road which falls within the study area. One collision occurred on Section 2 of Cowley Road and the other on Section 3. Neither collision involved a pedal cyclist or a pedestrian.
- 17.121 There is therefore no evidence of a collision cluster along the link in terms of location. Although the causation cannot be determined using the available dataset, the locations of the two collisions – on distinctly separate parts of Cowley Road – does not suggest any single underlying contributory factor.
- 17.122 Whilst the proposed scheme is forecast to temporarily increase construction-related movements along these links where collisions have occurred, the review of collision data has not highlighted any prevailing highway safety issues which would be exacerbated by this level of traffic.
- 17.123 It is therefore considered that any impact is likely to be **Temporary Adverse** but **Negligible**.

Operational Effects

17.124 As outlined above, the study area for this Chapter focuses on three defined sections of Cowley Road.

Severance

17.125 Cowley Road is the only vehicular access point to/from the Proposed Development and the rest of the highway network. Currently Cowley Road is utilised for vehicular trips to Cambridge North station, a number of commercial and light industrial developments which are accessed via Section 2 of Cowley Road, a Network Rail railhead, and an aggregate and asphalt plant.

17.126 **Table 17.2** demonstrated that the Proposed Development is forecast to increase traffic flows along Cowley Road by up to 67%. It is not anticipated that there will be a change in excess of 10% in terms of heavy vehicle usage associated with the operational phase of the Proposed Development. This would be a permanent impact.

17.127 IEMA guidance suggests “that changes in traffic flow of 30%, 60% and 90% are regarded as producing slight, moderate and substantial changes in severance respectively”. As severance effects are dependent on *total* vehicular flows (AADT Cowley Road 2,462), the increase in movements associated with the operation of the Proposed Development (1,653 movements) is more than the 60% threshold. It is therefore considered that the Proposed Development could potentially have a Permanent Adverse, Moderate impact on severance.

17.128 The IEMA guidelines state that links with high pedestrian and cycle flows are of high sensitivity. On all three sections of Cowley Road, pedestrians and cyclists are provided with infrastructure that is separated from the carriageway by a verge.

17.129 On Section 1, a number of informal pedestrian crossing points are identified within the masterplan. It is proposed that these crossing points would be clearly defined on the ground through the use of alternative surfacing materials and in some locations through provision of raised tables. This would provide pedestrians with a degree of priority over vehicular traffic thereby reducing severance effects along this section.

17.130 On Section 2 the segregation of pedestrians and cyclists is greatest, with a First Public Drain running parallel to the northern side of the shared foot/cycleway and a wide bank of dense vegetation. At present, there are no connections between the shared foot/cycleway and Cowley Road. However, the works proposed in connection with the One Cambridge Square office will, once complete, introduce two links. Despite this, demand to cross between the northern and southern sides of Cowley Road along Section 2 is expected to be limited based on the current land uses in the area.

17.131 Given this, it is considered that the effect of severance on pedestrians and cyclists is as follows;

- Cowley Road Section 1: **Permanent Adverse** effect considered to be **Minor**
- Cowley Road Section 2: **Permanent Adverse** effect considered to be **Negligible**
- Cowley Road Section 3: **Permanent Adverse** effect considered to be **Minor**

Driver Delay

17.132 Transport modelling of the local highway network, including for the Cowley Road / Milton Road junctions, was undertaken during the preparation of the TEB assessment for the draft Cambridge North Area Action Plan.

- 17.133 The TEB considered a number of development scenarios for the development of North East Cambridge (NEC) of which one, Scenario 2, is considered to most closely match current development proposals for NEC.
- 17.134 The models demonstrated that, if development across the NEC is brought forward and is delivered within the identified vehicular trip budgets, “both total network delay and individual junction delay is similar to existing in both peak hours” (see **Table 20**, North East Cambridge Area Action Plan Transport Evidence Base, 20 September 2019).
- 17.135 The TA (**Appendix 17.1**) has demonstrated that the Proposed Development will operate within its allocated trip budget.
- 17.136 Given the above, the effect on driver delay is considered to be a **Permanent Adverse** effect but considered to be **Negligible**.

Pedestrian and Cyclist Delay

- 17.137 In terms of pedestrian and cyclist delay, the IEMA Guidelines suggest an upper threshold of 40 second delay to pedestrians (and cyclists) at a crossing point. For a link with no crossing facilities this equates to a two-way flow of 1,400 vehicles per hour.
- 17.138 The trip distribution exercise set out in the TA indicates that the baseline traffic flow data, and traffic flows including the Proposed Development, do not exceed this threshold on Cowley Road. The trip generation assessment demonstrated that there would not be more than 150 additional two-way trips in the peak hour on Cowley Road as a consequence of the Proposed Development.
- 17.139 At the western end of Section 2 of Cowley Road is a staggered toucan crossing which provides a formal facility for pedestrians and cyclists to cross Cowley Road.
- 17.140 Given the above, the effect on pedestrian and cyclist delay is considered to be **Permanent Adverse** but **Negligible**.

Pedestrian / Cyclist Amenity

- 17.141 Pedestrian and cyclist amenity is affected by a range of factors such as traffic flow and composition, footway and cycleway width and separation from traffic. In respect of pedestrian amenity, the IEMA Guidelines suggest a doubling or halving of traffic flow, or its HGV component, as a threshold for judging the significance of changes.
- 17.142 As stated above in the section on severance, it is estimated that traffic flows on Cowley Road could increase by up to approximately 67% as a consequence of the Proposed Development. Consequently, given that this change exceeds the identified doubling threshold, the magnitude of effect on traffic flows is considered to be **Permanent Adverse, Moderate**.
- 17.143 However, the width of the footway and cycleway provision, and the level of separation from traffic, varies along the length of Cowley Road. Therefore, it is anticipated that the level of the effect on the pedestrian and cyclist amenity is as follows:
- Cowley Road Section 1: **Permanent Adverse** effect considered to be **Minor**
 - Cowley Road Section 2: **Permanent Adverse** effect considered to be **Negligible**
 - Cowley Road Section 3: **Permanent Adverse** effect considered to be **Minor**

Fear and Intimidation

- 17.144 The assessment criteria for fear and intimidation are the same as those applied above for the assessment of severance. On this basis, the magnitude of effect of operational traffic on fear and intimidation of pedestrians and cyclists on the shared use pedestrian and cycle link alongside Cowley Road is considered to be Negligible to Minor overall.
- 17.145 As above, given that the pedestrian and cycle infrastructure varies slightly along the length of Cowley Road, it is anticipated that the level of effect on the sensitivity of pedestrian and cyclist fear and intimidation is as follows:
- Cowley Road Section 1: **Permanent Adverse** effect considered to be **Minor**
 - Cowley Road Section 2: **Permanent Adverse** effect considered to be **Negligible**
 - Cowley Road Section 3: **Permanent Adverse** effect considered to be **Minor**

Accidents and Safety

- 17.146 A detailed analysis of the collision record over the latest available five-year period has been undertaken in the baseline assessment. The records show that two collisions have occurred on the section of Cowley Road which falls within the study area. One collision occurred on Section 2 of Cowley Road and the other on Section 3. Neither collision involved a pedal cyclist or a pedestrian.
- 17.147 There is, therefore, no evidence of a collision cluster along the link in terms of location. Although the causation cannot be determined using the available dataset, the locations of the two collisions – on distinctly separate parts of Cowley Road – does not suggest any single underlying contributory factor.
- 17.148 Whilst the proposed scheme is forecast to increase the traffic flows along these links where collisions have occurred, the review of collision data has not highlighted any prevailing highway safety issues which would be exacerbated by this level of traffic.
- 17.149 It is, therefore, considered that any impact is likely to be a **Permanent Adverse** effect considered to be **Negligible**.

Mitigation

- 17.150 This section sets out any scope for mitigation of any effects that have been identified as adverse in the above assessment.
- 17.151 Mitigation impacts could include measures which help to avoid, offset or reduce the adverse effects and to enhance beneficial effects.
- 17.152 If applicable, this section also sets out the mechanism for securing the mitigation and the implementation plan including the responsible party, timescale and relevance to the local planning authority (LPA).

Construction

- 17.153 Appropriate mitigation measures will be included within a Construction Traffic Management Plan (CTMP) anticipated to be required via a planning condition.
- 17.154 The CTMP would be a live document, linked to a wider Construction Environmental

Management Plan (CEMP) (**Appendix 4.2**) and managed by the contractor throughout the duration of the construction period.

- 17.155 It is anticipated that the CTMP would include the following high-level mitigation measures.
- Setting out a construction traffic routing plan;
 - Setting out appropriate parking locations for construction traffic;
 - Setting out a deliveries and loading strategy;
 - Outlining a wheel-washing protocol;
 - Provision for safe rerouting of walking and cycle routes that might be affected; and
 - Details of any works that impact on the highway to demonstrate that they will be carried out in accordance with appropriate controls and measures to ensure the safety of vehicular and non-vehicular traffic.

Residual Effects

17.156 This assessment has determined that the adverse transport impacts resulting from the Proposed Development are either minor or negligible

17.157 The residual effects are considered to be:

- **Severance:** The effect of severance on pedestrians and cyclists is considered to be minor on Sections 1 and 3 of Cowley Road and negligible on Section 2. Specific mitigation for severance is not proposed. There is likely to be a permanent, adverse effect on severance which is considered to be minor. This effect is not considered to be significant.
- **Driver Delay:** The effect on driver delay is considered to be permanent, adverse and negligible. No specific mitigation is therefore proposed, and the residual effect is considered to be negligible and not significant.
- **Pedestrian and Cyclist Delay:** The effect on pedestrian and cyclist delay is considered to be permanent, adverse but negligible. No specific mitigation is therefore proposed, and the residual effect is considered to be negligible and not significant.
- **Pedestrian and Cyclist Amenity:** The effect on pedestrian and cyclist amenity is considered to be permanent, minor adverse on Sections 1 and 3 of Cowley Road, and negligible on Section 2. No specific mitigation is proposed, and the residual effect is considered to be minor adverse but not significant.
- **Fear and Intimidation:** The effect on fear and intimidation is considered to be permanent, adverse and minor on Sections 1 and 3 of Cowley Road, and negligible on Section 2. No specific mitigation is proposed, and the residual effect is considered to be minor adverse but not significant.
- **Accidents and Safety:** The effect on accidents and safety is considered to be permanent, adverse but negligible. No specific mitigation is therefore proposed, and the residual effect is considered to be negligible and not significant.

Monitoring

17.158 This assessment indicates that there will not be any significant effects generated by the Proposed Development on sensitive groups in the area, and therefore no monitoring measures are proposed beyond those required to address Travel Plan behaviours, and trip budget

compliance. Adherence to the trip budget would be self-enforcing through low levels of on-site parking provision however, monitoring would be secured through a planning condition or S106 agreement and undertaken to assess travel patterns and any off-site car parking as a result of the Proposed Development.

Cumulative Effects

- 17.159 The assessment of transport impacts of the Proposed Development has been informed by the Transport Evidence Base prepared in support of the draft North East Cambridge Area Action Plan. The Transport Evidence Base has taken into account the impact of a number of cumulative developments in the area (including Waterbeach New Town and development at St John's Innovation Centre) in establishing an overall peak hour vehicle trip budget for North East Cambridge. The trip budget has subsequently been apportioned among the development sites, with the Proposed Development forecast to operate well within its allocated portion.
- 17.160 Other cumulative developments identified at the scoping stage are addressed below:
- 21/02450/REM: Reserved matters application 421 new homes, north of Newmarket Road. This site was allocated within the South Cambridgeshire Local Plan 2018. As a result, traffic flows associated with this site have been accounted for within the assessment that informed the Transport Evidence Base and therefore by extension the Proposed Development as a result of its conformity with the trip budget.
 - 21/04640/SCOP: DCO Scoping for the relocation of the Cambridge Waste Water Treatment Works. This site is located to the east of the Proposed Development, with proposed access via Junctions 34 and 35 of the A14. Forecast traffic levels from the Proposed Development on the A14 have been demonstrated to fall below the threshold requiring assessment based upon the IEMA guidelines. Whilst construction timescales may overlap (it is unclear at this stage), cumulative levels of construction traffic would not be expected to exceed the assessment thresholds on the A14. Operational trips associated with this scheme would be expected to be at a low level and therefore it is considered unlikely that there would be any significant cumulative traffic effects.

Conclusions and Summary of Effects

- 17.161 This chapter has assessed the potential traffic and transport impacts arising from the Proposed Development. The study area has been determined based on the thresholds for assessment set out in the IEMA Guidelines. This identified the need to consider the impacts of the Proposed Development on the users of Cowley Road.
- 17.162 During the operational phase, when impacts will generally be permanent, in respect of Severance, Driver Delay and Fear and Intimidation the residual operational effects are considered to be minor adverse and not significant. With regard to Pedestrian and Cycle Delay, Pedestrian and Cycle Amenity and an Increased Risk of Collisions, the residual operational effects are considered to be negligible. There are also temporary potential impacts associated with the 'peak construction' period, but these are assessed to be of lower overall significance when compared to the operational phase.
- 17.163 **Table 17.7** provides a summary of the effects, receptors, residual effects and a conclusion to whether each effect is significant.

Table 17.7: Summary of Impacts: Transport (Construction)

DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION	IMPACT AFTER MITIGATION (RESIDUAL)			
				ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/ LONG TERM	SIGNIFICANCE		ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/ LONG TERM	SIGNIFICANCE
Construction												
Severance	Pedestrians on shared use parallel Cowley Road link	Low	Neg	Adv	Rev	ST	Neg	CTMP linked to CEMP	Adv	Rev	ST	Neg
Driver Delay	Drivers of vehicles on Cowley Road	Low	Neg	Adv	Rev	ST	Neg	CTMP linked to CEMP	Adv	Rev	ST	Neg
Pedestrian and Cyclist Delay	Pedestrians and cyclists on shared use parallel Cowley Road link	Low	Neg	Adv	Rev	ST	Neg	CTMP linked to CEMP	Adv	Rev	ST	Neg
Pedestrian and Cyclist Amenities	Pedestrians and cyclists on shared use parallel Cowley Road link	Low	Neg	Adv	Rev	ST	Neg	CTMP linked to CEMP	Adv	Rev	ST	Neg
Fear and Intimidation	Pedestrians and cyclists on shared use parallel Cowley Road link	Low	Neg	Adv	Rev	ST	Neg	CTMP linked to CEMP	Adv	Rev	ST	Neg
Collisions	Any user on Cowley Road link	Low	Neg	Adv	Rev	ST	Neg	CTMP linked to CEMP	Adv	Rev	ST	Neg
Operational												
Severance	Pedestrians on shared use parallel Cowley Road link	Low	Min	Adv	Irrev	LT	Min	None	Adv	Irrev	LT	Min
Driver Delay	Drivers of vehicles on Cowley Road	Low	Neg	Adv	Irrev	LT	Neg	None	Adv	Irrev	LT	Neg
Pedestrian and Cyclist Delay	Pedestrians and cyclists on shared use parallel Cowley Road link	Low	Neg	Adv	Irrev	LT	Neg	None	Adv	Irrev	LT	Neg

DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION				IMPACT AFTER MITIGATION (RESIDUAL)				
				ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE	ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE	ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE	
Pedestrian and Cyclist Amenity	Pedestrians and cyclists on shared use parallel Cowley Road link	Low	Min	Adv	Irrev	LT	Min	None	Adv	Irrev	LT	Min	Adv	Irrev	LT	Min
Fear and Intimidation	Pedestrians and cyclists on shared use parallel Cowley Road link	Low	Min	Adv	Irrev	LT	Min	None	Adv	Irrev	LT	Min	Adv	Irrev	LT	Min
Collisions	Any user on Cowley Road link	Low	Neg	Adv	Irrev	LT	Neg	None	Adv	Irrev	LT	Neg	Adv	Irrev	LT	Neg

Key:

Min: Minor Irrev: Irreversible LT: Long Term Adv: Adverse
 Neg: Negligible Rev: Reversible ST: Short Term Ben: Beneficial

Wind

108

18.0 Wind

Introduction

- 18.1 This chapter addresses the likely significant effects of the Proposed Development in terms of Wind Microclimate.
- 18.2 It describes the methods used to assess the Wind Microclimate, the baseline wind conditions currently existing at the Site and surrounding area, and the likely effect of the Proposed Development on wind conditions.
- 18.3 This chapter should be read in conjunction with:
- **Appendix 18.1** CFD Analysis. This describes details of the Computational Fluid Dynamics (CFD) methodology.

Potential Sources of Impact

- 18.4 Given the height and wind exposure of the Proposed Development, the possibility of windiness levels in excess of tolerable limits for intended pedestrian, cyclist and vehicular activities has been considered. Potential impacts may include reduced usability of sensitive or frequently used areas such as entrances, pedestrian pathways and/or cycle paths.

Methodology

Scope of the Assessment

- 18.5 The EIA scoping report (**Appendix 2.1**) sets out the proposed scope of the Wind Microclimate assessment.
- 18.6 A qualitative desk study assessment has been used in conjunction with a CFD study to evaluate Wind Microclimate conditions at the existing Site (Baseline) and with the Proposed Development. The acceptability of windiness for pedestrian, cyclist and vehicular activities has been assessed based on the Lawson LDDC comfort and safety criteria. Details of the assessment methodology are described below.
- 18.7 A formal Scoping Opinion (**Appendix 2.2**) was received from South Cambridgeshire District Council in February 2022. The Council agreed that consideration of Wind Microclimate should be scoped into the ES. The potential impacts identified were agreed and the proposed assessment method was found acceptable.

Effects not considered within the Scope

- 18.8 Wind effects during construction have been scoped out, as these are not likely to be significant. Temporary plant and machinery do not give rise to significant adverse windiness at street level. Hoardings and temporary crash decks around the perimeter of the Site would provide shelter for pedestrians. As the buildings get taller and cladding is installed, wind effects would become more pronounced. However, the full extent of wind effects would only be experienced as a result of the completed development.

Wind Climate

- 18.9 The assessment of the wind climate at the Site has been based on analysis of long-term wind records from anemometer stations in the vicinity of Cambridge.

- 18.10 The closest anemometer station to the Site is Cambridge Airport, located ~2.6 km to the south-east. Examination of historical wind data from this station showed that measurements are only available for daytime, representing an incomplete dataset.
- 18.11 Historical wind records at Mildenhall RAF Station, located ~28km to the north-east of the Site, were therefore additionally considered. Measured records at this station showed an increased level of completeness; additionally, the quality of the measured wind data was considered adequate. This station was therefore chosen for the analysis of the wind climate.
- 18.12 The annual wind rose from Mildenhall RAF Station is shown in **Figure 18.1**. This represents the wind characteristics (direction and strength) across all times of day and all seasons. The wind climate at this meteorological station is representative of the wind climate in Cambridge and is generally similar to the rest of the UK.

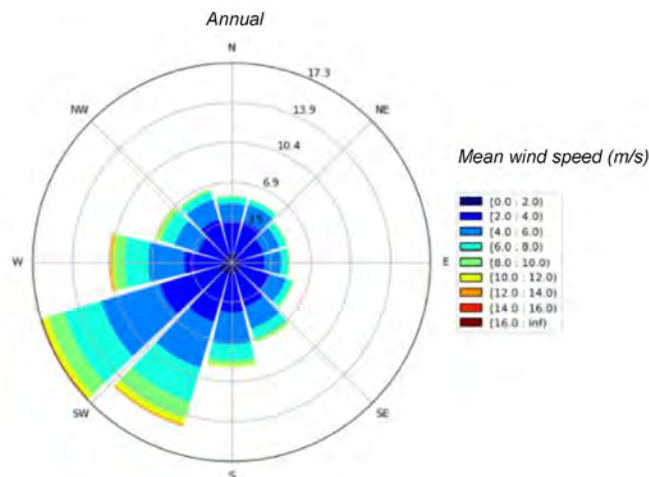


Figure 18.1: Annual wind rose from Mildenhall RAF, z=10m (2005-2022), where z is the height of the anemometer above the ground.

- 18.13 Seasonal wind roses from Mildenhall RAF are presented in **Figure 18.2**.
- 18.14 The most frequent and strongest winds at all times of the year in the UK blow from a quadrant centred on west south-west (240°E of N). These winds are relatively warm and wet. Almost all cases of serious annoyance due to strong winds around buildings are caused by winds from this direction.
- 18.15 During spring, north-east winds are almost as common as the west south-west winds, but are weaker. North-east winds are relatively cold and dry. These winds are often associated with poor internal conditions due to cold air infiltrating through doors.
- 18.16 Winds from the north-west can be as strong as the west south-west winds but are less frequent.
- 18.17 South-east winds are generally warm and light and are rarely associated with annoying ground level winds..

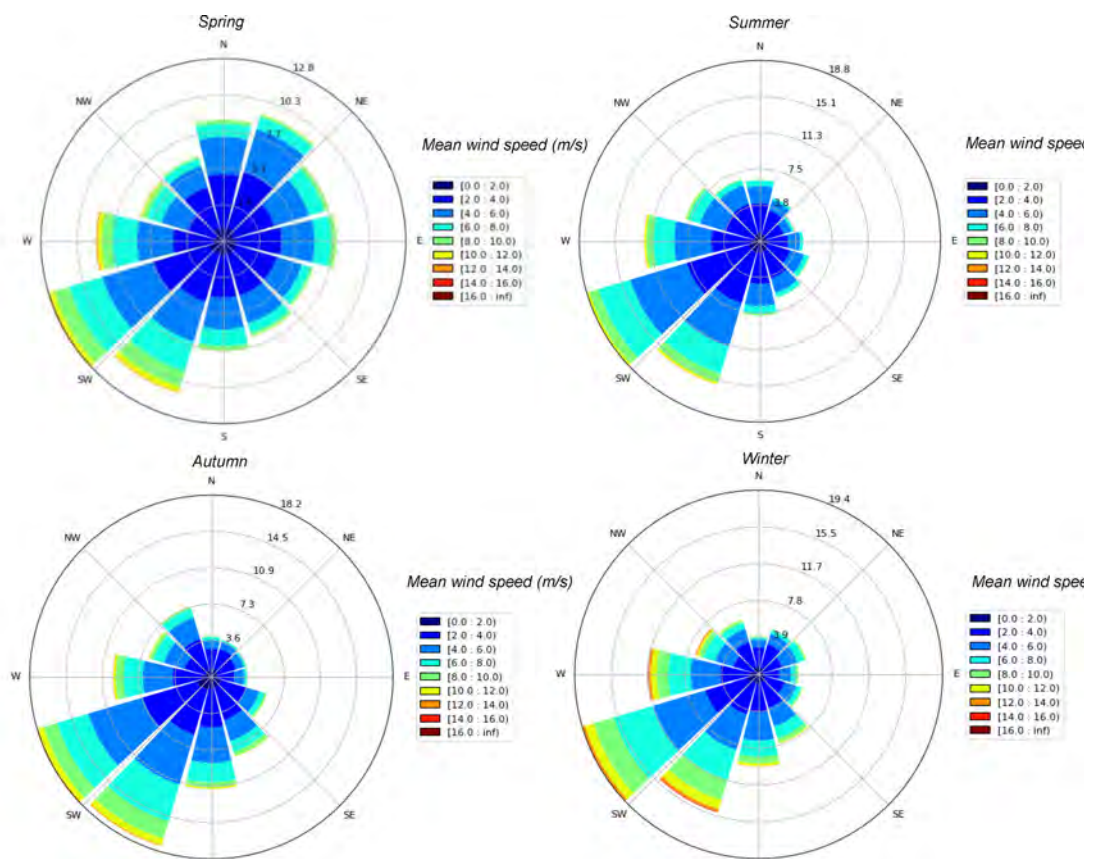


Figure 18.2: Seasonal wind roses from Mildenhall RAF, z=10m (2005-2022), where z is the height of the anemometer above the ground.

