APPENDIX NINE – NEW WATERBEACH STATION GRIP 2 REPORT (2016)

REPORT N^{O} 70000773/NWB/REP/001

NEW WATERBEACH STATION

FEASIBILITY REPORT GRIP 2

OCTOBER 2016

WSP | PARSONS BRINCKERHOFF

NEW WATERBEACH STATION SITE OPTIONEERING STUDY

FEASIBILITY REPORT GRIP 2

RLW Estates

Project no: 70000773
Feasibility Report GRIP 2
Date: October 2016

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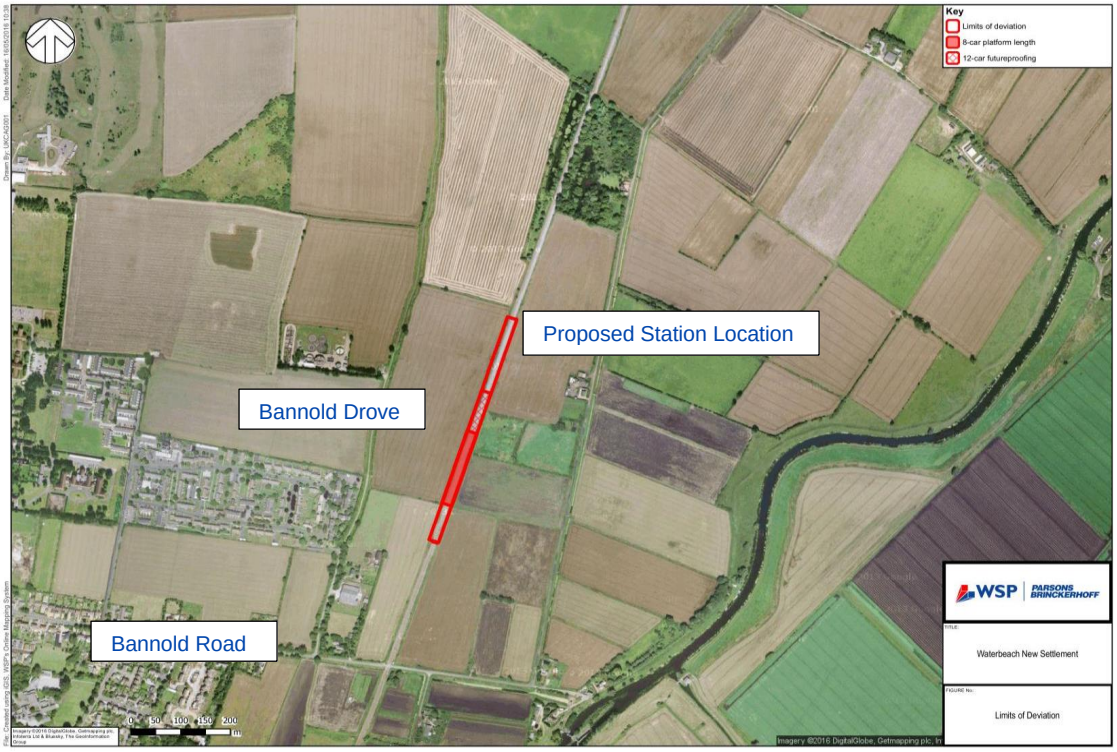
CONTENTS