18.18 Historical wind records from Mildenhall RAF (2005-2022) were also used to derive Weibull statistics, which describe the probability distribution of wind speed and directionality. These were adjusted for differences in terrain roughness between the anemometer at Mildenhall RAF and the Site using the atmospheric boundary layer model of ESDU 01008. As explained in the section **CFD Analysis**, Weibull statistics as obtained from the wind climate study were combined with wind speed-up ratios as obtained from the CFD analysis to evaluate comfort and safety wind speeds in accordance with the Lawson LDDC criteria; these criteria are described in the **Windiness Criteria and Sensitive Receptors** section.

Environmental Wind Desk Study

18.19 An environmental wind desk study assessment based on professional judgement has been undertaken to assess wind microclimate conditions within and around the Proposed Development. The assessment has been based on: (i) a review of the wind climate conditions in Cambridge (as described in the **Wind Climate** section); (ii) a review of architectural drawings provided by the design team (see **Table 18.1**); (iii) evaluation of aerial views of the Site and surroundings and (iv) Arup’s previous experience of windiness issues for developments of similar scale and exposure.

18.20 The Lawson LDDC criteria for comfort and safety (as described in the **Windiness Criteria and Sensitive Receptors section**) have been used to assess the acceptability of windiness levels for intended pedestrian activities.

18.21 The architectural drawings which informed the desk study assessment are listed in **Table 18.1**.

Table 18.1: Architectural drawings which informed the desk study assessment.

FILE NAME	DESCRIPTION	DATE RECEIVED
"220406-Existing-Rev A"	3D architectural model of the Baseline, e.g. the existing site. Issued by ACME Architects	7th April 2022
"220406-Proposed - Rev A"	3D architectural model of the Proposed Development and surrounding areas. Issued by ACME Architects	7th April 2022
"220330-239-ACME-Masterplan GF Access"	Architectural ground floor plan views, indicating position of entrances. Issued by ACME Architects	6th April 2022
"630_01 (MP) 007 Tree strategy HEIGHT at DAY 1_2022 03 30"	Landscaping plan showing position and expected height of trees when the Development will be completed and in operation. Issued by Robert Meyers Associates, Landscape Architecture	6th April 2022
"715_01 (MP) 003 Hotel Masterplan - Ground floor plan_ Rev C5"	Ground floor and landscaping plan for Block S2 (the Novotel). Issued by Robert Meyers Associates, Landscape Architecture	6th April 2022
"CB4-RMA-L-00-DP-L-0001 Ground Floor Hard Landscape Masterplan_Rev C03"	Ground floor and landscaping plan for Block S3 (One Cambridge Square). Issued by Robert Meyers Associates, Landscape Architecture	6th April 2022

18.22 The desk study assessment considered the following scenarios:

- i) The Baseline - the existing site in existing surroundings¹.
- ii) The Future Baseline - the existing site in future (planning approved) surroundings¹. This represents a possible scenario where the Proposed Development would not come forward. There are no future developments within the assessment radius of 400m from the centre of the Site. As such, the Future Baseline scenario is assumed to be the same as the Baseline scenario.
- iii) The Proposed Development in existing surroundings¹.

¹ The impact of building surroundings within a radius of 400m from the centre of the Site ("assessment radius") has been considered as part of the assessment. The choice of the assessment radius is based on standard practice for environmental wind studies. Building surroundings and obstructions that are outside this radius are not likely to impact windiness levels within the Development site and vice versa.

- iv) The Proposed Development in future (planning approved) surroundings¹. There are no future developments within the assessment radius of 400m from the centre of the Site. Future developments outside this radius are not likely to influence windiness levels within Site; similarly, the Proposed Development is unlikely to influence windiness levels in areas outside the assessment radius of 400m. As such, this scenario is assumed to be the same as the Proposed Development in existing surroundings scenario.

CFD Analysis

- 18.23 The environmental wind desk study assessment was supported by a CFD study to confirm and quantify pedestrian level wind conditions.
- 18.24 The scope of the CFD study was to assess, using the Lawson LDDC criteria for comfort and safety (as described in the **Windiness Criteria and Sensitive Receptors** section) the pedestrian level wind conditions for the following scenarios: Baseline (existing site) and Proposed Development in existing surroundings. For the reasons outlined in the **Environmental Wind Desk Study** section, the scenarios with the Future Baseline and with the Proposed Development in future surroundings have not been considered as part of the CFD study.
- 18.25 The CFD analysis was carried out for 16 equally spaced wind directions (in 22.5° intervals).
- 18.26 A detailed 3D representation of the assessment scenarios was produced. Building surroundings within a radius of 400m from the centre of the Site were modelled for each assessment scenario. The modelled geometry was based on the CAD models listed in **Table 18.2**.

Table 18.2: Received CAD files and information to produce 3D models for CFD analysis

FILE NAME	DESCRIPTION	DATE RECEIVED
220406-Existing-Rev A.3dm	3D architectural model of the Baseline, e.g. the existing site. Issued by ACME Architects	7 th April 2022
220406-Proposed - Rev A.3dm	3D architectural model of the Proposed Development and surrounding areas. Issued by ACME Architects	7 th April 2022
"630_01 (MP) 007 Tree strategy HEIGHT at DAY 1_2022 03 30"	Landscaping plan showing position and expected height of trees when the Development will be completed and in operation. Issued by Robert Meyers Associates, Landscape Architecture	6 th April 2022

- 18.27 Small building details of less than 0.5m were not modelled, as they would not be expected to impact the localised wind conditions.
- 18.28 Conservatively, landscaping, such as trees and other planting, was not modelled. Landscaping is likely to provide a beneficial impact on the wind environment by dissipating local windiness.
- 18.29 **Figure 18.3 - Figure 18.4** show the modelled 3D geometry for the assessment scenarios: The Baseline (existing site) and the Proposed Development in existing surroundings, respectively.

The extent of the CFD model domain with surrounding buildings was 400m radius from the centre of the Proposed Development site.

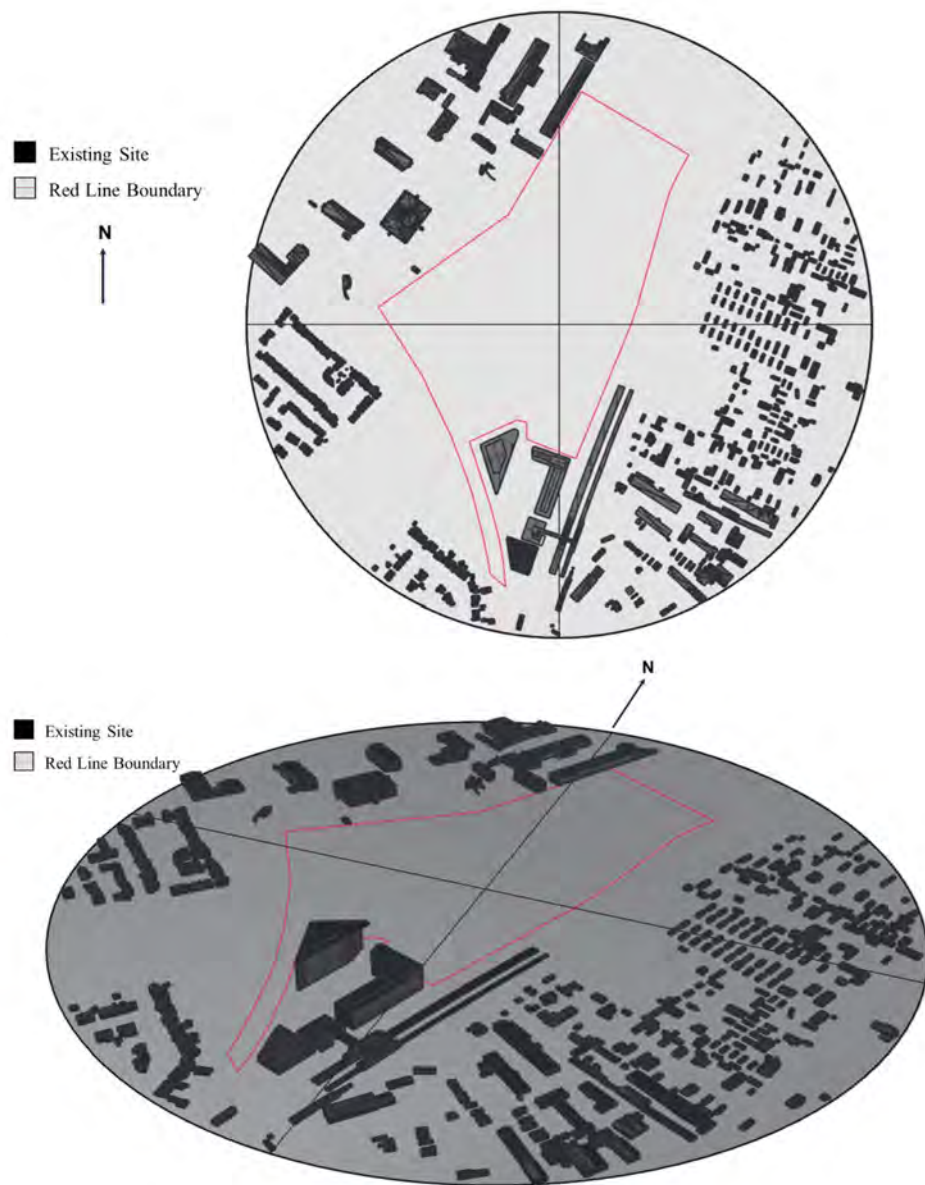


Figure 18.3: 3D geometry of the Baseline (existing site) in existing surrounding buildings within a radius of 400m from the centre of the Site as modelled in the CFD analysis.

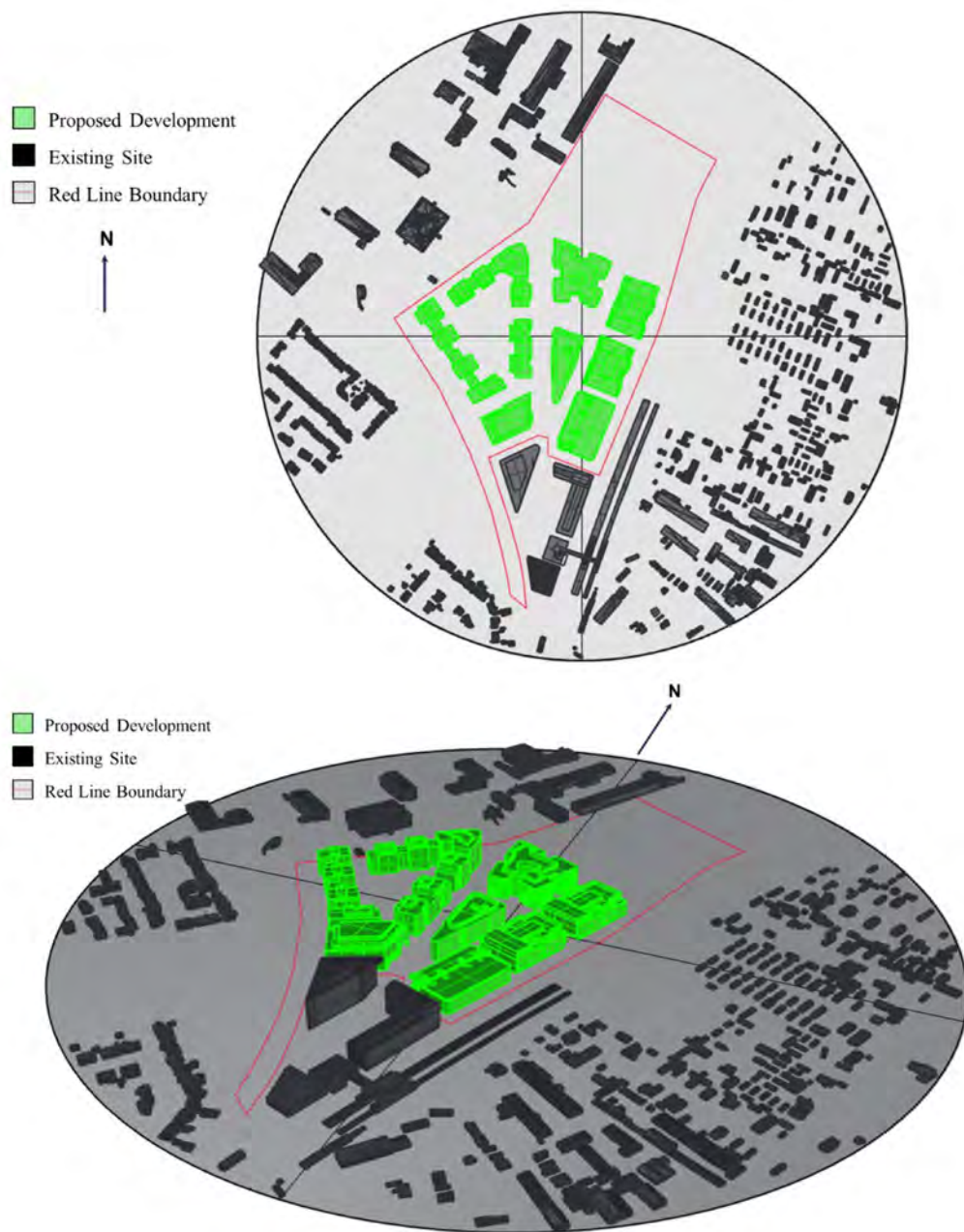


Figure 18.4: 3D geometry of the Proposed Development in existing surrounding buildings within a radius of 400m from the centre of the Site as modelled in the CFD analysis.

- 18.30 The computational mesh was approximately 8.4 million cells for the Baseline scenario (existing Site in existing surroundings) and 12.1 million cells for the scenario with the Proposed Development in existing surroundings. The building near wall regions were further refined using prism layers (up to 4 layers with first cell thickness ranging from 0.03m to 0.1m and expansion ratio of 1.2) with surface cells sizes of the order of 0.3m-0.6m. The ground was refined using prism layers (4 layers with first cell thickness of 0.3m).
- 18.31 A steady-state RANS based modelling approach was used for each of the 16 wind directions and for each assessment scenario. This method allows for the assessment of mean wind

speeds. However, the time-varying aspects of the flow (e.g. gusts) were not captured. A more complex CFD modelling approach or wind tunnel testing would be required to capture gusts. Having identified in the **Environmental Wind Desk Study** section, that the Site is unlikely to experience significant windiness issues in terms of pedestrian comfort or safety, the adopted approach, based on steady-state RANS simulations, was considered appropriate for this project.

- 18.32 CFD methods use an iterative approach to produce simulation results. It is therefore important to monitor the results to ensure convergence, this was done through placing virtual probes monitoring e.g., velocity located within the Site as modelled for the assessment scenarios. Outputs shown in the **Baseline Conditions** and **Operational Effects** sections respectively were extracted from these converged results, and consist of:
- a) Wind speed-up ratio contour plots for key wind directions². A wind speed-up is the wind speed at a given location at 1.5m above ground divided by the wind speed at an undisturbed location at 120m above ground.
 - b) Lawson contour plots, representing comfort and safety wind speeds at pedestrian-chest level (1.5m above ground) for the “worst” (winter) season and summer season. The Lawson comfort and safety contour plots are obtained by combining the directional wind speed-up ratios with the Weibull statistics as obtained from the wind climate study.

18.33 Further details on the CFD analysis methodology can be found in **Appendix 18.1**.

Windiness Criteria and Sensitive Receptors

18.34 The criteria used to describe windiness in this study are those of T.V. Lawson LDDC. The acceptability of windiness is subjective and depends on a number of factors, most notably the activities to be performed in the area being assessed. The Lawson LDDC criteria describe acceptability for particular activities in terms of ‘comfort’ and ‘distress’ (or safety). The criteria are relevant for assessing long term use on a local scale for low to medium sensitivity users (i.e. able-bodied users). Acceptable conditions for various activities in order of increasing windiness are described in **Table 18.3** below.

Table 18.3: Comfort criteria as defined by TV Lawson

COMFORT CRITERION	DESCRIPTION
‘Sitting’: Long-term sitting	Reading a newspaper, eating and drinking
‘Standing’: Standing or short-term sitting	Bus stops, window shopping and building entrances ^(a) and parks
‘Strolling’: Walking or strolling	General areas of walking and sightseeing
‘Business walking’: Business walking	Areas where people are not expected to linger

^(a) The use of this criterion for entrances is to avoid difficulties with maintaining balance when transitioning from a sheltered indoor location.

18.35 The conditions described in **Table 18.3** are the limiting tolerable criteria for comfort. For ideal conditions, the windiness in an area with a known activity will be a category better (i.e. tolerable conditions at a building entrance will be in the ‘Standing’ range but ideal conditions will be in the ‘Sitting’ range). For more sensitive activities, such as regular use for external eating, conditions should be well within the ‘Sitting’ category.

2 Wind speed-up ratio contour plots were obtained for each of the 16 equally spaced wind directions simulated. In the **Baseline Conditions** and **Operational Effects** sections, wind speed-up ratio contour plots are presented only for two key wind directions - ENE (67.5° E of N) and WSW (247.5° E of N).

- 18.36 The comfort criteria above are used to describe the more frequent wind conditions. There is also a distress criterion for 'General Public Access', equivalent to a mean speed of 15 m/s and a gust speed of 28 m/s (62 mph) to be exceeded less often than once a year. Exceeding this limit signifies a safety hazard for less able-bodied members of the public (e.g. elderly and cyclists). Conditions in excess of this limit may be acceptable for optional routes and routes which less physically able individuals are unlikely to want to use in windy weather.
- 18.37 There is a further limiting distress criterion within which even 'able-bodied' individuals may find themselves in difficulties at times. This corresponds to a mean speed of 20 m/s and a gust speed of 37 m/s (83 mph) to be exceeded less often than once a year. Beyond this gust speed, aerodynamic forces are likely to exceed body weight, where it becomes difficult for most to remain standing. Such speeds may also affect the safe operation of some road vehicles, particularly unloaded goods vehicles. The pedestrian safety criteria are provided in full in **Table 18.4**.

Table 18.4: Distress (safety) criteria as defined by TV Lawson

DISTRESS CRITERION	DESCRIPTION
'General Public Access'	Above which the less able and cyclists may at times find conditions physically difficult
'Able-Bodied' Access	Above which it may become impossible at times for an able-bodied person to remain standing.

Significance Criteria

- 18.38 Wind conditions from the assessment scenarios have been compared to the required levels for intended pedestrian activities to identify areas where significant effects may occur.
- 18.39 A significant adverse effect is defined as an area where wind conditions would be higher than the required levels for the intended use, as a result of the Proposed Development. For example, exceedances of the distress criteria described in **Table 18.4** would present a potential safety risk in areas regularly used by pedestrians. Such conditions would be unacceptable for areas accessed by the general public and are therefore considered to be significant adverse effects. Conversely an increase in windiness would be considered not significant if the conditions remained suitable for the intended activity.
- 18.40 **Table 18.5** defines the significance criteria used in this assessment in relation to the industry standard Lawson LDDC criteria for comfort and safety.

Table 18.5: Significance criteria.

SIGNIFICANCE OF IMPACT	EXPECTED IMPACT	LAWSON DESCRIPTION
Major adverse	Windiness with adverse impact on future wind 'safety', in areas of everyday use, such as main public access routes and building entrances. NB Substantial mitigation, for example possibly including alteration of building massing, may be required to reduce levels of windiness within acceptable limits.	Exceedance of Lawson's distress criteria in areas used regularly by the Public. Exceedance of 'Standing' conditions at major entrances. Exceedance of Lawson's 'Able-Bodied' distress range in any area accessible by the public (including vehicular routes)

SIGNIFICANCE OF IMPACT	EXPECTED IMPACT	LAWSON DESCRIPTION
Moderate adverse	Windiness with adverse impact on wind 'comfort' and 'safety' in less critical areas. NB Re-categorisation of intended usage, and/or mitigation measures may be desirable, depending on importance.	Exceedance of acceptable conditions in areas of less critical use, which may affect usage at times.
Minor adverse	Windiness with adverse impact only on non-critical future usage, e.g. changes in areas that are normally used only in suitable weather conditions, or minor or temporary exceedance of the relevant criteria in less critical areas. NB Wind conditions either remain acceptable for future intended use, or some mitigation may be desirable.	Marginal exceedance of acceptable conditions or exceedance in non-critical areas.
Negligible	Windiness with negligible impact on the future usage of the development, and in the surrounding areas. This includes areas where appropriately described wind mitigation has been incorporated into the scheme.	Acceptable conditions.
Minor beneficial	Windiness levels that contribute to future usage of the Development and surrounding areas.	Conditions are at least one-category calmer than acceptable in areas of non-critical usage.
Moderate beneficial	Windiness with beneficial impact on wind 'comfort' and 'safety' in less critical areas.	Conditions are calmer than acceptable in areas that were previously exceeded the relevant Lawson 'comfort' and 'safety' criteria.
Major beneficial	Improvement to windiness in important areas that previously exceeded the relevant 'comfort' and 'safety' requirements.	Conditions become at least acceptable in a critical location.

Baseline Conditions

18.41 The existing Site is currently occupied by ground-level car parking associated with Cambridge North Railway station, and other areas of previously developed land . A satellite view of the existing Site, with the approximate extent of the red-line boundary, is shown in **Figure 18.5**. The Site is bounded by the railway to the east and Cambridgeshire Guided Busway to the south-west. Block S3 (One Cambridge Square) of 6-storeys above ground, is located immediately to the south-east of the Site and faces Milton Avenue; this block is currently under construction and has conservatively been modelled as completed; the massing of Block S3 is not visible in

the satellite image in **Figure 18.5**. The massing of Block S3, as considered for the desk study assessment, and as modelled in the CFD analysis is shown in **Figure 18.3**. Block S2 (the Novotel), of 5-storeys above ground is located immediately to the south of the existing (on-site) car parking. Cambridge North Station and the associated cycle parking is immediately to the south of the Novotel. Both are visible in the satellite image in **Figure 18.5**.



Figure 18.5: Satellite view of the Baseline scenario (existing Site in existing surroundings).

- 18.42 The prevailing wind directions for Cambridge are mainly from the west and southwest; almost all cases of serious annoyance due to strong winds around buildings are caused by winds from these directions. During spring, northeast winds are almost as common as the west-southwest winds but are weaker.
- 18.43 **Figure 18.6 and Figure 18.7** show wind speed-up ratio³ contour plots at the existing Site for two key wind directions, ENE (67.5° E of N) and WSW (247° E of N), respectively. The small arrows in white are velocity vectors, representing local wind directions.
- 18.44 The surrounding terrain to the north-east is relatively open, which leaves the existing Site more exposed to windiness from these directions. As shown in **Figure 18.6**, the north-easterly winds are accelerated in the passage between Block S3 (One Cambridge Square) and Block S2 (the

³ A wind speed-up ratio corresponds to the ratio between the pedestrian level wind speed at 1.5m above ground and an undisturbed wind speed at 120m above ground. The colour scale has been calibrated, so that areas with calmer wind conditions, which correspond to a lower wind speed-up ratio, are represented in dark blue; areas with localised wind acceleration, which correspond to a higher wind speed-up ratio, are represented in light green and yellow.

Novotel); these blocks are taller and relatively distant from the surrounding buildings to the north-east, and as such are exposed to windiness from this direction.

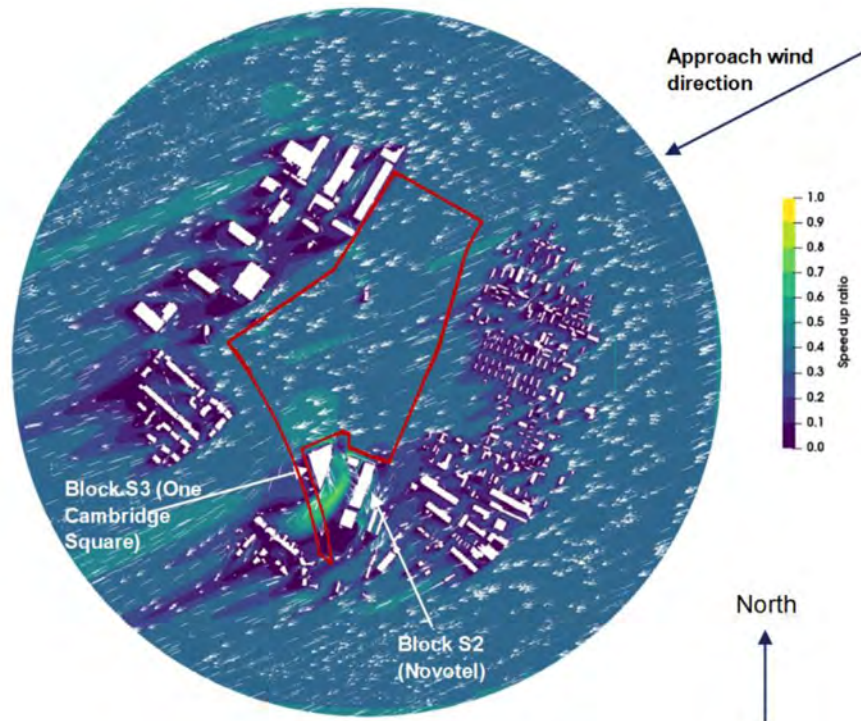


Figure 18.6: Wind speed up ratios for the Baseline scenario, for wind blowing from North-East (67.5° E of N)

- 18.45 The surrounding terrain to the west and south-west is built-up and predominantly consists of low-rise housing. Dense landscaping features are located along the south-west boundary of the Site. As shown in **Figure 18.7**, the Site is generally more sheltered from the south-westerly wind directions, which causes reduced wind speed-up ratios across the Site. Localised accelerations are observed around the perimeter of Block S3 (One Cambridge Square) and Block S2 (the Novotel).

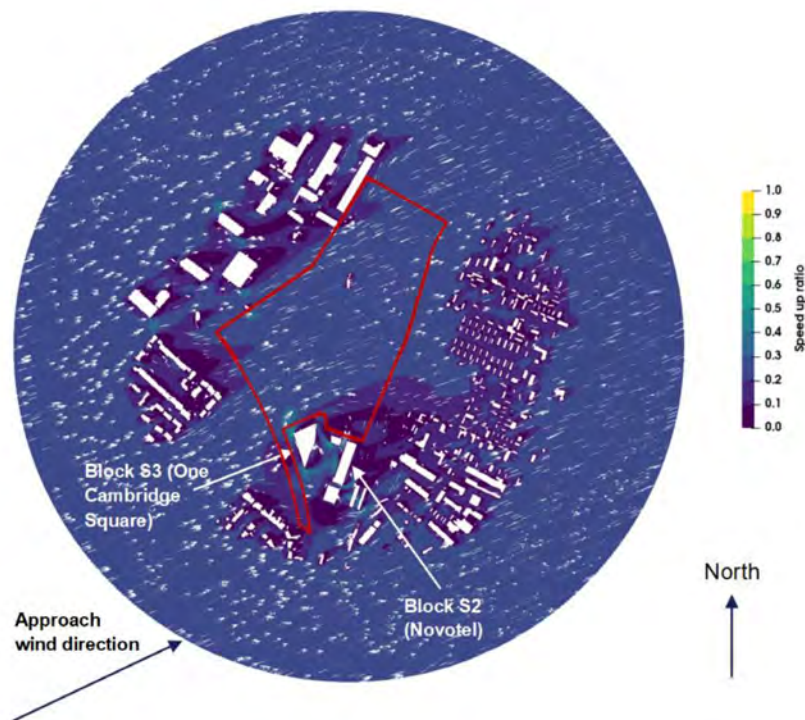


Figure 18.7: Wind speed up ratios for the Baseline scenario for wind blowing from southwest (247.5° E of N).

On-site Windiness Levels

- 18.46 General windiness levels within the existing Site boundary may be expected to range between “Sitting” to “Standing” levels in the “worst season”. These conditions are acceptable for car parking use and for limited pedestrian access, as currently intended.
- 18.47 The above conditions are in line with the results of the CFD analysis, which are shown in **Figure 18.8** and **Figure 18.9**, representing Lawson comfort and safety contour plots for the “worst” and summer season respectively.
- 18.48 The acceptability of windiness levels for intended pedestrian activities has been conservatively assessed below, based on the “worst” season results for areas that are used on an all-year basis. The Baseline scenario does not include outdoor amenity spaces that may be used in ‘good weather conditions’ (e.g. in the summer season) only; the summer season results are therefore presented for reference but are not discussed further in this section.
- 18.49 No exceedance of the Lawson distress limits may be anticipated within areas on-site; this is in line with the results of the CFD analysis.

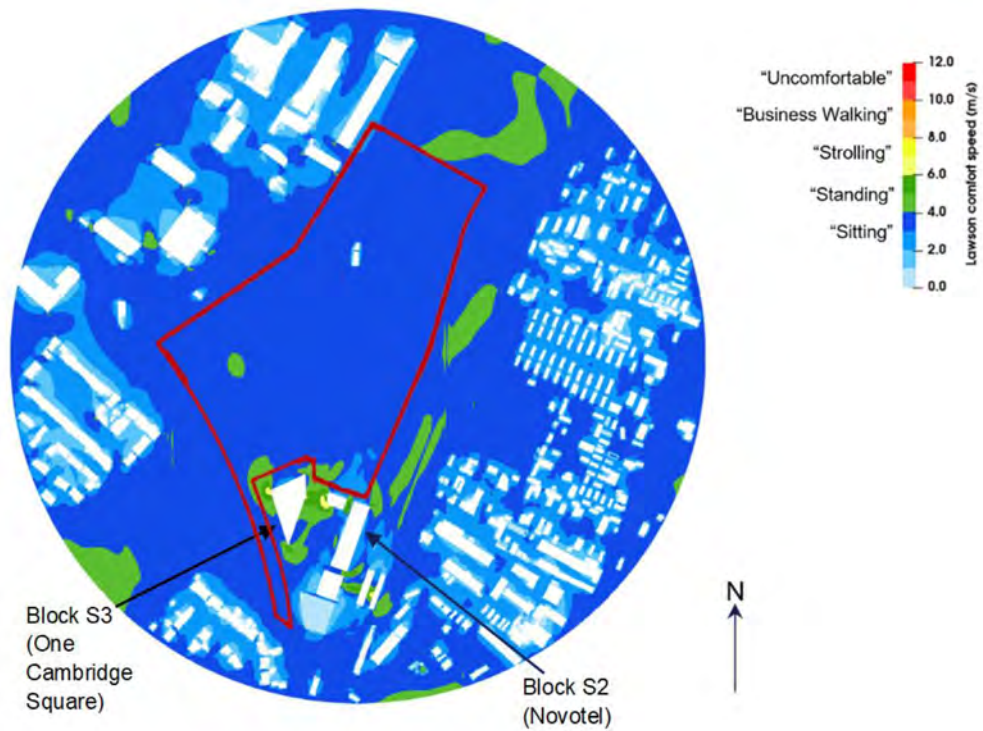


Figure 18.8: "Worst season" (winter) conditions for the Baseline scenario (existing Site in existing surroundings).

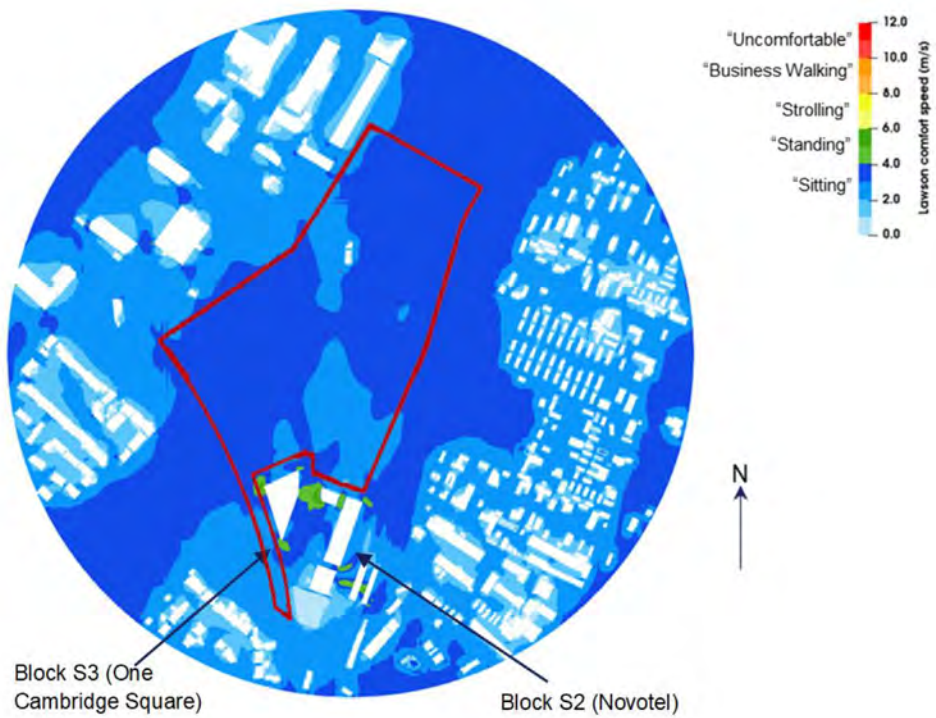


Figure 18.9: Summer season wind conditions for the Baseline scenario (existing Site in existing surroundings).

Off-site Windiness Levels

- 18.50 The surrounding terrain to the north-east of the Site is relatively open, which leaves the Baseline Site more exposed to windiness from these directions. As shown in **Figure 18.6**, localised wind accelerations are observed around Block S3 (One Cambridge Square) and Block S2 (the Novotel), which are significantly taller and distant from the surrounding buildings to the north-east.
- 18.51 Wind conditions up to “Strolling” levels may be expected to occur at the main entrance of Block S3 (One Cambridge Square) on the north-eastern façade. These conditions would be in excess of the acceptable “Standing” limit for primary entrance use. This is in line with the results of the CFD analysis in **Figure 18.8**, where a limited area of “Strolling” is identified on the north-eastern façade of Block S3 and in proximity to the main entrance. As demonstrated in the **Operational Effects** section, the local windiness at the main entrance of Block S3 improves after erection of the Proposed Development.
- 18.52 “Sitting” or “Standing” conditions may be expected at the primary entrance of Block S2 (the Novotel), which is protected by a canopy. These conditions are acceptable for the existing use as primary entrance and are in line with the results of the CFD analysis in **Figure 18.8**.
- 18.53 “Standing” to lower “Strolling” may be expected in other areas around the perimeter of Block S3 (One Cambridge Square) and of Block S2 (the Novotel). This is acceptable for the existing access or secondary entrance use and is in line with the results of the CFD analysis in **Figure 18.8**.
- 18.54 A ground floor plan view of Block S3 (One Cambridge Square) and of Block S2 (the Novotel), with indication of key entrances are shown for reference in **Figure 18.10**. Plan views as shown in **Figure 18.10** were obtained from Robert Meyers Associates; the position of primary and secondary entrances have been identified and labelled as Main Access and Secondary Access respectively.
- 18.55 No exceedance of the Lawson distress limits may be anticipated within areas off-site; this is in line with the results of the CFD analysis.

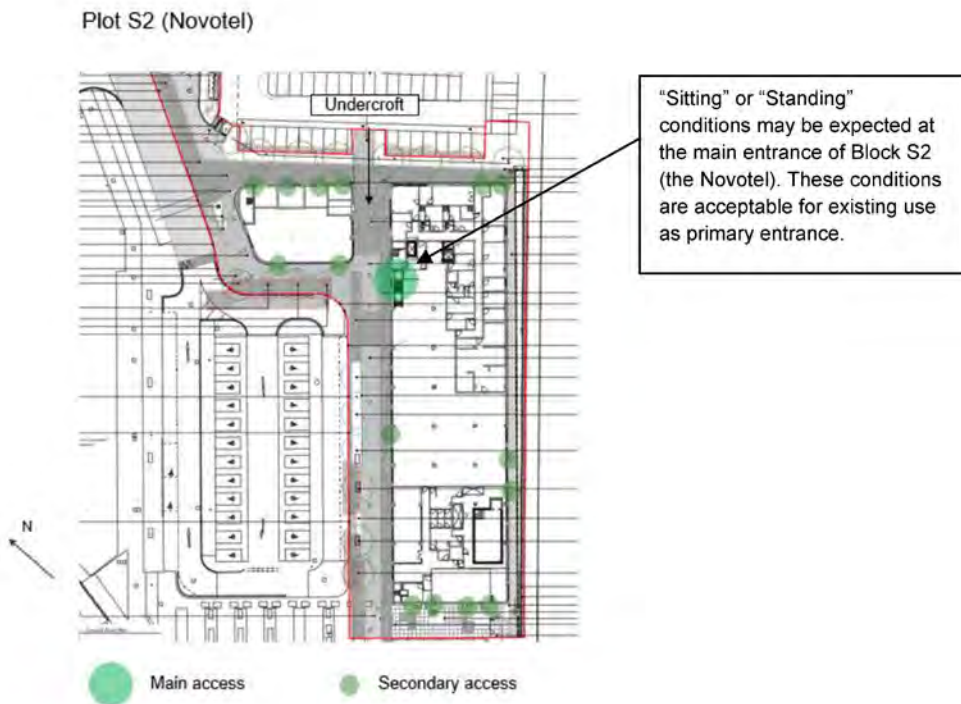
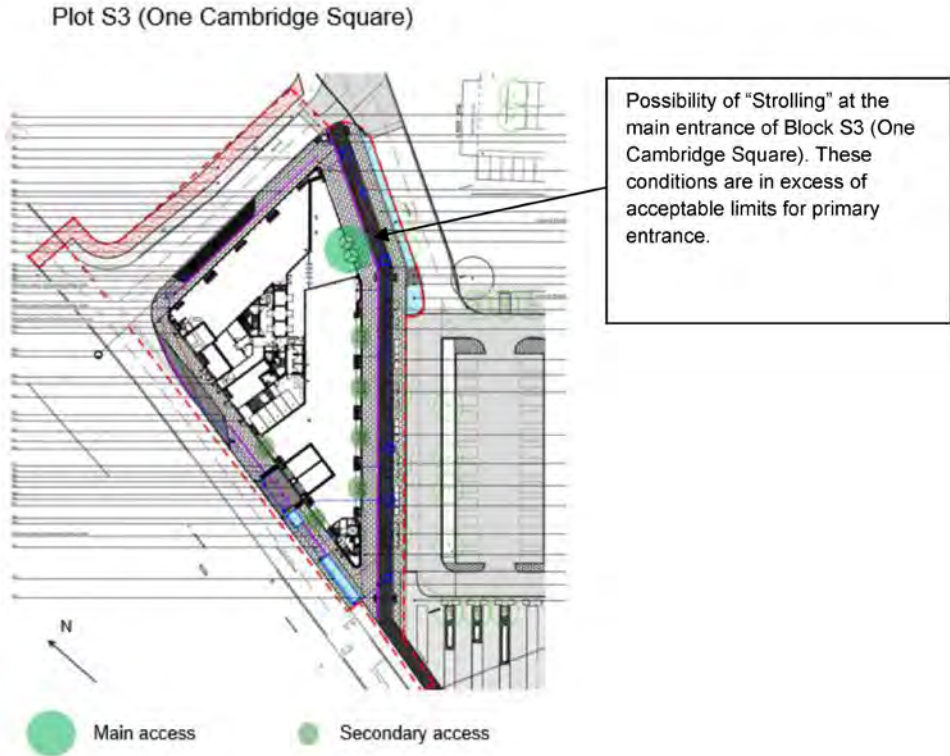


Figure 18.10: Ground floor plan view of Block S3 One Cambridge Square (left); and of Block S2 the Novotel (right), with indication of windiness levels at primary entrances.

Future Baseline Conditions

- 18.56 The Future Baseline represents a possible scenario where the Proposed Development would not be put forward.
- 18.57 Future developments are likely to be brought forward within areas surrounding the Site. However, the likely impact of these on wind environment would be assessed once specific schemes have been consented.
- 18.58 Currently, there are no future (planning approved) developments within the assessment radius of 400m from the centre of the Site. Future developments outside this radius are not likely to influence windiness levels within the Site. As such, the Future Baseline scenario is assumed to be the same as the Baseline scenario.
- 18.59 Wind conditions for the Future Baseline scenario are therefore expected to remain as reported for the Baseline scenario.

Predicted Effects

- 18.60 In this section, the likely significant impacts resulting from the Proposed Development once completed and operational are identified and assessed. The assessment of acceptability of Wind Microclimate for intended pedestrian activities is based on the Lawson LDDC criteria for comfort and safety, as illustrated in the **Windiness Criteria and Sensitive Receptors** section. The likely significance of the identified impacts is based on the criteria described in the **Significance Criteria** section. The outcomes of this assessment are summarised in the **Operational Effects** section.
- 18.61 As illustrated in the **Construction** section, wind effects during construction have been scoped out, as these are not likely to be significant.

Assessment of Operational Effects

- 18.62 The Proposed Development as completed is illustrated in **Figure 18.11**. The red line boundary is indicated in grey. The Development will consist of two lab buildings (S6 and S7) of 5-storeys above ground, and multi-storey car parking (S5) located along the eastern boundary of the Site; two office buildings of 5-storeys above ground located within the middle portion of the Site, namely the “triangle site” (S8 and S9); an office building (S4, One Milton Square) of 5-storeys above ground facing Cambridge Guided Busway; a residential quarter with building blocks ranging in height between 4- to 6-storeys above ground; and a wildlife habitat area within the northern portion of the Site. The proposed location of entrances for each block, as well as the proposed landscaping, are also indicated in **Figure 18.11**.
- 18.63 The geometry of the Proposed Development and surroundings within a radius of 400m as modelled through the CFD analysis is shown in **Figure 18.4**.



Figure 18.11: Plan view of the Proposed Development and immediate surrounding areas.

- 18.64 As illustrated in the Baseline Conditions section, the prevailing wind directions for Cambridge are mainly from the west and southwest; almost all cases of serious annoyance due to strong winds around buildings are caused by winds from these directions. During spring, northeast winds are almost as common as the west-southwest winds but are weaker.

- 18.65 **Figure 18.12** and **Figure 18.13** show wind speed-up ratio⁴ contour plots with the Proposed Development in existing surroundings for two key wind directions, north-east (67.5° E of N) and south-west (247° E of N), respectively. The small arrows in white are velocity vectors, representing local wind directions.

- 18.66 The surrounding terrain to the north-east is relatively open, which leaves the Site more exposed to windiness from these directions. As shown in **Figure 18.12**, with the introduction of the Proposed Development, calmer wind conditions are generally experienced around the perimeter of Block S3 (One Cambridge Square) and Block S2 (the Novotel) as compared to the Baseline scenario; these blocks benefit from an improved level of sheltering from the north-easterly wind components as offered by the massing of the Proposed Development.

4 A wind speed-up ratio corresponds to the ratio between the pedestrian level wind speed at 1.5m above ground and an undisturbed wind speed at 120m above ground. The colour scale has been calibrated, so that areas with calmer wind conditions, which correspond to a lower wind speed-up ratio, are represented in dark blue; areas with localised wind acceleration, which correspond to a higher wind speed-up ratio, are represented in light green and yellow.

18.67 The surrounding terrain to the west and south-west is built-up and predominantly consists of low-rise housing. Dense landscaping features are located along the south-west boundary of the Site. As shown in **Figure 18.13**, the Site is generally more sheltered from the south-westerly wind directions, which causes reduced wind speed-up ratios across the Site compared with the Baseline scenario. Localised accelerations are anticipated within One Milton Walk and the Link, which are between the Residential Quarter and Block S4, and between Block S4 and S3 respectively. One Milton Walk and the Link are aligned with the south-west directions.

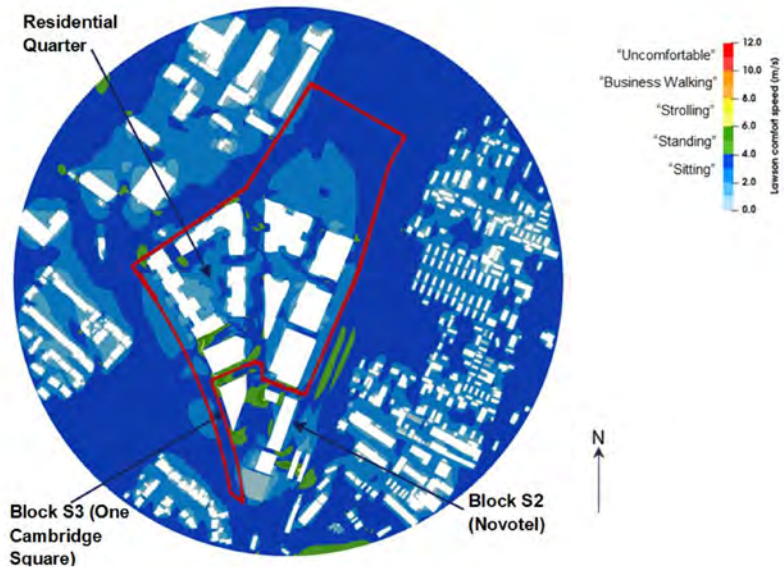


Figure 18.12: Wind speed up ratios for the Proposed Development in existing surroundings for wind blowing from North-East (67.5° E of N).