EXECUTIVE SUMMARY

1. This GRIP 2 study reviews the engineering feasibility of relocating Waterbeach Station, which is proposed as part of the package of infrastructure improvements that will be delivered in support of the proposed Waterbeach New Settlement.
2. Waterbeach New Settlement is a proposed development of up to 10,000 new homes and 10,000 new jobs to the north of the existing Waterbeach Village. The scheme has an allocation in the draft Local Plan, which is currently being reviewed by the Planning Inspectorate (as at August 2016). The plan is expected to be adopted in 2017, and first phase planning applications for the site are also expected in 2017. A significant proportion of the new residents and workers in the New Settlement are expected to travel by rail.
3. The draft Local Plan policy for the New Settlement (SS/5) requires the relocation of the station. Nevertheless the initial business case considered the potential for improving the existing station to meet the needs of the new settlement's residents alongside the existing station users. Discussions with Network Rail highlighted the significant difficulties associated with even interim improvements to the existing station to cater for residents of the New Settlement, and the business case assessment makes clear that any significant improvements at the existing station would cost substantially more than the equivalent relocated provision (due to the cost of addressing safety at the level crossing). In addition the relocation results in a substantial uplift in the potential revenue generation from new settlement residents, meaning that continued use of the existing station is not preferred as this would cost more in capital expenditure and generate less revenue for the rail industry. This GRIP2 study therefore focusses on the relocation options.
4. This study is being run in parallel with Network Rail's GRIP1-2 assessment of train lengthening for 8-car operation at all stations between Kings Lynn and Cambridge, (Project Reference EDP entry A006). Network Rail's intention is for all the stations on the line including Waterbeach to be operable for 8-car Govia Thameslink (GTR) services. The current programme expects 8-car running to start on the line after a power upgrade in December 2018.
5. Delivery of the proposed new station would remove the capital expenditure required for the upgrade of the existing Waterbeach Station and the business case for the Kings Lynn-Cambridge 8-car train lengthening GTR upgrade would be consequently improved.
6. This GRIP 2 study identifies that the new 172m long 8-car station platforms could be constructed anywhere within a 486m long zone shown in the map of the proposed new station development, overleaf. No engineering constraints have been identified that would hinder the delivery programme for the station. Ground conditions are favourable for all types of platform reviewed and station construction.
7. The study includes a review of options for the New Waterbeach Station location, including taking into account the potential for future proofing for 12 car trains and a turnback facility.
8. Extending the platforms at the existing Waterbeach Station with the potential new station build following soon after would result in significant abortive costs. To avoid these abortive costs it would clearly be preferable to open the new station in advance of 8-car running and this report sets out where and in what timescales the new station could be delivered. (See Item 4.4).
9. The business case shows "very high" value for money for public sector investment over a 60 year appraisal, with a BCR greater than 5.0. The total additional rail industry revenues are estimated to be £66,000,000 when discounted over a 60-year appraisal period. This is significantly in excess of the predicted capital and operational costs (c. £35,000,000).
10. With a Return On Capital Employed of 1.89 the fare revenue should allow a commercial arrangement to be struck with Network Rail for the station to be self-funding in the longer term.
11. It is proposed that the up-front cost of the prospective new Waterbeach station will be met by RLW Estates, the Developer funding the proposal, and will not introduce an additional capital expenditure to Network Rail. Subject to the relevant commercial agreements, the capital costs of

delivering the station could subsequently be recouped by the developer through a station access charge mechanism,



Map of Proposed New Station Development

12. A new station at Waterbeach located north of the existing station will offer significant benefits to the rail operation in this area and offer benefits to the local community as highlighted below:

- Anticipated improved safety at the existing Waterbeach Station level crossing, due to decreased use and shorter barrier closure times.
- Anticipated improved station user safety, with a segregated footbridge for crossing the railway instead of using the existing level crossing.
- A site with sufficient space available to provide a modern high quality station, with a wider range of facilities including wheelchair accessible lifts and pedestrian bridge.
- A more inviting passenger environment, with additional seating and covered waiting areas.
- Improved accessibility for cars, taxis, buses, cyclists, and pedestrians.
- Rail access suitable to accommodate a larger population base, including for the new settlement and new A10 connections.
- Increased station car parking and cycle parking capacity.
- Potential future proofing, such as provision for extended station platforms and turnback facility, potential for a Park & Ride system, reducing car commuting to Cambridge, reducing parking congestion in the village, and easing congestion at existing Cambridge Park & Ride facilities.

1 INTRODUCTION

1.1 REPORT OVERVIEW

1.1.1 This report describes the feasibility study undertaken by WSP|PB on behalf of RLW Estates to identify the best options for the location of the new Waterbeach station. The study defines the scope of investment, engineering constraints and anticipated costs.

1.1.2 This report is aligned with the Network Rail (NR) GRIP 2 process and is structured with Technical Appendices B & C specifically prepared for Network Rail's technical reviewers to assess the specific effects on the operational railway infrastructure. (Ref 3.3)

1.1.3 The main report has been prepared for all Stakeholders, not limited to but including Network Rail, the Department of Transport (DfT), South Cambridgeshire District Council and Cambridgeshire County Council. The main report is supported by Appendix A which comprises Annexes setting out the Business Case and Planning Programme.

1.1.4 Appendix B comprises of twelve Technical Annexes. Each of these is a standalone GRIP 2 level document addressing the field of interest for a specific technical discipline within NR. These are accompanied by Appendix C, containing the Hazard Log and Assumptions Register.

1.2 NETWORK RAIL KINGS LYNN-CAMBRIDGE 8-CAR UPGRADE GRIP2 STUDY

1.2.1 This study is being run in parallel with Network Rail's GRIP1-2 assessment of train lengthening for 8-car operation at all stations between Kings Lynn and Cambridge, (Project Reference EDP entry A006). Network Rail's intention is for of all the stations on the line including Waterbeach to be operable for 8-car GTR services. The current programme expects 8-car running to start on the line after a power upgrade in December 2018.