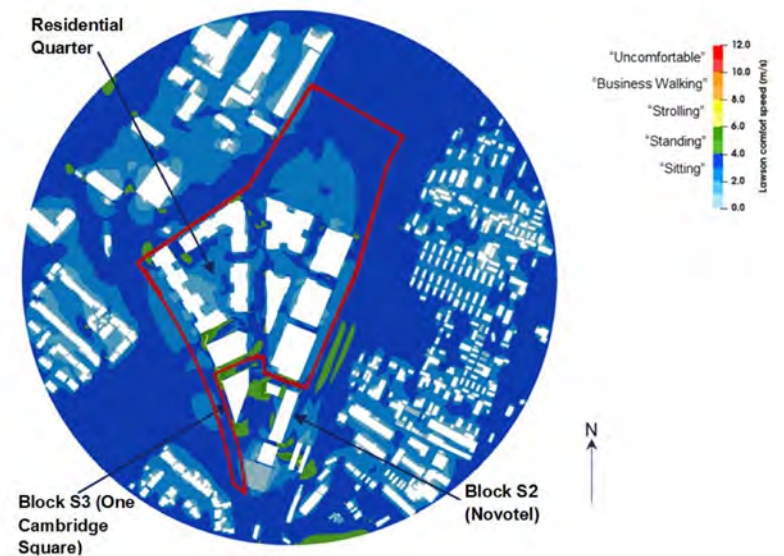


Figure 18.13: Wind speed up ratios for the Proposed Development in existing surroundings for wind blowing from North-East (67.5° E of N).

On-site Wind Conditions

- 18.68 General windiness levels within the Proposed Development boundary can be expected to range between “Sitting” to “Strolling” levels in the “worst season”. These conditions are in line with the results of the CFD analysis, which are shown in **Figure 18.14** and **Figure 18.15**, representing Lawson comfort and safety contour plots for the “worst” and summer season respectively.
- 18.69 The acceptability of windiness levels for intended pedestrian activities has been conservatively assessed below, based on the “worst” season results for areas that are used on an all-year basis. For outdoor amenity spaces that may be used in ‘good weather conditions’ (e.g. in the summer season) only, the assessment of acceptability is based on the summer season results.
- 18.70 As shown in **Figure 18.14**, “Sitting” to “Standing” levels are expected to be experienced within the majority of the Site in the “worst” season.
- 18.71 No exceedance of the Lawson distress limits is anticipated within areas on-site; this is in line with the results of the CFD analysis.
- 18.72 Wind conditions at individual key areas are described below.

Entrances

- 18.73 “Standing” conditions are likely to be experienced at key entrance locations in the “worst” season. These conditions would be acceptable for the intended uses as primary or secondary entrances, in accordance with the Lawson criteria. Therefore, it is concluded that no significant effects would occur locally. Mitigation measures are therefore not required locally.

Access Routes

- 18.74 “Sitting” or “Standing” conditions are likely to be experienced along most of the key access routes in the “worst” season. These conditions would be acceptable for the intended uses as pedestrian access in accordance with the Lawson criteria. Therefore, it is concluded that no significant effects would occur locally. Mitigation measures are therefore not required locally.
- 18.75 “Strolling” conditions are likely to be experienced in the “worst” season along One Milton Walk (between the Residential Quarter and Block S4) and along the Link (between Block S4 and S3), which are aligned with the south-west directions. These conditions would remain acceptable for the intended uses as pedestrian access, and secondary entrance in accordance with the Lawson criteria. Therefore, it is concluded that no significant effects would occur locally. Mitigation measures are therefore not required locally. The proposed landscaping along One Milton Walk and the Link is considered beneficial, as it will help to mitigate local windiness.
- 18.76 “Strolling” conditions are likely to be experienced around the western corner of the Residential Quarter, where local wind acceleration is observed. These conditions would remain acceptable for the intended uses as pedestrian access in accordance with the Lawson criteria. Therefore, it is concluded that no significant effects would occur locally. Mitigation measures are not required locally. The proposed landscaping around the perimeter of the Residential Quarter is considered beneficial, as it will help to mitigate local windiness.

Outdoor Amenity Areas

- 18.77 “Sitting” conditions are observed within Chesterton Gardens and Chesterton Square in the “worst” and summer seasons. These conditions would be acceptable for their intended use as outdoor amenity spaces, which may include bench seating in accordance with the Lawson

criteria. Therefore it is concluded that no significant effects would occur locally. Mitigation measures are therefore not required locally.

- 18.78 “Sitting” conditions are also observed within the Wild Habitat Area in accordance with the Lawson criteria. These conditions would be acceptable for their intended use as outdoor amenity spaces, which may include bench seating. Therefore it is concluded that no significant effects would occur locally. Mitigation measures are not required locally.

Off-site wind conditions

- 18.79 The Proposed Development massing shelters Block S3 (One Cambridge Square) and Block S2 (the Novotel) from winds from the north-east. As such, once the Proposed Development is in place, the wind conditions around the perimeter of these blocks are likely to be generally reduced to “Standing” levels in the “worst” season, which is acceptable for primary entrance and access use. This is in line with the results of the CFD analysis in **Figure 18.14**. The “worst” season windiness at the primary entrance of One Cambridge Square is likely to be reduced from “Strolling” levels in the Baseline scenario, which is in excess of acceptable limits for primary entrance use, to “Standing” levels with the Proposed Development, which would be acceptable for the intended use as primary entrance, in accordance with the Lawson criteria. Therefore it is concluded that a moderate beneficial impact would occur at this entrance.
- 18.80 “Strolling” conditions are also likely to be experienced around the southern corner of Plot S3 (One Cambridge Square), where local wind acceleration is observed. These conditions would remain acceptable for the intended uses as pedestrian access, in accordance with the Lawson criteria. Therefore, it is concluded that no significant effects would occur locally and no mitigation measures are required locally.
- 18.81 No exceedance of the Lawson distress limits are anticipated within areas off-site; this is in line with the results of the CFD analysis.

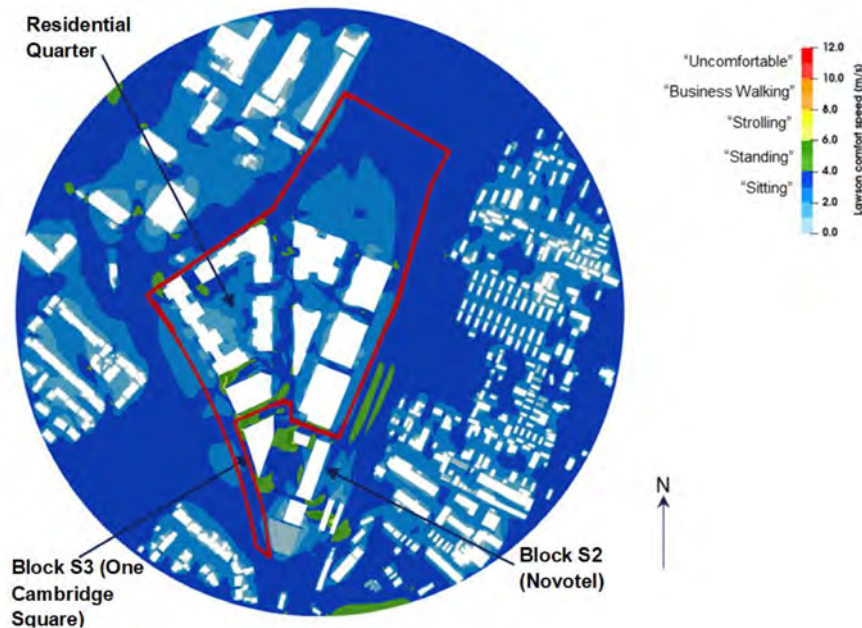


Figure 18.14: “Worst season” (winter) conditions with the Proposed Development in existing surroundings.

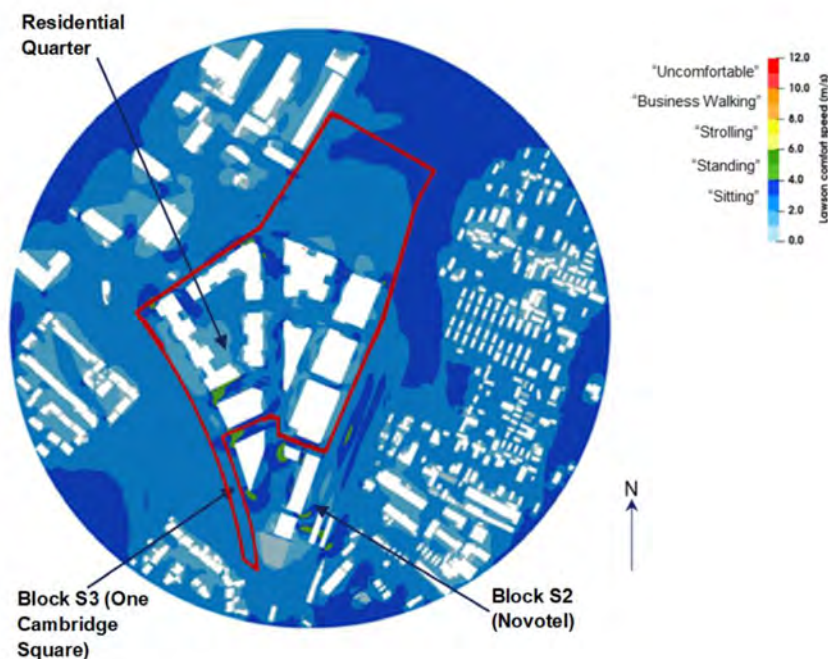


Figure 18.15: “Summer season” (winter) conditions with the Proposed Development in existing surroundings.

Mitigation

18.82 No significant adverse impacts have been identified. Hence, there are no requirements for wind mitigation measures.

Construction

18.83 Wind effects during construction have been scoped out as these are not likely to be significant. Mitigation measures are therefore not required during construction beyond those incorporated within the Construction Environmental Management Plan (CEMP) as a matter of good practice.

Operational

18.84 As described in section **Operational Effects**, no adverse impacts have been reported with the Proposed Development as completed and operational. Mitigation measures are therefore not required with the Proposed Development in operation. However, the assessment has demonstrated that the Proposed Development will itself provide mitigation for the adverse baseline conditions around the entrance to One Cambridge Square.

Residual Effects

18.85 With proposed temporary mitigation at the main entrance of Block S3 (One Cambridge Square), the local windiness is likely to be reduced to “Standing” levels, as acceptable for primary entrance use. Therefore, a negligible residual effect would be reported with the mitigation in place.

Monitoring

18.86 No significant adverse impacts have been identified. Hence, there are no specific requirements for monitoring.

Cumulative Effects

- 18.87 There are no future (planning approved) developments within the assessment radius of 400m from the centre of the Site. The committed developments identified during scoping (21/02450/REM, 20/03524/FUL, 20/03523/FUL, 21/04640/SCOP and 17/1616/CTY) are outside this radius are therefore not likely to influence windiness levels within the Site; similarly, the Proposed Development is unlikely to influence windiness levels in areas outside the assessment radius of 400m.
- 18.88 As such, no cumulative impacts have been identified.

Conclusions and Summary of Effects

- 18.89 An environmental wind desk study assessment supported by a CFD study has been carried out to assess the likely significant effects of the Proposed Development in terms of Wind Microclimate. Details of the assessment methodology are described in the Methodology section. Key outcomes are summarised below.
- 18.90 Wind conditions for the Baseline scenario (existing Site in existing surroundings) are likely to meet the desired targets for intended pedestrian use, with exception of the main entrance to Block S3 (One Cambridge Square) immediately off-site. The local wind conditions at this entrance are likely to be in the 'Strolling' range, and in excess of the acceptable comfort limits for primary entrance use ('Standing').
- 18.91 In the presence of the Proposed Development, on-site wind conditions at key receptors are likely to remain acceptable for their intended pedestrian activities. As such, a negligible impact has been reported. No requirements for on-site wind mitigation measures have been indicated.
- 18.92 In the presence of the Proposed Development, the local windiness at the main entrance to Block S3 (One Cambridge Square) immediately off-site is likely to improve to 'Standing' levels, as acceptable for the intended use as primary entrance. Therefore, a moderate beneficial impact has been reported locally.
- 18.93 A summary of impacts has been provided in the Summary of Impacts Table (**Table 18.6**).

Table 18.6: Summary of Impacts: Wind Microclimate

DESCRIPTION OF IMPACT	GEOGRAPHICAL IMPORTANCE	RECEPTOR SENSITIVITY	MAGNITUDE	IMPACT BEFORE MITIGATION				MITIGATION	IMPACT AFTER MITIGATION (RESIDUAL)			
				ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE		ADVERSE/BENEFICIAL	REVERSIBLE/IRREVERSIBLE	SHORT-TERM/LONG TERM	SIGNIFICANCE
Impact of Wind Microclimate	Entrance locations at the Proposed Development (on-site)	High	Low	Neg	Rev	LT	Neg	Not required	-	-	-	-
Impact of Wind Microclimate	Access routes at the Proposed Development (on-site)	High	Low	Neg	Rev	LT	Neg	Not required	-	-	-	-
Impact of Wind Microclimate	Outdoor Amenity areas at the Proposed Development (on-site)	Med	Low	Neg	Rev	LT	Neg	Not required	-	-	-	-
Impact of Wind Microclimate	Main entrance of Block S3 (off-site)	High	Mod	Ben	Rev	LT	Mod Ben	Not required	-	-	-	-

Key:

Mod: Moderate
 Med: Medium
 Ben: Beneficial
 Rev: Reversible
 Neg: Negligible
 LT: Long Term

Cumulative Effects

19

19.0 Cumulative Effects

Introduction

- 19.1 This chapter describes the cumulative effects in the locality of the Site as considered by this assessment.

Methodology

- 19.2 There is no accepted methodology for cumulative assessment, although guidance is available in the form of EC (May 1999) Guidelines for the Assessment of Indirect and Cumulative Impacts.

- 19.3 There are two main forms of cumulative effects:

- Inter-project effects: The combined effect of the Proposed Development together with other reasonably foreseeable or committed developments (taking into consideration effects at both the construction and operational phases); and
- Intra-project effects: The combined effects caused by the combination of a number of impacts on a particular receptor (taking into consideration impacts at both the construction and operational phases), which may collectively cause a more significant effect than individually. For example, the combination of noise and air quality impacts.

Inter-project Effects

- 19.4 Inter-project cumulative effects can result from the combination of impacts from the Proposed Development with those of other developments. For example, a number of developments in close proximity to one another may give rise to significant landscape and traffic effects cumulatively.

- 19.5 There is no guidance which defines the appropriate study area for considering the cumulative effects of identified consented developments. A set of screening criteria has, therefore, been developed to identify which cumulative schemes should be subject to assessment in combination with the Proposed Development; this was agreed with SCDC through the EIA scoping process.

- 19.6 Projects were considered for cumulative effects where they meet the following criteria:

- Development which is within a zone of influence of the Proposed Development. This zone has been set at a 2km of the Application Site;
- Planning applications within the zone of influence during the last five years which meet the criteria outlined;
- Development which is expected to be constructed at the same time as the Proposed Development; and/or
- EIA development (which is likely to have significant effects in its own right); and/ or
- Development which introduces sensitive receptors in close proximity to the Application Site (acknowledging that the “agent of change” principle means that the introducer of any sensitive receptors is responsible for assessing impacts on those receptors); and/or
- Major development.

- 19.7 SCDC classify major development as development involving one or more of the following:
- The winning or working of minerals or the use of land for mineral-working deposits;
 - Waste development;
 - The provision of dwelling houses where the number of dwelling houses to be provided is 10 or more;
 - The development is to be carried out on-site having an area of 1 hectare or more; and
 - The provision of a building or buildings where the floor space to be created is 1,000 square metres or more.

Intra-Project Effects

- 19.8 There is no established EIA methodology for assessing and quantifying the combined effects of individual effects on sensitive receptors. It should, however, be noted that cumulative effects can generally only be broadly identified and assessed qualitatively; they often cannot be quantified. The assessment has been undertaken in accordance with the following stages:
- Identification of sensitive receptors;
 - A review of the residual effects reported in Chapters 6 to 18 to identify the potential for interactions between effects that could in combination give rise to cumulative effects; and
 - Identification of appropriate mitigation of the identified effects, as required.

- 19.9 The criteria for identifying those receptors that are considered to be potentially sensitive include the nature of the receptor, proximity to the works, and extent of exposure to impacts. It should also be noted that different stages of construction works will result in effects of different magnitude. It may be the case that, for some environmental topics, there are no interactions with other individual effects and that no combined cumulative effects would therefore occur.

Results

Inter-Project Effects

- 19.10 Based on criteria set out earlier in this chapter, and following a planning search across SCDC and Cambridge City Council local authorities, the following projects were identified at the scoping stage to be included within the Cumulative Assessment:
- 21/02450/REM Reserved matters application 421 new homes with associated infrastructure, internal roads and open space;
 - 20/03524/FUL Upgrade to existing access roads and Cowley Road (as part of a wider proposal 20/03523/FUL for the erection of a 5-storey building and a 6-storey building for commercial/business purposes, erection of a transport hub, gymnasium, surface parking, landscaping and associated infrastructure including demolition of the existing building (St John's House) and associated structures);
 - 21/04640/SCOP Request for a Formal Scoping Opinion for an Order granting Development Consent for the Cambridge Wastewater Treatment Plant Relocation (the Proposed Development) Cambridge Waste- Water Treatment Plant Relocation Horningsea Road Fen Ditton Cambridgeshire; and
 - 17/1616/CTY EIA Scoping Opinion at Waterbeach New Town Waterbeach Barracks and Airfield Site Waterbeach Cambridgeshire.

19.11 The SCDC Scoping Opinion (**Appendix 2.2**) stated the following in relation to cumulative impacts:

'The schedule of projects to be considered within the cumulative assessment is agreed.

In addition, in accordance with established practice, the cumulative assessment should consider major development and infrastructure projects within at least a 2km radius of the application site, which have a reasonable prospect of coming forward before or at the same time as the Proposed Development.

Projects to be considered in the Site search should include:

- *Major developments with planning consent which are either under construction or have not yet commenced on site.*
- *Major developments where a planning application has been submitted and information is in the public domain but the application has not yet been determined.*
- *Major development proposals currently at Scoping stage.'*

19.12 Committed developments to be included within the Cumulative Assessment are therefore:

- 21/02450/REM;
- 20/03524/FUL and 20/03523/FUL;
- 21/04640/SCOP; and
- 17/1616/CTY.

19.13 The projects mentioned above have been used to inform the Cumulative Assessment of each topic. The summaries of the Cumulative Assessment for each topic are detailed below.

Predicted Cumulative Effects – Inter-Project Effects

Air Quality

19.14 The cumulative schemes that have been included and considered in this assessment are listed in paragraph 19.12.

19.15 The traffic data on which the operational phase assessment has been undertaken is inclusive of all allocated sites anticipated in the Local Plan.

19.16 The mitigation measures recommended in the air quality chapter are expected to at least partially mitigate any cumulative effects which operational traffic and construction activities from the Proposed Development could have with the cumulative schemes. No requirement for further mitigation has been identified.

Climate Change

Carbon Assessment

19.17 GHG emissions contribute cumulatively with all sources of GHG emissions globally to cause climate change. This Assessment has considered GHG emissions in the context of the UK carbon budgets and no further consideration of the Proposed Development's GHG emissions with other sources of GHGs is necessary.

ICCI Assessment

19.18 The cumulative construction and operational effects are considered by the relevant disciplines (e.g. air quality, biodiversity). All other schemes will have produced FRAs, Overheating

Assessments and landscape strategies to enable them to adapt to climate change and, therefore, no cumulative impacts are anticipated.

CCR Assessment

- 19.19 Vulnerability to climate change resilience is limited in spatial extent to the footprint of the Proposed Development, therefore, no cumulative impacts with other developments is considered.

Cultural Heritage

- 19.20 The cumulative projects that have been considered in the assessment of effects of the Proposed Development are listed in paragraph 19.12.
- 19.21 The assessment of effects concluded that the cumulative projects are rarely appreciated in conjunction with the Proposed Development. Therefore, the potential cumulative impact would be limited to a handful of heritage assets which are discussed below:

Riverside and Stourbridge Common Conservation Area and Grade I Listed Leper Chapel

- 19.22 In LVIA Viewpoint 22 from Newmarket Road, adjacent to the Grade I listed Leper Chapel, the Proposed Development is screened by intervening existing mature vegetation which also screens the St John's Innovation Park development (20/03523/FUL).
- 19.23 The St John's Innovation Park development (20/03523/FUL) falls within the vista of Viewpoint 15 but sits behind the Proposed Development and is thus not visible. Planning application 21/02450/REM lies to the west of (behind) this viewpoint and is of a mass and form which does not affect the wider appreciation of the rural river landscape of the Conservation Area. The other cumulative schemes (Water Treatment Centre and Waterbeach Barracks) are at sufficient distance and/or of such a form/massing that they are not appreciated in conjunction with the Proposed Development. There is no cumulative impact.
- 19.24 The St John's Innovation Park application sits to the west of the Proposed Development in Viewpoint E1 from the Chisholm Trail Bridge over the River Cam, and may potentially be seen across the railway line, through the trees and above the intervening development (houses in the middle distance). Given that the existing view consists of railway infrastructure and a mixture of development of no particular character (including the existing Novotel), the cumulative impact of the visibility of the St John's Innovation Park development would be neutral, as it would not materially affect the character of the Conservation Area at this point.

Castle and Victoria Road Conservation Area and Cambridge Castle Mound (Scheduled Monument)

- 19.25 Planning application 20/03523/FUL (St John's Innovation Park) sits to the west of the Proposed Development and is similarly screened/filtered by the high-level trees on the mound. It is very unlikely even in winter that the Proposed Development and the St John's Innovation Park development would be seen together, in the distant backdrop of the City. Even if views were possible, the two developments are separated by some distance and do not form an 'urbanised' backdrop of development in the wider views. There is no cumulative impact.

Grade II* Registered Park and Garden - Anglesey Abbey

- 19.26 Planning application 21/02450/REM sits directly in the centre of the axis of the view south-west from Coronation Avenue. There is, however, no cumulative effect from the Marleigh development off Newmarket Road and the proposed Cambridge North development, as any impact on the Garden arises solely from the Newmarket Road development, which would not

be appreciated in conjunction with the Cambridge North development, since the latter cannot be seen from the garden.