1.2.2 Train lengthening is required to address overcrowding in the peak services. Waterbeach Station is particularly affected due to the trains being full on arrival in the morning peak.

1.2.3 Initial discussions between NR and RLW Estates concluded that it would be desirable for the station relocation to come forward as swiftly as possible, as this would eliminate or at least reduce costs of any improvement at Waterbeach Station.

1.2.4 Consequently, it was agreed between NR and RLW Estates that RLW Estates would commission a parallel GRIP 2 study to recommend the best site for the prospective new station. This parallel GRIP 2 study is for comparative purposes and to demonstrate engineering feasibility alongside the strongly favourable business case for the new station, details of which are provided in (Appendix A).

1.2.5 From a delivery perspective, NR acknowledges that the timing and early delivery of the relocated station would bring benefits for the rail operations on this route.

1.3 PROJECT BACKGROUND

1.3.1 Waterbeach New Settlement is a proposed development of up to 10,000 new homes and 10,000 new jobs to the north of the existing Waterbeach Village. The scheme has an allocation in the draft Local Plan, which is currently being reviewed by the planning inspectorate (as at September 2016). The plan is expected to be adopted in 2017, and first phase planning applications for the site are also expected in 2017.

1.3.2 A significant proportion of the new residents and workers in the new settlement are expected to travel by rail. The draft Local Plan policy for the scheme (Site Specific Policy SS/5) sets out a number of infrastructure requirements that will be implemented to support the delivery of new homes and jobs in this location, (refer Figure 1) one of which is the delivery of a new station at Waterbeach.

1.3.3 The new station will cater for the increased passenger demand that will result from the new homes and jobs, and which cannot be readily accommodated by the existing station.

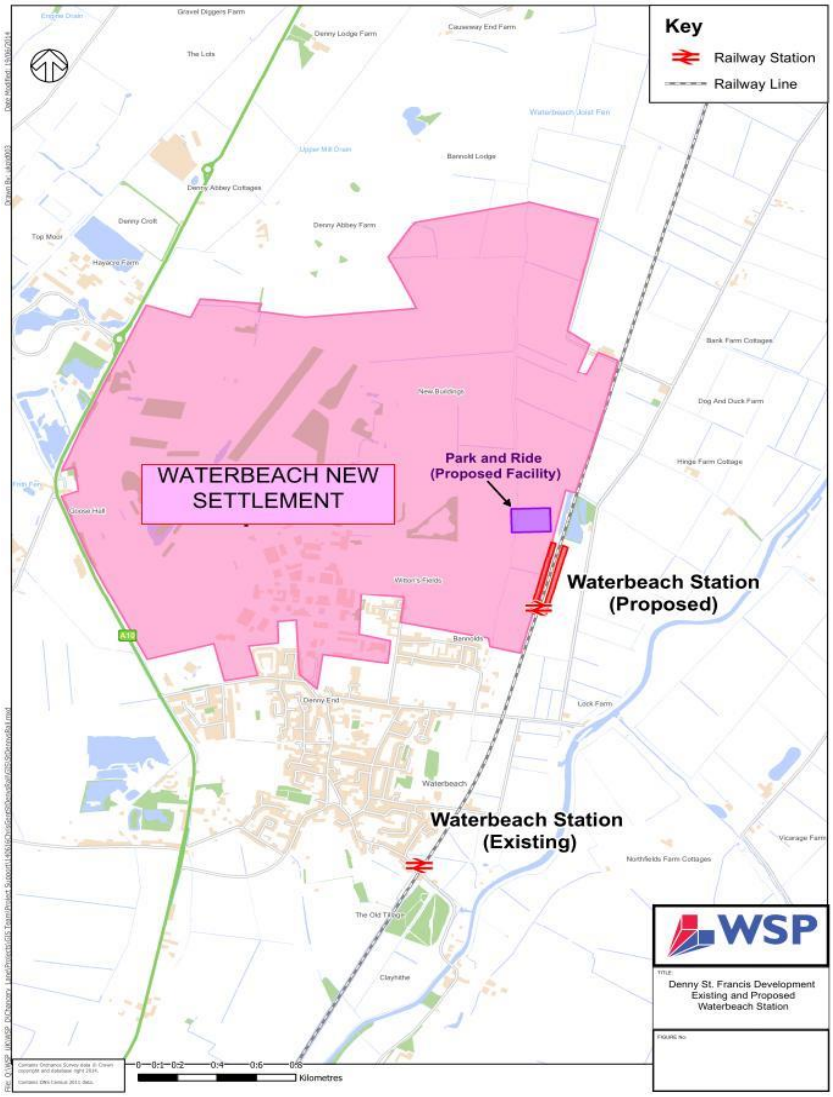


Figure 1 - Proposed Development Location

1.4 BUSINESS CASE FOR NEW WATERBEACH STATION

1.4.1 A preliminary business case for the proposed new station was prepared by WSP|PB on behalf of RLW Estates in December 2014 and updated in May 2016. The original 2014 business case was presented to the Train Operating Companies (TOCs), Network Rail, and the Department for Transport (DfT). The updated business case is included in Appendix A.

1.4.2 The business case identifies that the new settlement will generate large numbers of new station users. A new station further north than the existing station can offer significant benefits to the local community and rail industry operators including:

- Anticipated improved safety at the existing Waterbeach Station level crossing, due to decreased use and shorter barrier closure times.
- Anticipated improved station user safety, with a segregated footbridge for crossing the railway instead of using the level crossing.
- A site with sufficient space available to provide a modern high quality station, with a wider range of facilities including wheelchair accessible lifts and pedestrian bridge.
- A more inviting passenger environment, with additional seating and covered waiting areas.
- Improved accessibility for cars, taxis, buses, cyclists, and pedestrians.
- Rail access suitable to accommodate a larger population base, including for the new settlement and new A10 connections.
- Increased station car parking and cycle parking capacity.
- Potential future proofing, such as provision for extended station platforms for 12 car trains and the opportunity to provide a turnback facility. The detailed analysis of these options is contained in Appendix B Annex 12.
- Potential for a Park & Ride system, reducing car commuting to Cambridge, reducing parking congestion in the village, and easing congestion at existing Cambridge Park & Ride facilities.

1.4.3 Over the 60-year appraisal period, the station shows a strong economic case for its relocation. This means that the total benefits of the new station greatly exceed the total capital and operational costs.

1.4.4 Taking into account the strong non-revenue benefits such as journey time savings the new station shows a benefit to cost ratio of 6.53, or 7.22 once wider economic benefits have been accounted for.

1.4.5 Irrespective of any potential developer funding, this provides strong justification for public sector investment in the rail station relocation, as it significantly exceeds the Benefit Cost Ratio (BCR) threshold of 4.00, which the DfT considers “very high” value for money. However, securing public sector finance is not always straightforward and the timescales involved may slow down the anticipated delivery programme.

1.4.6 The business case shows that the additional revenue to the rail industry due to the combined effect of the New Settlement and the relocated station is £66,413,000 over the 60-year appraisal period, compared with a total capital and operational cost of £35,064,000. The Return On Capital Employed (ROCE) is thus 1.89.

1.4.7 Subject to an appropriate remuneration agreement with the DfT, the ROCE measure suggests that there will be sufficient new TOC revenue over the 60-year appraisal period to contribute significantly to, if not pay for entirely, the costs of privately financing the construction of the proposed new station.

1.5 EXISTING STATION INFRASTRUCTURE AND INTERMODAL LINKS

Existing Station – Level Crossing

1.5.1 The existing Waterbeach station has platforms suited for 4-car trains. The platforms are staggered with one each side of the level crossing. Passengers have to use the level crossing to access the platforms each side.

1.5.2 The station level crossing has an individual risk rating of D (High), a collective risk rating of 1 (Extremely High) which is the highest risk level involving any person or vehicle on the crossing (Ref source: ABC Railway Guide last assessment April 2015). Misuse history records four incidents and one near miss in the last year. The key risk factors are visibility, crossing at a station, crossing approach, cars blocking back onto the crossing, large number of users and frequent trains. Congestion is exacerbated by the narrow width of Station Road, which is approximately 5m wide at pinch points, with parked cars reducing the available carriageway to one-way effective operation.

1.5.3 Discussions with Network Rail suggest that any significant increase in the use of the existing station would bring forward the need to address the level crossing.

Existing Station – Accessibility

1.5.4 Due to the historic nature of Station Road, footways on the approach to the existing station are of limited width, less than 1m in places. Between St John the Evangelist's Church on Station Road and its junction with Lode Avenue (some 250m) there is a footway on one side only, with parked cars alongside (Figure 2). This makes the station difficult to access for wheelchair users and pedestrians with prams. It can also be difficult for pedestrians to pass each other.