Cumulative Effects Conclusion

19.27 In the majority of LVIA viewpoints and in the assessment of heritage assets, it was evident that the orientation of the developments, the distances involved, or the intervening built form or landscaping would avoid any cumulative impact.

19.28 From Anglesey Abbey, as evidenced by LVIA viewpoint P8, the Marleigh Development off Newmarket Road in Cambridge would have potentially a far greater impact on this high sensitivity heritage asset than the proposed Cambridge North development, which would have no impact. The potential impact from the Marleigh development, however, is limited to that project alone and is not a cumulative impact in combination with the Cambridge North development. There are, therefore, no cumulative effects arising.

Ecology

19.29 The Proposed Developments listed in paragraph 19.12 are within areas of low ecological value. The development sites comprise low value biodiverse habitats with limited numbers of protected and notable species, predominantly breeding birds and foraging and commuting bats. None of the other development sites comprise Open Mosaic Habitat on Previously Developed Land or have been identified as important for their invertebrate assemblage.

19.30 The closest Proposed Development to the Site 'Land in the North West Part of St Johns Innovation Park' comprises the erection of two buildings and associated upgrades within a previously developed site, so is unlikely to significantly impact the surrounding area if the construction works run concurrently with this development.

19.31 Whilst the Land North of Newmarket Road development is of larger scale, it is over 2km from the Site and is considered sufficiently distant for no cumulative effects to occur during construction.

19.32 Considering the nature of the schemes, it is possible that these would be implemented concurrently with the Proposed Development. However, the applications will include mitigation for the loss of habitat and protected species. Therefore, significant cumulative effects are not considered likely.

19.33 Documentation will be reviewed and updated throughout the construction phase if further potential risks are identified.

Flood Risk and Drainage

19.34 The cumulation of these developments listed in paragraph 19.12 will have an impact on foul water discharged to the public sewer network. However, as with all planned growth, statutory undertakers are obliged to programme reinforcement works to water supply and wastewater infrastructure to ensure there is capacity for future growth. As such the cumulative impact on water resources and drainage infrastructure is considered to be negligible, resulting in no significant effect.

19.35 Flood risk and drainage impacts associated with the Site affect the land occupied by the Site itself and the nearby water bodies (the River Cam, the First Public Drain and overflow, and the aquifers). In accordance with local and national policy requirements, all new development must ensure that there is no adverse impact on flood risk on- or off-site. As such, the cumulative impact on flood risk and drainage is considered to be negligible, resulting in no significant effect.

- 19.36 It is considered that there would not be any cumulative impacts associated with any new developments within the area from a flood risk and drainage perspective, as all developments would adhere to the same principles as outlined in the NPPF and local planning policy with regard to reducing flood risk and to limiting surface water run-off to greenfield or agreed rates.
- 19.37 Of the projects set out above, only the relocation of the Cambridge Waste-Water Treatment Plant may not be subject to the NPPF, as it may proceed under permitted development rights. However, it can be assumed that one of the objectives of relocating the sewage treatment works is to improve its sewage treatment capacity and improve the water quality output to the River Cam, providing a beneficial effect.

Human Health

Construction

- 19.38 During construction, there is potential for cumulative effects between the Proposed Development and the committed developments listed in paragraph 19.12.
- 19.39 From an environmental health perspective, the key concern during construction is in regard to air quality and noise. Chapter 6 Air Quality and Chapter 14 Noise do not identify any likely adverse cumulative impacts.

Operation

- 19.40 Regarding environmental health, there have been no identified adverse cumulative effects with regards to air quality, flood risk and ground conditions. Chapter 14 Noise identifies that there is potential for minor adverse impacts with regards to road traffic noise, whilst noise from mechanical plant is likely to be negligible.
- 19.41 Chapter 15 Socio-Economics notes that the cumulative effects outside of the NECAAP area are unlikely to result in significant cumulative effects, as they are at a sufficient distance and unlikely to share social infrastructure.

Landscape and Visual

- 19.42 Out of the committed developments listed in paragraph 19.12, 21/04640/SCOP and 17/1616CTY lack critical information (i.e. indicative masterplan or parameter plans) on the Planning Portal to be able to undertake a reliable assessment of cumulative impact. Further investigation of the potential cumulative effects was carried out for 21/02450/REM and 20/03524/FUL.
- 19.43 In terms of landscape/townscape effects, the Marleigh Development Phase 2 sits outside the LVIA study area, creating a new interface between the City and different character areas from those associated with the Site. Therefore, it could not result in cumulative effects in relation to the receptors relevant to the Site.
- 19.44 The St John's Innovation Park application is located within the commercial townscape to the north-west of the study area. This will provide an additional commercial built form akin to the existing townscape character. Therefore, the Proposed Development will neither change nor transform the existing townscape character of the study area when assessed cumulatively with this project, as it will not tip the balance towards creation of a new townscape character area.
- 19.45 Consequently, it is considered that the current proposal will not add to or combine with 20/03524/FUL to create a significant cumulative effect.

- 19.46 The assessment of cumulative visual effects has been informed by the technical visualisations in **Appendix 12.4**. The cumulative projects are visible in viewpoints 4, 14, 15, 16, P4, P5, P6. However, in the close and middle range views, the Proposed Development remains dominant in the foreground, compared with the other developments, such that cumulative effects will not occur.
- 19.47 There is a clearer appreciation of all the Proposed Developments in the long-distance views, P4, P5 and P6. However, the Marleigh Development Phase 2 sits below the skyline and appears considerably separated and independent from the Proposed Development and the St John's Innovation Park cluster. Hence, cumulative effects are not considered to be significant.
- 19.48 The clustering of St John's Innovation Park with the Proposed Development is more evident in P6. In this instance, the Proposed Development is not considered to result in changes to visual amenity (see Visual Assessment in **Appendix 12.3**), due to the screening provided by intervening built form and vegetation. Similarly, St John's Innovation Park is considered to benefit from the same degree of screening, such that there would be no significant cumulative visual effects.

Lighting

- 19.49 None of the committed development identified in paragraph 19.12 would result in cumulative effects with the Proposed Development.

Noise and Vibration

Construction Phase

- 19.50 Detailed assessments of construction noise are not available for the schemes listed in paragraph 19.12, so it is not possible to undertake a quantitative assessment of the cumulative noise effects. However, given these are circa 200m away from the Site, and the fact that the industrial estate along Cowley Road provides separation, cumulative construction impacts are unlikely to occur.

Off-Site Traffic Noise

- 19.51 Cumulative noise from construction traffic from planned committed developments is unlikely to give rise to any additional adverse effects. The contractors on each scheme will liaise with South Cambridgeshire District Council to establish a Traffic Management Plan to minimise any potential for effects due to cumulative construction traffic noise along surrounding roads.

Operational Phase

Mechanical Plant Noise

- 19.52 It is expected that building services noise from the committed developments will be designed to achieve appropriate operational noise limits.
- 19.53 Due to the distances between the committed developments and the nearest existing receptors, it is considered that the operational noise limits advised in the noise assessments for each scheme would not be exceeded with all developments in operation.
- 19.54 Overall, it is considered that cumulative building services noise would be of negligible significance.

Traffic Noise

- 19.55 The change in noise associated with committed developments and Proposed Development traffic on the surrounding road network has been predicted and is presented in **Table 14.26** in chapter 14.
- 19.56 The cumulative impact of committed developments and Proposed Development traffic on road traffic noise would be of minor significance.

Socio-Economics

- 19.57 No significant cumulative socio-economic effects are anticipated between the Proposed Development and the two sites outside of the NECAAP area set out in the EIA Scoping Opinion (**Appendix 2.2**). This is because they are sufficiently distant that are unlikely to share the same social infrastructure and will require their own measures to meet their own additional demands on education and open space.
- 19.58 As discussed in the Socio-Economic Assessment in Chapter 15, much of the identified need for education and open space identified in the topic papers supporting the emerging NECAAP will relate to the Cambridge Waste Water Treatment Plant site. This will introduce residential uses to an area that is separated from existing residential areas and will, therefore, need to provide much of its own social infrastructure to ensure that it is within appropriate walking distances. This is different from the Proposed Development, which is within suitable walking distances to existing social infrastructure and can therefore reasonably make use of any spare capacity, much of which is increasing as the ageing population leads to a decline in the overall residential population in the area.

Soils and Groundwater

- 19.59 Potential cumulative effects have been considered for the committed developments listed in paragraph 19.12.
- 19.60 By virtue of the planning process, the potential developments will be subject to the NPPF and it will be necessary under planning for appropriate mitigation to be implemented during construction, in accordance with current legislation and industry best practice to control potential impacts and effects. Potential cumulative effects during construction are therefore considered to be unlikely.
- 19.61 It is assumed that operation of the potential developments will be in accordance with any granted planning permission and that the appropriate pollution prevention measures will be implemented. There is the potential for some sterilisation of sand and gravel in the MSA as a result of the potential developments if prior extraction is not undertaken. A low potential for cumulative effects is predicted during operation.

Transport

- 19.62 The assessment of transport impacts of the Proposed Development has been informed by the Transport Evidence Base prepared in support of the draft North East Cambridge Area Action Plan. The Transport Evidence Base has taken into account the impact of a number of cumulative developments in the area (including Waterbeach New Town and development at St John's Innovation Centre) in establishing an overall peak hour vehicle trip budget for North East Cambridge. The trip budget has subsequently been apportioned among the development sites, with the Proposed Development is forecast to operate well within its allocated portion.

- 19.63 Other cumulative developments identified at the scoping stage are addressed below:
- 21/02450/REM: Reserved matters application for 421 new homes, north of Newmarket Road. This site was allocated within the South Cambridgeshire Local Plan 2018. As a result, traffic flows associated with this site have been accounted for within the assessment that informed the Transport Evidence Base, and therefore by extension the Proposed Development as a result of its conformity with the trip budget.
 - 21/04640/SCOP: DCO Scoping for the relocation of the Cambridge Waste Water Treatment Works. This site is located to the east of the Proposed Development, with proposed access via Junctions 34 and 35 of the A14. Forecast traffic levels from the Proposed Development on the A14 have been demonstrated to fall below the threshold requiring assessment based upon the IEMA guidelines. Whilst construction timescales may overlap, cumulative levels of construction traffic would not be expected to exceed the assessment thresholds on the A14. Operational trips associated with this scheme would be expected to be at a low level and therefore it is considered unlikely that there would be any significant cumulative traffic effects.

Wind

- 19.64 There are no future (approved) developments within the assessment radius of 400m from the centre of the Site. The committed developments identified during scoping listed at paragraph 19.12 are outside this radius and are therefore not likely to influence windiness levels within the Site; similarly, the Proposed Development is unlikely to influence windiness levels in areas outside the assessment radius of 400m. As such, no cumulative impacts have been identified.

Predicted Cumulative Effects – Intra Project Effects

- 19.65 The receptors considered to be the most sensitive to cumulative impacts are dwellings on Discovery Way, dwellings on Long Reach / Bourne / Fairbairn Road, Sunningdale Caravan Park, Southgate's Caravan Park, Novotel Hotel, Cambridge Commercial Park, Cambridge Business Park, and One Cambridge Square and users of local Public Rights of Way, including Footpath 85/6.

Cumulative Construction Effects

- 19.66 Due to the proximity of nearby residents and other sensitive receptors in the vicinity of the Proposed Development, there will be some construction impacts, most notably noise, dust and transport.
- 19.67 The Air Quality and Transport Assessment concluded that residual air quality and transport effects at the construction phase would not be significant.
- 19.68 The Noise Assessment concluded that there would be temporary minor to moderate adverse effects at the closest receptors to the Proposed Development as a result of construction works, with short periods of noise levels leading to major impact.
- 19.69 Based on the considerations above, significant cumulative construction effects on sensitive receptors are not considered likely.

Cumulative Operational Effects

- 19.70 The Air Quality, Noise, Land Contamination and Health Assessments have confirmed that, once the Proposed Development is operational, there will be no significant effects on sensitive human receptors and that the Site is suitable for its proposed use.

- 19.71 Once the Proposed Development is operational, nearby residents, users of the adjacent existing Cambridge North Site, and users of local footpaths will experience combined effects, particularly in relation to air quality, noise and landscape and views. As mentioned above, the Air Quality Assessment confirms that there will be no significant impacts on human receptors in the vicinity of the Site. The Noise Assessment also concludes that there will be no significant noise effects once the Proposed Development is operational. The Landscape and Visual Assessment concludes that there will be a significant visual residual effect (major adverse) on users of footpath 85/6. (Viewpoint 8).
- 19.72 Given the above, there are likely to be some significant visual effects on sensitive receptors but since there will be no significant air quality and noise effects, there are unlikely to be significant cumulative effects once the Proposed Development is operational.

Conclusions

- 19.73 The combined effects of the different types of residual effects from the Proposed Development have been considered, and it is concluded that no significant cumulative effects would arise. Consequently, no additional mitigation is required over those measures already identified in relation to individual topics.
- 19.74 The next chapter provides a summary of effects reported within this ES.

Summary of Significant Effects

20

20.0 Summary of Significant Effects

Introduction

- 20.1 The EIA has assessed the significant environmental effects which are likely to arise from the Proposed Development, based upon the parameter plans and project information provided and detailed earlier in this ES.
- 20.2 The EIA Regulations require that this planning application is subject to an EIA. In considering the Proposed Development, the ES also documents the considerations given by the Applicant to alternative layouts and designs in this location.
- 20.3 In order to determine the scope of the EIA, a formal scoping process was undertaken, and has continued informally, as required, with the LPA throughout the development of the Proposals and as the technical work has progressed.
- 20.4 The scoping process was further supplemented by pre-application consultation with the LPA and statutory consultees whilst undertaking the technical assessments. Specialist consultants were appointed to assess these issues and to recommend appropriate mitigation measures where necessary.
- 20.5 The resultant assessments have been carried out, as agreed with the Council and its consultees, for the following environmental topics:
- Air Quality;
 - Climate Change;
 - Cultural Heritage;
 - Ecology;
 - Flood Risk and Drainage;
 - Human Health;
 - Landscape and Visual;
 - Lighting;
 - Noise and Vibration;
 - Socio-Economics;
 - Soils and Groundwater;
 - Transport;
 - Wind; and
 - Cumulative Impacts.
- 20.6 Each chapter sets out the baseline information for the environmental topic, assesses the potential impacts, recommends mitigation measures (if required) and makes a judgement on the significance of the effects for the construction and operational phases of the Proposed Development. Each chapter concludes by summarising the results of the assessments in a summary of impacts table. The concluding remarks of each assessment chapter are set out below.

Air Quality

- 20.7 Based on the monitoring data and Defra background mapped concentrations, pollutant concentrations at receptors which may be affected by the Proposed Development in the vicinity of the Site are currently unlikely to exceed the relevant Air Quality Objectives.
- 20.8 The Air Quality chapter has reviewed existing air quality and has assessed the effects of fugitive dust from construction related activities (such as demolition) on human health, amenity and ecological receptors qualitatively in accordance with best practice guidance. It has also used detailed dispersion modelling to quantify the change in pollutant concentrations brought about by road traffic attributable to the operation of the Site.
- 20.9 Before mitigation, the Dust Risk Assessment has identified that construction activities pose a maximum of a medium risk. Negligible adverse effects were identified due to increases in pollutant concentrations attributable to the Proposed Development.
- 20.10 With the implementation of the mitigation measures, such as a Dust Management Plan and Travel Plans, vehicle movements connected with the Proposed Development are expected to have negligible adverse effects on existing receptors.

Climate Change

Carbon Assessment

- 20.11 Carbon emissions for the Proposed Development have been calculated at 496,904 tonnes of carbon dioxide equivalents (CO₂e), of which 78% is associated with the operation of the Site and the remaining 22% with construction related activities.
- 20.12 The construction related carbon footprint has considered multiple design options and identified which options would minimise carbon emissions. Further optioneering is planned as the Proposed Development design progresses.
- 20.13 An Energy Strategy and Energy Statement have been prepared for the Proposed Development, which includes on-site renewable energy generation, and a combination of air source heat pumps and solar photovoltaics. The Site is expected to deliver a 10% in operational carbon emissions through low and zero carbon (LZC) technologies resulting in approximately 30% sitewide carbon reduction over a baseline/typical development.
- 20.14 The Proposed Development is expected to have a moderate adverse effect considered as significant. This is because the Proposed Development is consistent with applicable existing policy requirements, but not consistent with emerging policy requirements to meet net zero by 2050 and will likely hinder the UK's trajectory towards net zero. However, it should be noted that the project's impact can shift to minor adverse (considered as not significant) through further carbon mitigation measures as design progresses in subsequent stages of the development.

In-combination Climate Change Impact Assessment

- 20.15 In-combination Climate Change Impact Assessments have been undertaken for each topic scoped into the ES to understand how climate change will impact the results of each topic's assessment.
- 20.16 Potentially adverse significant effects because of climate change have been identified by the landscape and visual team and cultural heritage team in the operational phase. This is related

to change in rainfall and wind speeds causing damage to trees required to screen the Site from viewpoints and designated landscapes off-site. The impacts on notable viewpoints will be monitored and existing planting will be used to soften some of the effects. As the areas impacted by climate change are buildings and land outside of the proposed scheme, there is therefore, no control over these impacts within the scope of this project.

- 20.17 Potentially beneficial significant effects have been identified by the ecology team, highlighting that the open mosaic habitats on the Site are well adapted to stressed environments and will benefit by the increase in extreme weather events (droughts, floods etc).
- 20.18 No significant in-combination climate change impact effects have been identified by any other environmental topic, as climate change has been accounted for in the design or in management plans.

Climate Change Resilience Assessment

- 20.19 A Climate Change Resilience Assessment has been undertaken to understand the impact of climate change on the development under future climate conditions. This involved understanding how climate change had been considered in the design including the development of flood risk assessments, overheating analysis and landscape management plans and using this information to understand the likelihood and magnitude of climate change impacts. The Assessment has identified that there are no significant adverse climate change resilience impacts for any aspects of the design. This is because resilience has been achieved through design decisions, production of a Flood Risk Assessment, overheating analysis and maintenance/management plans.
- 20.20 As some plots of the hybrid application are outline design, a list of design guide measures have been prepared. These measures should be included in the detailed design when these plots come forward to ensure there are no significant climate change resilience impacts.

Cultural Heritage

- 20.21 The Cultural Heritage Chapter addresses the potential effects of the Proposed Development on the historic built environment within an approx. 5km radius of the Site boundary. 23 designated heritage assets were identified through scoping and pre-application discussions that warranted detailed assessment. These are:
- 6 Conservation Areas (Baits Bite Lock, Castle & Victoria Road, Fen Ditton, Horningsea, Milton, and Riverside and Stourbridge Common);
 - 2 Scheduled Monuments (Cambridge Castle Mound and Milton multi-phased settlement);
 - 2 Grade I Listed Buildings (Chapel of St Mary Magdalene Stourbridge Chapel, Cambridge; and, Church of St Peter, Horningsea);
 - 1 Registered Park and Garden (Anglesey Abbey, Grade II*);
 - 5 Grade II* Listed Buildings (The Old Rectory, Ditton Hall, Parish Church of St Mary Virgin, Barn to NW of Ditton Hall, and Biggin Abbey, Fen Ditton); and
 - 7 Grade II Listed Buildings (Poplar Hall, 4 Green End, Grassey Cottage, Riverside Cottage, Wildfowl Cottage, Lode Cottage, and Garden & Boundary Wall to Ditton Hall, Fen Ditton).
- 20.22 The architectural, archaeological, artistic and historic interests of all these heritage assets have been assessed and the contribution that their settings make to this interest or heritage significance has been described. The impact of the proposals on their surroundings and

heritage significance was assessed using Historic England guidance and the harm or benefit of the development on their significance described.

- 20.23 The Assessment has also considered any cumulative effect that could arise in combination with relevant committed developments in the area. It concludes that none of the other Proposed Developments in the area would, in conjunction with the Proposed Development, have any additional material effect on the historic environment. This is because of the distances between the cumulative projects, the orientation of the developments and/or intervening vegetation and built form.
- 20.24 The Cultural Heritage Assessment concludes that there would only be non-significant adverse effects on 2 heritage assets: the Fen Ditton Conservation Area and the Riverside & Stourbridge Common Conservation Area. This would occur during the construction and operational phases. Mitigation measures are largely embedded, as they relate primarily to the sensitive use of materials and palette and the careful articulation of heights. A comprehensive landscaping strategy will also soften the edges of the Proposed Development, and as it matures (by around 15 years) its mitigation effects will become more effective.
- 20.25 There will be no significant adverse effects on designated heritage assets during either the construction or operational phases of the development. Residual effects on the two conservation areas would be minor adverse.

Ecology

- 20.26 As discussed in Chapter 8, baseline information on ecological receptors within the area was collected through a desktop review of existing datasets and a number of site surveys, including protected species surveys.
- 20.27 One non-statutory site was recorded within 2km of the Site: Bramblefields Local Nature Reserve, which is approximately 450m from the Site boundary. Impacts as a result of disturbance and pollution events were considered to give rise to a minor adverse residual effect, which is not significant.
- 20.28 Open Mosaic Habitat on previously developed land is present across the Site, which is considered to be of national value and is a UK BAP Priority habitat listed in section 41 of the Natural Environment and Rural Communities (NERC) Act 2006. Whilst the Proposed Development would result in the loss of up to 1.84ha of Open Mosaic Habitat, 2.38ha of replacement habitat would be created. This will result in a minor adverse residual effect which is not significant.
- 20.29 The habitats within the Site comprise semi-improved neutral grassland, scattered scrub, ponds and woodland edge, which are considered to be of medium ecological value. All of the habitats are common within the wider landscape and are not considered to have an ecological value beyond the local level (i.e. low sensitivity). Therefore, the overall effect of the construction phase of the Proposed Development, taking the proposed mitigation into account, is deemed to be minor adverse, which is not significant.
- 20.30 A possible remnant population of reptiles was identified on-site. Mitigation to mitigate potential effects on reptiles is proposed and includes measures to move the reptiles from construction areas and to create new habitat on-site. The residual effect on reptiles would be minor beneficial and not significant.

- 20.31 Breeding birds were identified on-site. Proposed mitigation measures include retaining suitable nesting habitat and inclusion of a range of nest box types to support a wide range of species. The residual effect on breeding birds would be minor beneficial and not significant.
- 20.32 Foraging and commuting bats were identified on site. Mitigating measures will include the use of directional lighting during construction to minimise the disturbance from light spillage on foraging and commuting bats. Taking account of the proposed habitat enhancement, the residual effect on bats would be minor beneficial and not significant.
- 20.33 Invasive plant species were identified on-site. Mitigating measures will include the safe removal of invasive species from the Site and preventing their spread into the surrounding area. The residual effect would be minor adverse and not significant.
- 20.34 Overall, the Ecological Assessment concludes that the residual effects will range from minor beneficial to minor adverse, which would not be significant. The open space and landscaping proposals will provide a variety of habitat types, and once these are established the Proposed Development will deliver 86.26 % biodiversity net gain on-site.

Flood Risk and Drainage

- 20.35 The Flood Risk and Drainage Assessment has been undertaken in consultation with statutory consultees and in line with current legislation, policy, and best practice guidance.
- 20.36 Baseline conditions have been established using readily available information, including web-based information, topographical surveys, previous planning reports and other material submitted with this planning application.
- 20.37 This information has been used to identify the following five key water receptors and their associated sensitivity/value:
- The River Cam (Moderate Sensitivity);
 - The First Public Drain (FPD, Moderate Sensitivity);
 - The First Public Drain Overflow (Moderate Sensitivity);
 - Principal bedrock aquifer (High Sensitivity); and
 - Secondary A superficial aquifer (Moderate Sensitivity).
- 20.38 Construction workers, as well as site occupiers, visitors, and other members of the public have also been identified as receptors. These are collectively identified throughout this assessment as human receptors (very high sensitivity).
- 20.39 Potential impacts with respect to the construction and operational phases of the Proposed Development on these key receptors, and their effects, have been identified. Potential sources of impact comprise:
- Increased local flood risk; and
 - Mobilisation of silt and other contaminants resulting in the pollution of surface and groundwater bodies.
- 20.40 In terms of flood risk, the Assessment has demonstrated that providing the mitigation measures identified in this assessment and supporting FRA and Drainage Strategy (**Appendix 10.1**) are

adhered to, the Proposed Development will sustainably manage the drainage of the Site and flood risk (both on and off-site) for its lifetime, accounting for the effects of climate change.

- 20.41 The Assessment has concluded that in the long-term there will be a minor adverse significant effect on the quality of the receiving surface waters such as the FPD Overflow and the River Cam. However, the development of the Site will impede the perpetuation of pollution linkages between existing contaminated ground and the underlying Secondary A-Aquifer and nearby River Cam, resulting in a minor beneficial effect. In addition, surface water flood risk associated with the poor drainage of the existing on-site car park will be removed, resulting in a moderate beneficial significant effect on human receptors (occupiers and visitors).

Human Health

- 20.42 An assessment has been undertaken with regard to the likely significant effects of the Proposed Development on the health and wellbeing of residential communities and other health-sensitive groups (referred to as 'receptors').
- 20.43 The Construction Assessment has considered the following determinants of health:
- Active travel: including promoting walking/cycling, reducing car use, connectivity and safety;
 - Health environment: including air quality and dust, noise, vibration, ground contamination, access to green infrastructure and flood risk; and
 - Vibrant neighbourhoods: including access to local employment, and access to amenities and local food.
- 20.44 The Operational Assessment has considered the following determinants of health:
- Healthy housing: including access to affordable, high quality housing;
 - Active travel: including promoting walking/cycling, reducing car use, connectivity and safety;
 - Health environment: including air quality and dust, noise, vibration, ground contamination, access to green infrastructure, flood risk, local food growing, and overheating; and
 - Vibrant neighbourhoods: including access to healthcare services, education, social infrastructure, and local employment.
- 20.45 The Assessment has concluded that overall, the population of Greater Cambridge has relatively good health. However, there are health issues that need to be addressed, including diabetes and dementia diagnosis rates, prevalence of asthma, emergency hospital stays for male self-harm, high blood pressure, depression, coronary heart disease, chronic obstructive pulmonary disease, stroke and high levels of mental disorders in 5 to 19 year olds.
- 20.46 When comparing the Study Area with the national average, there are significant differences between Cambridge City and South Cambridgeshire. Overall, health is good in South Cambridgeshire, although there are issues regarding emergency hospital admissions for children. However, within Cambridge there are further health issues regarding deaths from all causes, cancer and circulatory disease, as well as hospital admissions for self-harm, alcohol, hip fractures and Chronic Obstructive Pulmonary Disease. Life expectancy is worse for those in Cambridge compared to those in South Cambridgeshire.
- 20.47 With regards to wider determinants of health, Cambridge and South Cambridgeshire have been identified as areas of high affordability pressure, and it is an expensive place to buy or rent a

home. The Site is well connected to the local cycle network and an extensive network of existing and future pedestrian footways and Public Rights of Way. It is served well by public transport and is in close proximity to a range of services and facilities. Overall, the Site has a low risk of flooding, and there have been no exceedances in Air Quality Objectives for nitrogen dioxide in recent years.

- 20.48 During construction, a series of mitigation measures would be applied, including a Construction Travel Plan, Construction Traffic Management Plan and Construction Environmental Management Plan. Meanwhile, uses will be available on-site during the phased construction, including a 'pop up park' that will include raised beds and community growing space.
- 20.49 During construction, there will be moderate adverse effects on health as a result of noise and vibration, which is significant.
- 20.50 The Assessment concluded that the completed development will also generate the following significant beneficial health effects:
- Accessible housing (moderate beneficial);
 - Housing mix and affordability (moderate beneficial);
 - Walking and cycling (major beneficial);
 - Open space, play space and access to nature (moderate beneficial); and
 - Local employment (major beneficial).

Landscape and Visual

- 20.51 The LVIA has concluded that the Proposed Development would result in one residual, significant adverse effect. This is associated with the visual experience of ramblers on a public footpath to the east of the Site; see the assessment of Viewpoint 8.
- 20.52 The visual amenity of this receptor group is strongly associated with appreciation of Cambridge's rural setting. Due to its height and mass, the Proposed Development will erode the sense of rurality and extend the urban influence of the City. Although the aspiration for high-quality design provides some mitigation of the visual effects, it would not compensate for the loss of the distinctive character of this view.
- 20.53 Two of the identified groups of visual receptors are subject to moderate adverse effects, which are not considered significant for EIA purposes. Notwithstanding the sensitivity of the receptors, in both instances, the magnitude of change is considered to be medium, introducing a change that partially alters the view but affords a degree of screening. In the case of visitors to the Bramblefields LNR, it is noted that the vegetative screening will increase substantially during summer and that the existing influence of urban elements has already compromised the visual experience. By contrast, the residents on Discovery Way will be subject to visual change associated primarily with the outline scheme, for which the lack of architectural detailing determines the adverse nature of the effects.
- 20.54 In terms of landscape and townscape, the Proposed Development does not result in any significant effects. The evolution of the masterplan considered the sensitivities highlighted in the LVIA process, resulting in a proposal that appropriately responds to its context. Nonetheless, it is noted that the sensitivity of the eastern edge of the Site is sufficient to give rise to moderate adverse effects on the landscape setting of the Fen Ditton CA, aligned with the significant

effects on receptors at Viewpoint 8. However, these effects should be read in conjunction with the lack of adverse visual effects on Viewpoints 5 and 24, indicating that the change to townscape is not perceived equally across the receptor. As a result, the effect on the landscape setting of the Fen Ditton CA is not considered to be significant.

20.55 In conclusion, the Proposed Development is acknowledged as a noticeable change in the study area, due to the introduction of large-scale buildings that will reinforce the emerging cluster of tall buildings at Cambridge North Station, contributing to the evolution of this gateway to the railway corridor. The aspiration for high-quality design is crucial to mitigating the visual and landscape/townscape impact. In particular, the successful establishment of the landscape scheme will reduce the effects of the proposed buildings on the identified landscape/townscape receptor and will improve the streetscape experience locally.

Lighting

20.56 The assessment of sunlight and daylight, reflected glare and obtrusive lighting may be summarised as follows:

- All receptors considered for the sunlight and daylight effects meet industry guidance (BR 209) and the effects would be not significant.
- All receptors considered in the assessment of reflected solar glare meet targets for veiling luminance under the assumptions made and the effects are, therefore, not significant.
- The information available for the proposed lighting of the Proposed Development is consistent with the ILP guidance, adherence to which will ensure that the effects of obtrusive lighting are not significant.

20.57 It has been concluded that the effects of the Proposed Development for lighting are not significant.

Noise and Vibration

20.58 The Noise Assessment has been based on environmental surveys, predictions and calculations undertaken for the Site.

20.59 The main existing sources of noise incident on the Site and surrounding receptors were road traffic noise (including the Cambridgeshire Guided Busway) and rail noise. Other noise sources contributing to a lesser degree included construction noise from One Cambridge Square and distant aircraft noise.

20.60 The impact of noise and vibration during construction of the Proposed Development has been predicted and assessed in accordance with BS 5228. Impacts from construction activities are predicted at the closest noise sensitive receptors. Temporary minor to moderate adverse effects have been predicted at these receptors, with short periods of noise levels leading to a major effect. Best practicable means measures have been recommended to minimise noise and vibration from construction, which when implemented are capable of ensuring that the impact of noise and vibration will be reduced.

20.61 It is predicted that off-site construction traffic will have a minor effect on Cowley Road, the A14 EB on slip (near B1049) and A14 WB off slip (near B1049) and will result in negligible change on other parts of the surrounding road network.

- 20.62 As there is currently no detailed information on the proposed noise generating plant to be used on-site once operational, SCDC will require the Site to comply with noise limits set out in this ES. It is assumed that sufficient embedded mitigation will be employed so that the limits are complied with, and on this basis no significant effects are likely to occur.
- 20.63 In relation to operational road traffic, minor short-term and negligible long-term effects have been predicted for Cowley Road. Negligible short and long-term effects have been predicted for Milton Road, A1134 Elizabeth Way, A1303 Newmarket Road, A14 west of A1309, A14 EB off slip road (near A1309), A14 WB off slip road (near A1309) and A14 WB on slip road (near A1309). No change has been predicted on all other roads.
- 20.64 A Site Suitability Assessment has been completed. Noise modelling has been used to predict road traffic noise levels at the proposed façades and external spaces of sensitive receptors within the Proposed Development when operational. It is likely to be feasible to meet the BS 8233 and WHO guideline internal noise levels using the following practical design approach for the building façade, thereby avoiding adverse effects for future residents:
- Specific calculated assessment required of sound insulation for all elements of the building envelope;
 - Standard performance double glazing; and
 - Standard sound insulation for walls, roof, and ventilation.
- 20.65 Guideline external noise levels are likely to be met for the majority of residential amenity areas within the Proposed Development, such as courtyards. External balconies overlooking the roads will be exposed to noise levels above the upper guideline of 55 dB LAeq,T, but where the noise level requirements are not met suitable alternative quieter areas are available.
- 20.66 Vibration exposure from the guided busway and rail sources were measured during an attended survey to derive the vibration dose value during the daytime and night-time. The levels measured indicate that no adverse comments are expected.
- 20.67 Based on the results of the external noise ingress calculations for commercial buildings, it is feasible to meet the internal noise level criteria and avoid adverse effects using a typical masonry construction supplemented internally with a plasterboard lining. Lightweight façade systems may also be appropriate, but will most likely require additional boards and resilient fixings. Lightweight rainscreen cladding systems may also be acceptable if appropriate internal linings and sheathing boards are used to provide additional mass. A 200mm in-situ concrete slab roof and moderate performance double glazing for areas such as windows and any external glazed doors (up to 29 dB Rw + Ctr, for example, 4/12/6 configuration) will meet the airborne sound insulation requirements for environmental noise ingress. Lightweight spandrel panels used on plot S4, consisting of an external metal panel supplemented with mineral wool insulation and internal boards, are also expected to meet the recommended sound insulation performance.
- 20.68 Other developments located within approximately 200m of the identified sensitive receptors can give rise to a potential cumulative noise and vibration impacts, should construction works take place simultaneously on all sites. However, due to the distance of the other development schemes, circa 200m away to the Site, and the fact that the industrial estate along Cowley Road provides separation, cumulative construction impacts are unlikely to occur.

20.69 It is expected that building services noise from the committed developments will be designed to achieve appropriate operational noise limits. Due to the distances between the committed developments and the nearest receptors, it is considered that the operational noise limits advised in the Noise Assessments for each scheme would not be exceeded with all developments in operation. Overall, it is considered that cumulative building services noise would be of negligible significance.

Socio-Economics

20.70 Overall, the Proposed Development is not predicted to result in any significant adverse socio-economic impacts.

20.71 The Local Study Area appears to have had a declining population in recent years, most likely a result of an ageing population and limited additional housing development. The Proposed Development will introduce a new population that will help to stabilise this, particularly given that the private rental element will likely continue to regularly replenish the number of younger households in the area.

20.72 The Assessment found that there is an acute housing need in Greater Cambridge, evidenced by increasing affordability constraints, with house price inflation over the last twenty years being considerably greater than growth in earnings. As a result, the provision of a mixed tenure residential development that is most likely to appeal to younger households is particularly beneficial.

20.73 In terms of education, the assessment found that there was sufficient capacity in primary schools and nurseries in the local area to meet the needs of the Proposed Development. Capacity in secondary schools is currently limited, but this is expected to change in the future with falling school rolls anticipated as the lower birth rates seen in the past decade start to have an impact. Overall, the Proposed Development is not predicted to have an adverse impact on local schools.

20.74 In terms of open space provision, the Proposed Development will provide high quality formal and informal children's play space and other informal open spaces to meet its own needs. The Proposed Development does not include any outdoor sport space or allotments, but there is evidence of an oversupply of these in the local area. Consequently, it is proposed to provide financial contributions towards their improvement rather than providing additional facilities.

20.75 The Assessment found that there are high rates of employment in Greater Cambridge and the need for the Proposed Development is instead market-led. As such, despite providing considerable employment opportunities, these are considered to be of only benefit in socio-economic terms.

Soils and Groundwater

20.76 An assessment has been undertaken of the effects on soils and groundwater in relation physical effects, effects on geology as a valuable resource, and effects associated with contamination, reuse of soil, and generation of waste soil arisings.

20.77 With implementation of mitigation, the predicted construction effects are of permanent and temporary minor adverse to negligible significance.

20.78 With implementation of mitigation, the predicted operational effects are of permanent minor adverse to minor beneficial significance.

Transport

20.79 Chapter 17 has assessed the potential traffic and transport impacts arising from the Proposed Development. The study area has been determined based on the thresholds for assessment set out in the IEMA Guidelines. This identified the need to consider the impacts of the Proposed Development on the users of Cowley Road.

20.80 During the operational phase, when impacts will generally be permanent, in respect of Severance, Driver Delay and Fear and Intimidation, the residual operational effects are predicted to be minor adverse and not significant. With regard to Pedestrian and Cycle Delay, Pedestrian and Cycle Amenity and an Increased Risk of Collisions, the residual operational effects are predicted to be negligible. There are also temporary potential impacts associated with the 'peak construction' period, but these are assessed to be of lower overall significance when compared to the operational phase.

Wind

20.81 An Environmental Wind Desk Study Assessment supported by a Computational Fluid Dynamics (CFD) study has been carried out to assess the likely significant effects of the Proposed Development in terms of Wind Microclimate.

20.82 Wind conditions for the Baseline scenario (existing site in existing surroundings) are likely to meet the desired targets for intended pedestrian use, with the exception of the main entrance to Block S3 (One Cambridge Square) immediately off-site. The local wind conditions at this entrance are likely to be in the 'Strolling' range, and in excess of the acceptable comfort limits for primary entrance use ('Standing').

20.83 With introduction of the Proposed Development, on-site wind conditions at key receptors are likely to remain acceptable for their intended pedestrian activities. As such, a negligible impact has been reported. No requirements for on-site wind mitigation measures have been indicated.

20.84 In the presence of the Proposed Development, the local windiness at the main entrance to Block S3 (One Cambridge Square) immediately off-site is likely to improve to 'Standing' levels, as acceptable for the intended use as primary entrance. Therefore, a moderate beneficial impact has been reported locally.

Summary of Mitigation Measures and Residual Effects

20.85 **Table 20.1** provides a summary of the mitigation measures proposed as a result of the assessment process for each of the environmental topics, which can be implemented either through planning conditions or legal agreement.

20.86 The residual effects are those effects that remain post-mitigation. Each of the technical chapters contained within this ES contains a detailed assessment of the residual impacts in respect of both the construction and operational phases of the Proposed Development.

20.87 The design proposals have evolved with, and been informed by the EIA process, in order to minimise any identified environmental effects as the design has progressed. However, where it has not been possible to fully resolve any adverse effects through design, a range of mitigating measures have been incorporated into the scheme.

Table 20.1: Summary of Mitigation and Residual Effects

ENVIRONMENTAL ASPECT	DESCRIPTION OF EFFECT	SIGNIFICANCE	MITIGATION MEASURES PROPOSED	MECHANISM OF CONTROL/DELIVERY	RESIDUAL EFFECT
Air Quality	Construction				
	Impact of Construction Dust on human health, amenity and ecological receptors.	Adverse	CEMP	Planning Condition	Negligible
Climate Change	Operation (includes cumulative development traffic in future year scenarios)				
	Human health (impacts of scheme on local air quality).	Negligible	Provision of EV charging points and cycle parking. Pedestrian connections across the Site. Travel plan, recommendations for vehicle fleets using site	Design as Proposed	Negligible
	Impact of Construction Dust and PM ₁₀	Minor Adverse	As outlined in CEMP - Sheetting of loose aggregates; Use dust suppression tools; Regular inspection and cleaning of local highways; Ensure all construction plant and equipment is well maintained; No unauthorised burning of materials on site	Planning condition	Negligible
Carbon Assessment					
	Carbon emissions	Moderate Adverse	N/A	N/A	N/A
ICCI Assessment					
	Air Quality	Not Significant	None required	N/A	Not Significant
	Carbon	Not Significant	None required	N/A	Not Significant
	Contaminated Land	Not Significant	None required	N/A	Not Significant
	Cultural Heritage	Significant	Monitoring the impacts on notable viewpoints with existing planting to soften some of the effects. As the areas impacted by climate change are buildings and land outside of the proposed scheme, there is therefore no control over these impacts within the scope of this project. Woodland management on-site should include succession planting, as well as planting during favourable conditions Not possible to mitigate for impacts that may occur within the wider landscape	Design as proposed	Significant

ENVIRONMENTAL ASPECT	DESCRIPTION OF EFFECT	SIGNIFICANCE	MITIGATION MEASURES PROPOSED	MECHANISM OF CONTROL/DELIVERY	RESIDUAL EFFECT
Climate Change	Ecology	Not significant	<p>Some micro-climates should be introduced on the roof top planting spaces, to provide shelter for invertebrates during high winds. This will include increasing both the height and the number of the deadwood piles and bee bank features and making sure the alignments are orientated to the SE and not the SW so there is shelter from the prevailing wind direction; and</p> <p>Ensure planting in and around balancing ponds accounts for drought and flooding by containing the right balance of species</p>	Design as proposed	Not Significant
	Human Health	Not Significant	<p>Outside furniture (benches, floor surfaces and handrails etc) should be suitable for changing temperatures for example they not be metal which could overheat</p> <p>Ensure there is connectivity to outside spaces within the boundary of the Site. Provide routes into buildings for site users when weather outdoors becomes uncomfortable/extreme</p>	RMA applications	Not Significant
	Landscape and Visual	Significant	<p>Monitoring the impacts on notable viewpoints with existing planting to soften some of the effects. As the areas impacted by climate change are buildings and land outside of the proposed scheme, there is therefore no control over these impacts within the scope of this project. Woodland management on-site should include succession planting, as well as planting during favourable conditions</p> <p>Not possible to mitigate for impacts that may occur within the wider landscape</p>	Planning condition	Significant

ENVIRONMENTAL ASPECT	DESCRIPTION OF EFFECT	SIGNIFICANCE	MITIGATION MEASURES PROPOSED	MECHANISM OF CONTROL/DELIVERY	RESIDUAL EFFECT
Climate Change	Noise and Vibration	Not Significant	None required	N/A	Not Significant
	Socio-Economics	Not Significant	None required	N/A	Not Significant
	Traffic and Transport	Not Significant	None required	N/A	Not Significant
	Water Resources, Flood Risk and Drainage	Not Significant	None required	N/A	Not Significant
CCR Assessment					
	Proposed Development	Negligible	The landscape management plan should include the following measures: <ul style="list-style-type: none"> The timing of the grassland cut may be increased if there are extended droughts/heatwaves anticipated; and Include consideration of increased lightning strikes. 	Planning Condition	Negligible
Cultural Heritage	Visual intrusion of Construction Activities on Fen Ditton Conservation Area including the presence of cranes in the skyline, the visibility of floodlighting in the rural river landscape and noise disturbance in the tranquil river areas.	Minor Adverse	CEMP to outline phasing of the works, careful management of the Site to maintain a tidy appearance and use of hoardings to create acceptable Site boundaries	Planning Condition	Minor Adverse
	Visual intrusion of Construction Activities on Riverside and Stourbridge Common Conservation Area including the presence of cranes in the skyline, the visibility of floodlighting in the rural river landscape and noise disturbance in the tranquil river areas.	Minor Adverse	CEMP to outline phasing of the works, careful management of the Site to maintain a tidy appearance and use of hoardings to create acceptable Site boundaries	Planning Condition	Minor Adverse

ENVIRONMENTAL ASPECT	DESCRIPTION OF EFFECT	SIGNIFICANCE	MITIGATION MEASURES PROPOSED	MECHANISM OF CONTROL/DELIVERY	RESIDUAL EFFECT
Cultural Heritage	Urbanising effect of completed development affecting limited views of and from Fen Ditton Conservation Area, detracting from rural character and setting.	Minor Adverse	Careful articulation of building form, height management, use of neutral/muted material palette and sturdy materials which are characteristic of Cambridge. A robust soft landscaping strategy that includes significant tree planting to soften the development's edges, aiding the transition with the sensitive Fen Edge, assumed to be mature at 15 years	Design and Proposed	Minor Adverse
	Urbanising effect of completed development affecting limited views of and from Riverside and Stourbridge Common Conservation Area, detracting from rural character and setting.	Minor Adverse	Careful articulation of building form, height management, use of neutral/muted material palette and sturdy materials which are characteristic of Cambridge. A robust soft landscaping strategy that includes significant tree planting to soften the development's edges, aiding the transition with the sensitive Fen Edge, assumed to be mature at 15 years	Design as Proposed	Minor Adverse
Ecology	Construction				
	Bramblefields LNR	Minor Adverse	CEMP	Planning Condition	Minor Adverse
	Noise levels generated from construction traffic				
	Milton Hedgerows CiWS	Negligible	CEMP	Planning Condition	Negligible
	Open Mosaic Habitat on Previously Developed Land	Moderate Adverse	Retention and enhancement and the creation of replacement habitat	Design as Proposed	Minor Adverse
	Temporary direct loss of habitat on site				
Invertebrates	Moderate Adverse	Retention and enhancement and the creation of replacement habitat	Design as Proposed	Minor Adverse	
Temporary direct loss of habitat on site					

ENVIRONMENTAL ASPECT	DESCRIPTION OF EFFECT	SIGNIFICANCE	MITIGATION MEASURES PROPOSED	MECHANISM OF CONTROL/DELIVERY	RESIDUAL EFFECT	
Ecology	Reptiles Loss and disturbance to habitat	Minor Adverse	Move reptiles from construction areas and to create new habitat	Planning Condition and Design as Proposed	Minor Beneficial	
	Breeding Birds Loss of nesting sites and temporary noise disturbance	Minor Adverse	CEMP and new habitat	Planning Condition and Design as Proposed	Minor Beneficial	
	Bats Loss of foraging habitat	Minor Adverse	New habitat	Design as Proposed	Minor Beneficial	
	Invasive Species Risk of spreading invasive species	Minor Adverse	Management of invasive species on site to be undertaken during construction (CEMP)	Planning Condition	Minor Beneficial	
	Operation					
	Bramblefields LNR Visitor Pressure	Minor Adverse	Public open space proposed as part of design	Design as Proposed	Design as Proposed	Minor Adverse
	Milton Hedgerows CiWS	Negligible	None required	N/A	N/A	Negligible
	Open Mosaic Habitat on Previously Developed Land Habitat creation	Minor Beneficial	Habitat creation	Habitat creation	Design as Proposed	Minor Beneficial
	Invertebrates Habitat creation	Minor Beneficial	Habitat creation	Habitat creation	Design as Proposed	Minor beneficial
	Reptiles Habitat creation	Minor Beneficial	Habitat creation	Habitat creation	Design as Proposed	Minor Beneficial
	Breeding Birds Habitat creation	Minor Beneficial	Habitat creation	Habitat creation	Design as Proposed	Minor Beneficial
	Bats Habitat creation	Minor Beneficial	Habitat creation	Habitat creation	Design as Proposed	Minor Beneficial

ENVIRONMENTAL ASPECT	DESCRIPTION OF EFFECT	SIGNIFICANCE	MITIGATION MEASURES PROPOSED	MECHANISM OF CONTROL/DELIVERY	RESIDUAL EFFECT
Flood Risk and Drainage	Surface Water Run-off and Sediment Control.				
	High (Principal Bedrock Aquifer)	Negligible	CEMP to be secured by planning conditions/necessary permitting and consents required from the EALLFA	Planning Condition	Negligible
	Moderate (FPD)	Minor Adverse	Design and management of the Proposed Development in accordance with industry standard practice, guidance and regulation		Negligible
	Moderate (R. Cam)	Minor Adverse			Negligible
	Moderate (FPD Overflow)	Minor Adverse			Negligible
	Moderate (Secondary A Aquifer)	Moderate Adverse			Construction of development should be phased appropriately to protect permanent drainage system and SuDS
	Pollutive Activities from the Site Compound				
	High (Principal Bedrock Aquifer)	Negligible	CEMP	Planning Condition	Negligible
	Moderate (FPD)	Minor Adverse	CEMP		Negligible
	Moderate (R. Cam)	Minor Adverse			Negligible
Moderate (FPD Overflow)	Minor Adverse	Negligible			
Moderate (Secondary A Aquifer)	Moderate Adverse	Negligible			
Piling for Foundations					
High (Principal Bedrock Aquifer)	Negligible	CEMP	Planning Condition	Negligible	
Moderate (FPD)	Minor Adverse	CEMP		Negligible	
Moderate (R. Cam)	Minor Adverse			Negligible	
Moderate (FPD Overflow)	Minor Adverse			Negligible	
Moderate (Secondary A Aquifer)	Moderate Adverse			Negligible	

ENVIRONMENTAL ASPECT	DESCRIPTION OF EFFECT	SIGNIFICANCE	MITIGATION MEASURES PROPOSED	MECHANISM OF CONTROL/DELIVERY	RESIDUAL EFFECT
Flood Risk and Drainage	Dewatering Operations, Over-Pumping and Excavations				
	High (Principal Bedrock Aquifer)	Negligible	CEMP	Planning Condition	Negligible
	Moderate (FPD)	Minor Adverse			Negligible
	Moderate (R. Cam)	Minor Adverse			Negligible
	Moderate (FPD Overflow)	Minor Adverse			Negligible
	Moderate (Secondary A Aquifer)	Moderate Adverse			Negligible
	Work on or Near Water	Major Adverse	CEMP	Planning Condition	Negligible
Flood Risk					
High (Principal Bedrock Aquifer)	Negligible		Surface water run-off attenuated to suitable max rates (agreed through consultation with SCDC) through use of SuDS, to manage flood risk on- and off-site	Design as Proposed	Negligible
Moderate (FPD)	Negligible				Negligible
Moderate (R. Cam)	Negligible		Design to incorporate suitable groundwater flood risk mitigation measures including: waterproofing basements in accordance with BS 8102:2022; providing granular corridors underneath and around basement structures; setting FFLs 150mm above surrounding ground levels; and design of external levels to manage exceedance flows safely	Design as Proposed	Negligible
Moderate (FPD Overflow)	Negligible				Negligible
Moderate (Secondary A Aquifer)	Moderate Adverse				Negligible
Very High (Human) – groundwater	Moderate Adverse				Negligible
Very High (Human) – surface water	Moderate Beneficial				Moderate Beneficial

ENVIRONMENTAL ASPECT	DESCRIPTION OF EFFECT	SIGNIFICANCE	MITIGATION MEASURES PROPOSED	MECHANISM OF CONTROL/DELIVERY	RESIDUAL EFFECT
Flood Risk and Drainage	Surface Water Run-off				
	High (Principal Bedrock Aquifer)	Negligible	The culverted FPD overflow passing through the Site will be diverted to support the proposed arrangement of new structures throughout the Proposed Development. The diversion will be controlled through the LDC process	Design as Proposed	Negligible
	Moderate (Secondary A Aquifer)	Minor Beneficial	Surface water run-off will be discharged into the diverted FPD overflow culvert to avoid mobilising any contaminants present within the underlying ground. The FPD overflow culvert outfalls to the River Cam to the east of the Site		Minor Beneficial
	Moderate (R. Cam) – run-off water quality	Moderate Adverse	Throughout the Site, a multi-functional SuDS network will be specified as part of the surface water drainage strategy design, to provide the necessary water quality improvements to surface water run-off before being discharged. SuDS will include green roofs, rain gardens, swales, tree pits, and attenuation tanks		Minor Adverse
	Moderate (R. Cam) – reducing pollution linkages	Minor Beneficial			Minor Beneficial
	Moderate (FPD)	Minor Adverse			Negligible
	Moderate (FPD Overflow)	Moderate Adverse			Minor Adverse
	Very High (Human)	Major Adverse			Negligible
	Foul Drainage				
	Moderate (R. Cam)	Negligible	Foul water from the Proposed Development to drain by gravity to a new foul pumping station in the southern corner of the Site. Development foul flows to be pumped north from the new pumping station, along Cowley Road, to discharge into the existing Anglian Water sewer network to the north-west of the Site Foul water discharge to public sewer system subject to Anglian Water approval	Design as Proposed	Negligible
Human Health	Construction				
	Active Travel During Construction				
	Promote walking and cycling / Reduce car use	Minor Beneficial	Travel Plan CCTV for secure cycle parking	Planning Conditions	Minor Beneficial
	Safety	Neutral	CTMP Public site notice to provide contact details (accessible to all protected characteristics in the Equalities Act 2010) for raising concerns over safety.	Planning Condition	Neutral

ENVIRONMENTAL ASPECT	DESCRIPTION OF EFFECT	SIGNIFICANCE	MITIGATION MEASURES PROPOSED	MECHANISM OF CONTROL/DELIVERY	RESIDUAL EFFECT	
Human Health	Connectivity	Neutral	CEMP	Planning condition	Neutral	
	Healthy Environment During Construction					
	Air Quality	Neutral	As set out in Air Quality chapter	As set out in Air Quality Chapter.	Neutral	
	Noise and Vibration	Moderate Adverse	As set out in noise chapter	As set out in Noise Chapter.	Moderate Adverse	
	Contaminated Land	Neutral	As set out in contaminated land chapter	As set out in Contaminated Land Chapter.	Neutral	
	Access to open space	Minor Beneficial	Non proposed	N/A	Minor Beneficial	
	Flood Risk	Neutral	As proposed in flood risk and drainage chapter	As proposed in Flood Risk and Drainage Chapter.	Neutral	
	Vibrant Neighbourhood During Construction					
	Local employment	Minor Beneficial	preparation of an Employment Skills Plan CEMP include requirement for contractors and construction companies to prepare and Implement a Mental Health Plan	Planning Conditions	Minor Beneficial	
	Access to amenities and local food	Neutral	None proposed	N/A	Neutral	
	Operation					
	Healthy Housing During Operation					
Accessible housing	Moderate Beneficial	None proposed	N/A	Moderate Beneficial		
Housing mix and affordability	Moderate Beneficial	Tenure and size mix to be determined through reserved matters to meet local needs	RMA Application	Moderate Beneficial		
Homes to age well	Minor Beneficial	Maintenance plan RMA to provide inclusive accessibility through design of buildings, landscaping and access	RMA Application	Minor Beneficial		

ENVIRONMENTAL ASPECT	DESCRIPTION OF EFFECT	SIGNIFICANCE	MITIGATION MEASURES PROPOSED	MECHANISM OF CONTROL/DELIVERY	RESIDUAL EFFECT	
Human Health	Active Travel During Operation					
	Walking and Cycling	Major Beneficial	Travel Plan	Planning Condition	Major Beneficial	
	Safety	Neutral	None proposed	N/A	Neutral	
	Connectivity	Neutral	None proposed	N/A	Neutral	
	Minimising car use	Minor Beneficial	None proposed	N/A	Minor Beneficial	
	Healthy Environment During Operation					
	Air quality	Neutral	RMA to considerations to internal air quality	RMA		Neutral
	Noise	Minor Adverse	Further assessment of the proposed mechanical services plant	RMA		Minor Adverse
	Contaminated Land	Neutral	None proposed	N/A		Neutral
	Open space, play space and access to nature	Moderate Beneficial	Landscape management and maintenance strategy should include consideration of space design to meet the needs of all age groups, residents and employees on site, including those protected characteristics in the Equalities Act	Planning Condition		Moderate Beneficial
	Local food growing	Minor Beneficial	A s106 will secure community growing on site of 1 Milton Avenue and triangle site and then to be relocated north of Cowley Road at later phases	S106 Agreement		Minor Beneficial
	Overheating	Minor Beneficial	Overheating risk assessment	Planning Condition at Reserved Matters		Minor Beneficial
	Flood risk	Neutral	Regular maintenance of SUDS features as set out in the Drainage Strategy	Planning Condition		Neutral
	Vibrant Neighbourhood During Operation					
Healthcare services	Minor Adverse	Contribution to local services	S106 Agreement		Neutral	
Education	Neutral	None Proposed	N/A		Neutral	
Access to social infrastructure, public buildings, and spaces.	Minor Beneficial	None Proposed	N/A		Minor Beneficial	
Local Employment	Major Beneficial	Preparation of an Employment Skills Plan to prioritise local recruitment	Planning Condition		Major Beneficial	

ENVIRONMENTAL ASPECT	DESCRIPTION OF EFFECT	SIGNIFICANCE	MITIGATION MEASURES PROPOSED	MECHANISM OF CONTROL/DELIVERY	RESIDUAL EFFECT
Landscape and Visual	Landscape				
	Introduction of the Proposed Development in 'NCA 88: Bedfordshire and Cambridge Clayland'	Minor Adverse	High quality design	Design as Proposed	Minor Adverse
	Introduction of the Proposed Development in 'LCA 9A Cam River Valley – Cambridge'	Moderate Adverse	High quality design	Design as Proposed	Moderate/Minor Adverse
	Introduction of the Proposed Development in the railway corridor	Moderate Adverse	High quality design	Design as Proposed	Moderate Beneficial
	Introduction of the Proposed Development in the context of the local residential area	Moderate Neutral	High-quality design and implementation of a 30 year landscape maintenance plan	Design as Proposed	Moderate Beneficial
	Introduction of the Proposed Development in the Cambridge's skyline	Moderate Adverse	High quality design	Design as Proposed	Moderate Neutral
	Introduction of the Proposed Development in the landscape setting of Fen Ditton CA	Major Adverse	High quality design	Design as Proposed	Moderate Adverse

ENVIRONMENTAL ASPECT	DESCRIPTION OF EFFECT	SIGNIFICANCE	MITIGATION MEASURES PROPOSED	MECHANISM OF CONTROL/DELIVERY	RESIDUAL EFFECT
Landscape and Visual	Introduction of the Proposed Development in the landscape setting of Riverside and Stourbridge Common CA	Minor Adverse	High quality design	Design as Proposed	Minor Neutral
	Visual				
	Introduction of the Proposed Development in the visual experience of visitors of the Bramblefields LNR	Major Adverse	Propose a development appropriate to the Site's context in terms of scale, height and form	Design as Proposed	Moderate Adverse
	Introduction of the Proposed Development in the visual experience of visitors of the Limekiln Road West Pit LNR	Moderate/Minor Adverse	Propose a development appropriate to the Site's context in terms of scale, height and form	Design as Proposed	None
	Introduction of the Proposed Development in the visual experience of road users in proximity of the Site, including the guided busway.	Moderate/Minor Adverse	Propose a development appropriate to the Site's context in terms of scale, height, materiality and form	Design as Proposed	Moderate/Minor Neutral
	Introduction of the Proposed Development in the visual experience of road users on the A14	Moderate/Minor Adverse	High quality design	Design as Proposed	Moderate/Minor Neutral

ENVIRONMENTAL ASPECT	DESCRIPTION OF EFFECT	SIGNIFICANCE	MITIGATION MEASURES PROPOSED	MECHANISM OF CONTROL/DELIVERY	RESIDUAL EFFECT
Landscape and Visual	Introduction of the Proposed Development in the visual experience of ramblers on the public footpaths to the east of the Site	Major Adverse	Propose a development appropriate to the Site's context in terms of scale, height and form	Design as Proposed	Moderate/Major Adverse
	Introduction of the Proposed Development in the visual experience of ramblers in the green open spaces along the river	Major Adverse	High quality design	Design as Proposed	Minor Neutral
	Introduction of the Proposed Development in the visual experience of ramblers on footpaths in the wider landscape (long distance views, including relevant Policy 60 key views)	Major Adverse	High quality design	Design as Proposed	None
	Introduction of the Proposed Development in the visual experience of cyclists and pedestrians on the Chisholm Trail	Major Adverse	High quality design	Design as Proposed	Negligible
	Introduction of the Proposed Development in the visual experience of local residents to south-west of the Site	Major Adverse	High quality design	Design as Proposed	Moderate Adverse

ENVIRONMENTAL ASPECT	DESCRIPTION OF EFFECT	SIGNIFICANCE	MITIGATION MEASURES PROPOSED	MECHANISM OF CONTROL/DELIVERY	RESIDUAL EFFECT
Landscape and Visual	Introduction of the Proposed Development in the visual experience of local residents to the south-east	Major Adverse	High quality design	Design as Proposed	Minor/Moderate Neutral
Lighting	Impact of proposed massing on daylight and sunlight to surrounding buildings.	Not Significant	Not required	N/A	Not Significant
	Impact of proposed massing on daylight and sunlight to surrounding areas.	Not Significant	Not required	N/A	Not Significant
	Impact of Proposed Development lighting to surrounding areas.	Not Significant	Mitigation measures require the lighting systems to adhere to ILP guidance on obtrusive lighting	Design as Proposed	Not Significant
Noise and Vibration					
	Construction noise - Existing noise sensitive receptors (Dwellings on Discovery Way (R1), Dwellings on Long Reach / Bourne / Fairbairn Road (R2), Sunningdale Caravan Park (R3), Southgate's Caravan Park (R4), Dwellings on Grange Park / Sandy Lane (R5))	Moderate Adverse	Best Practice, CEMP	Planning Condition	Minor Adverse

ENVIRONMENTAL ASPECT	DESCRIPTION OF EFFECT	SIGNIFICANCE	MITIGATION MEASURES PROPOSED	MECHANISM OF CONTROL/DELIVERY	RESIDUAL EFFECT
Noise and Vibration	Construction noise - Existing noise sensitive receptors (Novotel Hotel (R7, Cambridge Commercial Park (R8), Cambridge Business Park (R9), and One Cambridge Square (R10))	Minor Adverse	Best practice, CEMP	Planning Condition	Minor Adverse
	Construction noise - Future residents of the Residential Quarter of the Proposed Development (R6)	Minor Adverse	Best practice, CEMP	Planning Condition	Minor Adverse
	Construction vibration - Existing and future sensitive residential receptors (Dwellings on Discovery Way (R1), Dwellings on Long Reach / Bourne / Fairbairn Road (R2), Sunningdale Caravan Park (R3), Southgate's Caravan Park (R4), Dwellings on Grange Park / Sandy Lane (R5), Residential Quarter of the Proposed Development (R6), Cambridge Business Park (R9))	Minor Adverse	Best practice, CEMP	Planning Condition	Minor Adverse

ENVIRONMENTAL ASPECT	DESCRIPTION OF EFFECT	SIGNIFICANCE	MITIGATION MEASURES PROPOSED	MECHANISM OF CONTROL/DELIVERY	RESIDUAL EFFECT	
Noise and Vibration	Construction Vibration - Existing sensitive receptors (Novotel Hotel (R7), Cambridge Commercial Park (R8), and One Cambridge Square (R10))	Moderate Adverse	Best practice, CEMP	Planning Condition	Minor Adverse	
	Construction Traffic - All existing and future noise sensitive receptors	Minor Adverse	Construction traffic management plan as part of CEMP	Planning Condition	Minor Adverse	
Operation						
Socio-Economics	Operational mechanical plant – all existing and future noise sensitive receptors	Negligible	Plant noise limits	Design as Proposed	Negligible	
	Operational traffic noise – all existing and future noise sensitive receptors	Minor Adverse	None	N/A	Minor Adverse	
	Provision of housing (Local)	Major Moderate Beneficial	None	N/A	Major/ Moderate Beneficial	
	Provision of housing (Gt Camb)	Moderate Beneficial	None	N/A	Moderate Beneficial	
	Impact of nursery and pre-school provision	Negligible	None	N/A	Negligible	
	Impact on primary school provision	Negligible	None	N/A	Negligible	
	Impact on secondary school provision	Negligible	None	N/A	N/A	Negligible

ENVIRONMENTAL ASPECT	DESCRIPTION OF EFFECT	SIGNIFICANCE	MITIGATION MEASURES PROPOSED	MECHANISM OF CONTROL/DELIVERY	RESIDUAL EFFECT
Socio-Economics	Impact on public open space (including children's play space)	Negligible	None	N/A	Negligible
	Impact on outdoor sport space	Minor Adverse	Financial contribution towards improvements of existing facilities	S106 Agreement	Negligible
	Impact on allotment space	Minor Adverse	Financial contribution towards improvements of existing facilities	S106 Agreement	Negligible
	Provision of construction employment opportunities	Minor Beneficial	None	N/A	Minor Beneficial
	Provision of operational employment opportunities	Minor Beneficial	None	N/A	Minor Beneficial
	Construction				
Soils and Groundwater	Changes in topography	Minor Adverse/ Negligible	No mitigation identified	N/A	Minor Adverse/ Negligible
	Soil compaction and erosion	Minor Adverse	Implementation of CEMP	Planning Condition	Minor Adverse
	Ground stability	Minor adverse/ Negligible	Ground investigation to characterise geotechnical engineering properties of the ground and inform detailed design Landscaping/tree planting design to take account of shrink-swell potential of Gault Clay Earthworks to prepare development plots to be undertaken and validated in accordance with appropriate works specification	Planning Condition	Negligible
	Contamination, reuse of soil, generation of waste soil arisings.	Minor Adverse/ Negligible	Ground investigation, gas monitoring and groundwater sampling; human health generic quantitative risk assessment, preliminary controlled waters risk assessment and gas risk assessment; completion of detailed risk assessment and/or remediation as required; completion of foundation works risk assessment	Planning Condition	Negligible
		Minor Adverse/ Negligible	Ground investigation, gas monitoring and groundwater sampling; human health generic quantitative risk assessment, preliminary controlled waters risk assessment and gas risk assessment; completion of detailed risk assessment and/or remediation as required; completion of foundation works risk assessment	Planning Condition	Negligible

ENVIRONMENTAL ASPECT	DESCRIPTION OF EFFECT	SIGNIFICANCE	MITIGATION MEASURES PROPOSED	MECHANISM OF CONTROL/DELIVERY	RESIDUAL EFFECT
Soils and Groundwater	Operation				
	Changes in topography	Negligible	No mitigation identified	N/A	Negligible
	Soil compaction and erosion	Minor Beneficial	No mitigation identified		Minor Beneficial
	Ground stability	Moderate/Minor Adverse	No mitigation identified		Negligible
Transport	Contamination, reuse of soil, generation of waste soil arisings	Minor Adverse/Negligible	No mitigation identified		Minor Adverse/Negligible
	Construction				
	Severance	Negligible	CTMP linked to CEMP	Planning Condition	Negligible
	Driver Delay	Negligible	CTMP linked to CEMP		Negligible
Transport	Pedestrian and Cyclist Delay	Negligible	CTMP linked to CEMP		Negligible
	Pedestrian and Cyclist Amenity	Negligible	CTMP linked to CEMP		Negligible
	Fear and Intimidation	Negligible	CTMP linked to CEMP		Negligible
	Collisions	Negligible	CTMP linked to CEMP		Negligible
	Operation				
Transport	Severance	Minor Adverse	None	N/A	Minor Adverse
	Driver Delay	Negligible	None		Negligible
	Pedestrian and Cyclist Delay	Negligible	None		Negligible
	Pedestrian and Cyclist Amenity	Minor Adverse	None		Minor Adverse
	Fear and Intimidation	Minor Adverse	None		Minor Adverse
	Collisions	Negligible	None		Negligible

ENVIRONMENTAL ASPECT	DESCRIPTION OF EFFECT	SIGNIFICANCE	MITIGATION MEASURES PROPOSED	MECHANISM OF CONTROL/DELIVERY	RESIDUAL EFFECT
Wind	Entrance locations at the Proposed Development (on-site)	Negligible	Not required	N/A	N/A
	Access routes at the Proposed Development (on-site)	Negligible	Not required	N/A	N/A
	Outdoor Amenity areas at the Proposed Development (on-site)	Negligible	Not required	N/A	N/A
	Main entrance of Block S3 (off-site)	Moderate Beneficial	Not required	N/A	Moderate Beneficial

References

21.0 References

- Aerial photography: Google Maps (<http://maps.google.co.uk>)
- An Approach to Landscape Character Assessment Christine Tudor and Natural England, October 2014
- Arup. (2022). *Development Trip Generation v2*.
- Assessing Landscape Value Outside National Designations Technical Guidance Note 02/21, by the Landscape Institute (February 2021)
- Association of Noise Consultants (2020) Acoustics Ventilation and Overheating: Residential Design Guide, January 2020, Version 1.1
- Bat Conservation Trust (2014). Artificial lighting and wildlife Interim Guidance: Recommendations to help minimise the impact of artificial lighting on bats. Bat Conservation Trust, London.
- Bat Conservation Trust and Institution of Lighting Professionals (2018) Guidance Note 08/18 Bats and Artificial Lighting in the UK. Bats and the built environment series.
- BBC. (2022). *News Webpage*. Retrieved from <https://www.bbc.co.uk/news>
- BEIS Green Book. (2012). *Green Book supplementary guidance* . Retrieved from <https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal#:~:text=In%20consultation%20with%20analysts%20across,methodology%20for%20UK%20policy%20appraisal>.
- BEIS. (2021). *BEIS TAG Databook*. Retrieved from <https://www.gov.uk/government/publications/tag-data-book>
- Bird, E., Ige, J., Burgess-Allen, J., Pinto, A., & Pilkington, P., 2018. Healthy people healthy places evidence tool: Evidence and practical linkage for design, planning and health
- BRE BR 209 – Site layout planning for daylight and sunlight – A guide to good practise, Second edition. Paul Littlefair, BRE, 2011
- British Geological Survey (2022) Geology of Britain Viewer. Available at: <https://mapapps.bgs.ac.uk/geologyofbritain/home.html> (Accessed 6 April 2022)
- British Standard 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'
- British Standard 5228-1:2009+A1:2014 "Code of practice for noise and vibration control on construction and open sites" Part 1: Noise
- British Standard 5228-2:2009+A1:2014 "Code of practice for noise and vibration control on construction and open sites" Part 2: Vibration
- British Standard 6472-1: 2008 'Guide to Evaluation of Human Exposure to Vibration in Buildings Part 1: Vibration Sources other than Blasting'
- British Standard 7445-1:2003 'Description and Measurement of Environmental Noise. Part 1: Guide to Quantities and Procedures'. BSI, London
- British Standard 7445-2:1991 'Description and Measurement of Environmental Noise. Part 2: Guide to the Acquisition of Data Pertinent to Land Use'. BSI, London
- British Standard BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings'. BSI, London
- British Standards Institute (2013) 'BS7913: 2013 – Guide to the principles of the conservation of historic buildings', BSI Standards Limited.
- British Standards Institute, 2017*. British Standard 10175:2011+A2:2017 Investigation of potentially contaminated sites
- British Standards Institute, 2019. British Standard 8485:2015+A1:2019 Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings
- British Standards Institute, 2020*. British Standard 5930:2015+A1:2020 Code of practice for ground investigations
- BS 5489, Part 1 (2020): Code of Practice for the design of road lighting

- BS EN 12464, Part 2 (2014): Outdoor Lighting
- BSI (2020) BS 5930:2015+A1:2020 Code of practice for ground investigations
- BSI (2022) BS 8102:2022 Protection of below ground structures against water ingress. Code of Practice
- Building Energy Efficiency Survey. (2016). *BEES*. Retrieved from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/565748/BEES_overarching_report_FINAL.pdf
- Cambridge City Council (October 2018), Cambridge Local Plan
- Cambridge City Council Annual Status Report (2021)
- Cambridge City Council, 2018. Cambridge City Council Air Quality Action Plan 2018-2023. Available from: <https://www.cambridge.gov.uk/media/3451/air-quality-action-plan-2018.pdf>
- Cambridge City Council, 2020. Greater Cambridge Sustainable Design and Construction Supplementary Planning Document. Available from: <https://www.cambridge.gov.uk/media/8157/greater-cambridge-sustainable-design-and-construction-spd.pdf>
- Cambridge City Council. (2018). *Climate Change Strategy 2016-2021*.
- Cambridge City Council. (2021). *CCC Climate Strategy 2021 - 2026*. Retrieved from <https://www.cambridge.gov.uk/climate-change-strategy>
- Cambridge Inner Green Belt Boundary Study (November 2015)
- Cambridge Insight, 2019. South Cambridgeshire District Summary. [online] available at: Cambridgeshire Insight – Joint Strategic Needs Assessment (JSNA) – Published Joint Strategic Needs Assessments
- Cambridge Insight, 2021. Economy. [Online] Available at: <https://cambridgeshireinsight.org.uk/economy/>
- Cambridge Landscape Character Assessment (April 2003)
- Cambridge Local Plan (October 2018)
- Cambridge Local Plan Policies Map (October 2018)
- Cambridgeshire News. (2022). Retrieved from <https://www.cambridge-news.co.uk/news>
- CCC (2013) Cambridgeshire's Culvert Policy
- CCC (2016) Cambridgeshire Flood and Water Supplementary Planning Document
- CCC (2021) Surface Water Planning Guidance
- CCC (2022) Cambridgeshire Flood Risk Management Strategy 2021-2027
- CCiC and SCDC (2010) Cambridge and South Cambridgeshire Level 1 Strategic Flood Risk Assessment
- CCiC and SCDC (2014) Cambridge Northern Fringe East: Area Flood Risk Assessment
- Change, I. P. (2006). *Intergovernmental Panel on Climate Change*. Retrieved from Intergovernmental Panel on Climate Change: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_08_Ch8_Settlements.pdf
- Chartered Institution of Building Services Engineers. (2012). *Guide F Energy efficiency in buildings (2012)*. Retrieved from Chartered Institution of Building Services Engineers: <https://www.cibse.org/Knowledge/knowledge-items/detail?id=a0q20000008I7oTAAS>
- CIEEM (2017). Guidelines for Preliminary Ecological Assessment 2nd Edition. Institute of Ecology and Environmental Management, Winchester.
- CiFA, IEMA & IHBC (2021) 'Principles of Cultural Heritage Impact Assessment', IEMA.
- CIRIA (2001) Control of water pollution from construction sites. Guidance for consultants and contractors (C532)
- CIRIA (2006) Control of pollution from linear construction projects. Technical Guidance (C648)
- CIRIA (2015) The SuDS Manual (C753)
- CIRIA, 2001. C552 Contaminated land risk assessment. A guide to good practice.*
- Climate UK. (2012). A Summary of Climate Change Risks for East England: to coincide with the publication of the UK Climate Change Risk Assessment.

- Collins J. (ed.) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd ed.). London: The Bat Conservation Trust.
- Committee on Climate Change. (2022). Climate Change Committee UK Carbon Budgets. Retrieved April 27, 2022, from : <https://www.theccc.org.uk/about/our-expertise/advice-on-reducing-the-uks-emissions/>
- Construction Leadership Council. (2022). Guidance Documents for PAS 2080.
- Crosher, I., Gold, S., Heaven, M., Heydon, M., Moore, L., Panks, S., Scott, S., Stone, D. & White, N. (2019) The Biodiversity Metric 2.0: auditing and accounting for biodiversity value. User guide (Beta Version, July 2019). Natural England, York.
- CUPSE. (2019). Cambridgeshire County Council : Net Zero Cambridge. Retrieved from <https://data.cambridgeshireinsight.org.uk/dataset/cambridgeshire-policy-challenges-cambridge-university-science-and-policy-exchange-cuspe-8>
- Defra (2015) Non-statutory technical standards for sustainable drainage systems
- Defra (2022) MAGiC Website. Available at: <https://magic.defra.gov.uk/magicmap.aspx> (Accessed 6 April 2022)
- Defra (March 2010), The Noise Policy Statement for England
- Defra NOx to NO2 Calculator (v8.1) <https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html>
- Defra. 2021. Emissions Factors Toolkit version 11.0.
- Department for Business, Energy & Industrial Strategy. (2016). Building Energy Efficiency Survey (BEES). Retrieved January 2022, from <https://www.gov.uk/government/publications/building-energy-efficiency-survey-bees>
- Department for Business, Energy & Industrial Strategy. (2021). GOV.UK. Retrieved April 27, 2022, from <https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal>
- Department for Business, Energy and Industrial Strategy; Prime Minister's Office, 10 Downing Street. (2020). GOV.UK. Retrieved April 27, 2022, from <https://www.gov.uk/government/publications/the-ten-point-plan-for-a-green-industrial-revolution/title>
- Department for Communities and Local Government (DCLG) (July 2019), National Planning Practice Guidance
- Department for Environment, Food and Rural Affairs, 2007. The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Volume 1). London, Her Majesty's Stationary Office.
- Department for Environment, Food and Rural Affairs, 2016. Part IV of the Environment Act 1995: Local Air Quality Management: Technical Guidance LAQM.TG(16), London: Crown.
- Department for Environment, Food and Rural Affairs, 2020. UK Atmospheric Information Resource. [online] Available at: <http://uk-air.defra.gov.uk>
- Department for Transport. (2021). Decarbonising Transport: a better, greener Britain.
- Department of Communities and Local Government (July 2021), The National Planning Policy Framework The National Planning Practice Guidance (NPPG) (2019)
- Department of Transport Welsh Office, HMSO. (1998). Calculation of Road Traffic Noise
- Design Manual for Roads and Bridges, Volume 11, Environmental Assessment, Section 3, Environmental Assessment Techniques, Part 7, LA 111, Noise and Vibration, (formerly HD 213/11, IAN 185/15), Highways England, May 2020
- Directive (EC) 2008/50 of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe entered into force on 11 June 2008. Official Journal of the European Union, L152/1.
- Directive 2006/118/EC of the European Parliament and of the Council of 12 December 2006 on the protection of groundwater against pollution and deterioration (2006) Official Journal L372, p. 19
- Eaton M. A., Aebischer, N., Brown A., Hearn R., Lock L., Musgrove A., Noble D., Stroud D. & Gregory R. D. (2015). Birds of Conservation Concern 4: The population status of birds in the United Kingdom, Channel Islands and Isle of Man. British Birds 108, 708-746.

Environment Act 1995.

Environment Act 2021.

Environment Agency (2022a) Flood Map for Planning. Available at: <https://flood-map-for-planning.service.gov.uk/confirm-location?easting=547446&northing=260823> (Accessed 6 April 2022)

Environment Agency (2022b) Long Term Flood Risk Mapping. Available at: <https://check-long-term-flood-risk.service.gov.uk/map?easting=547446&northing=260823> (Accessed 6 April 2022)

Environment Agency (2022c) Catchment Data Explorer. Available at: <https://environment.data.gov.uk/catchment-planning/WaterBody/GB105033042750> (Accessed 6 April 2022)

Environment Agency, 2013. Technical guidance on detailed modelling approach for an appropriate assessment for emissions to air (AQTAG06).

Environment Agency, 2020. Land Contamination: Risk Management

Environmental Noise Guidelines for the European Region (2018)

Environmental Protection Strategies Ltd (2021) Phase I Geo-Environmental Desk Study: North East Cambridge Area, Cambridgeshire

ESDU 01008, Computer program for wind speeds and turbulence properties: flat or hilly sites in terrain with roughness changes

Fen Ditton Conservation Area Appraisal (2005)

GCSP (2020) Greater Cambridge Sustainable Design and Construction Supplementary Planning Document

GCSP (2021a) Topic Paper: Climate Change, Energy, Water and Sustainable Design and Construction

GCSP (2021b) NECAAP Draft Surface Water Drainage Core Principles: Key Parameters

GCSP (2021c) Greater Cambridge Local Plan: First Proposals

GCSP et al. (2019a) Cambridge Northern Fringe East Surface Water Drainage Space Allocation for Master Planning

GCSP et al. (2019b) Cambridge Northern Fringe East: Area Flood Risk Assessment

Gibbs, D.J (2021). An invertebrate survey of Chesterton sidings, Cambridge North Station. Report to RPS.

GLA. (2022). Whole life-cycle carbon assessment guidance . Retrieved from <https://www.london.gov.uk/what-we-do/planning/implementing-london-plan/london-plan-guidance/whole-life-cycle-carbon-assessments-guidance>

Greater Cambridge Landscape Character Assessment (February 2021)

Greater Cambridge Planning. (2020). Retrieved from <https://www.scambs.gov.uk/planning/local-plan-and-neighbourhood-planning/greater-cambridge-sustainable-design-and-construction-supplementary-planning-document-spd/>

Greater Cambridge Shared Planning (January 2020), Greater Cambridge Sustainable Design and Construction Supplementary Planning Document

Greater Cambridge Shared Planning, Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 2017, Scoping Opinion. Land Cambridge North Commercial Quarter, Cambridge. Scoping Response on behalf of South Cambridgeshire District Council Planning Reference 21/05178/SCOP, 09 February 2022.

Greater Cambridge Shared Planning. (2021). Proposed Submission North East Cambridge Area Action Plan Regulation 19.

Greater Cambridge Shared Planning. (2022). Retrieved from [https://www.greatercambridgeplanning.org/Guidelines for Landscape and Visual Impact Assessment, \(GLVIA3\) produced by the Landscape Institute with the Institute of Environmental Management and Assessment \(Third Edition, 2013\)](https://www.greatercambridgeplanning.org/Guidelines%20for%20Landscape%20and%20Visual%20Impact%20Assessment,%20(GLVIA3)%20produced%20by%20the%20Landscape%20Institute%20with%20the%20Institute%20of%20Environmental%20Management%20and%20Assessment%20(Third%20Edition,%202013))

Highways England, et al (2020) 'Design Manual for Roads and Bridges (DMRB) LA 106 – Cultural Heritage assessment, Revision 1', Highways England.

- Historic England (2015) 'Historic Environment Good Practice Advice in Planning: Note 2 – Managing Significance in Decision-Taking in the Historic Environment,' Historic England.
- Historic England (2015) 'Historic Environment Good Practice Advice in Planning: Note 3 – The Setting of Heritage Assets', Historic England.
- Historic England (2016) 'Historic England Advice Note 2: Making Changes to Heritage Assets,' Historic England.
- Historic England (2019) 'Historic England Advice Note 12 – Statements of Significance: Analysing Significance in Heritage Assets,' Historic England.
- Historic England (2022) 'Historic England Advice Note 4: Tall Buildings', Historic England.
- HM Government. The Building Regulations 2010 - Approved Document O, Overheating (2021)
- Hoare Lea ES. (2022). Document reference: REP-2323544-05-WN-20220420) .
- Hoare Lea S4. (2022). Document reference: REP-2323544-05-SK-20220520-LCA Options Appraisal S4-Rev00.docx. Retrieved from Building S4, Cambridge, Brookgate.
- Hoare Lea S6 and S7. (2022). Document reference: REP-2323544-05-SK-20220520-LCA Options Appraisal S6 + S7-Rev00.docx. Retrieved from Building S6 and S7 Cambridge, Brookgate.
- Holman et al (2014). IAQM Guidance on the assessment of dust from demolition and construction (Version1.1), Institute of Air Quality Management, London.
- Hyder Consulting (UK) Ltd (2014) Cambridgeshire County Council Surface Water Management Plan: Countywide Update 2014
- IAIA, 2019. Addressing Human Health in Environmental Impact Assessment – Consultation Draft. [Online] Available at: <https://www.iaia.org/consultation-draft-addressing-human-health-in-eia.php>
- IEMA GHG. (2022). Environmental Impact Assessment Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance. Retrieved from <https://www.iema.net/resources/blog/2022/02/28/la>
- IEMA, 2017. Health in Environmental Impact Assessment: A Primer for a Proportionate Approach. Ben Cave Associates Ltd, IEMA and the Faculty of Public Health. Lincoln, England. Available at www.iema.net
- IEMA. (2022). Institute of Environmental Management and Assessment (IEMA). Retrieved from Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation.
- ILP Guidance Note GN08 (2018): Bats and artificial lighting in the UK
- ILP Professional Lighting Guide PLG 04 (2013): Guidance on Undertaking Environmental Lighting Impact Assessments
- Institute of Environmental Assessment (1993) Guidelines for the Environmental Assessment of Road Traffic. Guidance Notes 1. IEA, Lincoln.
- Institute of Environmental Management and Assessment, (2014) Guidelines for Environmental Noise Impact Assessment
- Institute of Environmental Management. (2022). Institute of Environmental Management. Retrieved April 27, 2022, from https://s3.eu-west-2.amazonaws.com/iema.net/documents/knowledge/policy/impact-assessment/J35958_IEMA_Greenhouse_Gas_Guidance-1.pdf
- Institute of Lighting professionals (ILP) Guidance Note GN01 (2020): Guidance Notes for the Reduction of Obtrusive Light
- International Council on Monuments and Sites (2011) 'Guidance on Heritage Impact Assessments for Cultural World Heritage Properties,' ICOMOS.
- International Organisation for Standardisation (ISO) 9613-2:1996 Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation (1996)
- IOA, ANC and CIEH (2017), ProPG: Planning & Noise Professional Practice Guidance on Planning & Noise New Residential Development
- ISO 9613 Attenuation of sound during propagation outdoors – Part 2: A general method of calculation

- JNCC (2010). Handbook for Phase 1 Habitat survey: a technique for environmental audit (revised reprint). Joint Nature Conservation Committee, Peterborough.
- Landmark Information Group, (2022) Envirocheck Report
- Lawson, T.V., The determination of the wind environment of a building complex before construction; London Docklands Development Corporation, 1990.
- Legislation.gov.uk. Wildlife and Countryside Act 1981.
- Mayor of London, 2014a. The Control of Dust and Emissions during Construction and Demolition - Supplementary Planning Guidance.
- Ministry of Housing, Communities & Local Government (2021) National Planning Policy Framework
- Ministry of Housing, Communities & Local Government (2022) Planning Practice Guidance. Available at: <https://www.gov.uk/government/collections/planning-practice-guidance> (Accessed 13 April 2022)
- Ministry of Housing, Communities and Local Government (1994). Planning Policy Guidance 24 Planning and Noise
- Ministry of Housing, Communities and Local Government, 2019a. National Planning Policy Framework. Available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/810197/NPPF_Feb_2019_revised.pdf
- Ministry of Housing, Communities and Local Government, 2019b. Planning Practice Guidance (PPG) – Air Quality. Available from: <https://www.gov.uk/guidance/air-quality--3>
- Moorcroft et al., 2017. Land Use Planning & Development Control: Planning For Air Quality. London: Institute of Air Quality Management.
- Multi-Agency Geographic Information for the Countryside (MAGIC): Web-based interactive GIS mapping site (www.magic.gov.uk)
- National Landscape Character Profiles, Natural England
- National Planning Policy Framework (February 2019)
- Natural England, 2018. Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations.
- Natural England. (2021). Carbon Storage and Sequestration by Habitat.
- NHBC, Environment Agency and Chartered Institute of Environmental Health, 2008. R&D Publication 66 Guidance for the Safe Development of Housing on Land Affected by Contamination
- NHS London Healthy Urban Development Unit (2017) HUDU Planning for Health, Healthy Urban Planning Checklist. Available [Online] at: www.healthyurbandevlopment.nhs.uk
- North East Cambridge Landscape Character and Visual Impact Appraisal: Development Scenarios by The Environmental Partnership (December 2019)
- Office for National Statistics, 2011, NOMIS census data. Available [online] at: <https://www.nomisweb.co.uk/default.asp>
- Ordnance Survey 1:10,000 scale Application Site-centred digital raster map
- Public Health England (2020) Health Impact Assessment in spatial planning. Available [Online] at: <https://www.gov.uk/government/publications/health-impact-assessment-in-spatial-planning>
- Public Health England (2021) South Cambridgeshire 007, Cambridge 003 and 006. Available [Online] at: <https://www.localhealth.org.uk/#c=home>
- Reflectivity: Dealing with Rogue Solar Reflections, Illustrated by David N. H. Hassall, Publisher D.N.H. Hassall, 1991
- Riverside and Stourbridge Common Conservation Area Appraisal (March 2012)
- Royal Institution of Chartered Surveyors. (2012). Royal Institution of Chartered Surveyors. Retrieved April 27, 2022, from https://www.igbc.ie/wp-content/uploads/2015/02/RICS-Methodology_embodied_carbon_materials_

final-1st-edition.pdf

Royal Institution of Chartered Surveyors. (2017). Royal Institution of Chartered Surveyors. Retrieved April 27, 2022, from <https://www.rics.org/globalassets/rics-website/media/news/whole-life-carbon-assessment-for-the-built-environment-november-2017.pdf>

SCDC (2018) South Cambridgeshire Local Plan

SLL LG6 (2016): The Exterior Environment

Socotec (2017) Cambridge North Development Phase 1A and 1B, Factual Report on Ground Investigation: Report No E7030

Socotec, November 2017. Cambridge North Development Phase 1A and 1B Factual Report on Ground Investigation.

South Cambridgeshire District Council (September 2018), South Cambridgeshire Local Plan

South Cambridgeshire District Council Annual Status Report (2021)

South Cambridgeshire Local Plan (2018)

South Cambridgeshire Local Plan. (2018). Retrieved from <https://www.scambs.gov.uk/planning/local-plan-and-neighbourhood-planning/the-adopted-development-plan/south-cambridgeshire-local-plan-2018/>

Sports England, 2021, "Active Lives data tables" Available at: <https://www.sportengland.org/know-your-audience/data/active-lives/active-lives-data-tables>

Stantec (2021) Greater Cambridge Integrated Water Management Study: Level 1 Strategic Flood Risk Assessment

Stantec. (2021). Greater Cambridge Integrated Water Management Study: Level 1 Strategic Flood Risk Assessment.

TAG Data Book. (2022). Historical and reference information on all the appraisal and modelling values referred to in the transport analysis guidance (TAG). Retrieved from <https://www.gov.uk/government/publications/tag-data-book>

The Air Quality (England) (Amendment) Regulations 2002 (2002 No. 3043)

The Air Quality (England) Regulations 2000 (2000 No 928).

The Air Quality Standards (Amendment) Regulations 2016 (2016 No. 1184).

The Air Quality Standards Regulations 2010 (2010 No 1001).

The Conservation of Habitats and Species Regulations 2017 (2017 No 1012).

The Control of Pollution Act (1974)

The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020 (2020 No 000).

The Environmental Protection Act (1990)

Townscape Character Assessment, Technical Information Note 05/2017, by the Landscape Institute (5 December 2017)

UKCP18. (2022). Retrieved from <https://ukclimateprojections-ui.metoffice.gov.uk/products>

University of Manchester. (2022). Tyndall Centre carbon budgets. Retrieved from <https://carbonbudget.manchester.ac.uk/reports/E07000176/>

Waste Core Strategy. (2021). Cambridgeshire and Peterborough Minerals and Waste Local Plan. Retrieved from <https://www.cambridgeshire.gov.uk/business/planning-and-development/planning-policy/adopted-minerals-and-waste-plan>

Water UK (2020) Design and Construction Guidance for foul and surface water sewers offered for adoption under the Code for adoption under the Code for adoption agreements for water and sewerage companies operating wholly or mainly in England

World Health Organisation (1999), WHO Guidelines for Community Noise

World Health Organisation, 2022, Noise Topic Available at WHO/Europe | Noise

PREPARED BY