Figure 2 On-street parking

1.5.5 The on-street parking has a traffic calming effect, discouraging rat running through the village and reducing vehicle speeds on the approach to the station. However, as noted previously, it also causes a congestion hazard at the level crossing.

1.5.6 There are existing bus stops within 50m of the railway station on Station Road. However, the passenger-waiting environment is poor with limited footway space available, no shelters or seating and minimal passenger information. (Figure 3).

Figure 3 Station Road

1.5.7 Bus Service 196 (Whippet Coaches Waterbeach-Fen Ditton-Cambridge service) which operates to these stops is also a low frequency service and the timetables do not coincide with peak hour train services, albeit it is unlikely that bus passengers on this route would interchange with rail services).

1.5.8 Other buses operating to Waterbeach village (Citi 2, 9 and X9) operate more frequently but do not currently connect directly with the rail station. Some of these services also operate on routes to Cambridge competing with rail services, especially during off-peak hours where rail services are less frequent.

Existing Station – Facilities

1.5.9 The existing station has 77 car spaces, 12 cycle stands, limited shelters, no station building and substandard access facilities for disabled passengers and unstaffed.

1.5.10 During a site visit at 9am on a typical working weekday in May 2016, the existing station car park (Figure 4) was observed to be almost full (three disabled bays and two Premier bays remaining). There was also evidence of overflow parking on the adjacent highway network, with vehicles left in unmarked areas of grass verge to the east of the level crossing.

1.5.11 It is also likely that many of the cars parked on street in Station Road and Lode Avenue were overflow car parking from rail station passengers. This suggests that any new station should have more car parking capacity than the existing.

Figure 4 Station car park

1.5.12 The continued use of the existing station would result in large numbers of new users at the station after new settlement is built. This would add to traffic passing through Waterbeach village and increase the use of the existing level crossing, both of which would be difficult to mitigate, given the current station's location, configuration and land ownership constraints. These issues provide further reasoning for relocating the station.

1.6 PROPOSED NEW STATION

1.6.1 A new station at Waterbeach located north of the existing station would offer significant benefits to the rail operation in this area and to the local community for the following reasons:

- Anticipated reduced risk at the existing Waterbeach Station level crossing. (An operational risk assessment will be required at the next GRIP stage to confirm this expectation).
- Anticipated improved user safety with segregated footbridge for crossing the railway instead of using the existing level crossing.
- Relatively unconstrained site with sufficient space available to provide a modern high quality station with a wider range of facilities including wheelchair accessible lifts and pedestrian bridge.
- Opportunity for improved access for non-motorised users and public transport in comparison with the existing Waterbeach station. Potential for improved accessibility for cars, taxis, buses, cyclists, and pedestrians.
- Access to a larger population base, with the new settlement development in place and new A10 connections.
- Opportunity to offer increased car parking and cycle parking capacity.
- Opportunity for future proofing with longer station platforms and a turnback facility. (Appendix B Annex 12).
- A more inviting passenger environment with additional seating and covered waiting areas.

1.6.2 The new station accommodation will be designed to accommodate longer 8-car trains and will have a safe means of accessing the East platform via an Access for All (AfA) compliant footbridge and lifts.

1.6.3 It is anticipated that the reduction in the number of level crossing users and a reduction in the barrier closure period due to trains no longer stopping adjacent to the level crossing will improve the current risk category, which is the maximum category 1.

1.6.4 The provision of a Park and Ride car park has the potential to reduce car commuting to Cambridge, reduce parking congestion in the village and ease congestion on the existing Park and Rides on the outskirts of Cambridge.

1.7 PLANNING PROGRAMME

1.7.1 As noted in Paragraph 1.3.1, the new settlement has an allocation in the draft Local Plan, which the planning inspectorate is currently reviewing (as at October 2016). The plan is expected to be adopted in 2017, and first phase planning applications for the site are also expected in 2017.

1.7.2 At present, it is envisaged that a planning application for the new Station will be submitted in Mid-2017, with construction starting in 2018 and the new station opening in 2019.

2 STAKEHOLDER ENGAGEMENT

2.1.1 In previous studies the proposed relocation of Waterbeach station has been discussed and progressed through consultation with key parties including:

- South Cambridgeshire District Council (Local Planning Authority);
- Cambridgeshire County Council (Local Transport Authority);
- Waterbeach Parish Council;
- Network Rail (NR);
- Department for Transport (DfT); and
- The Train Operating Company(TOC)

2.1.2 The production of this study has included further engagement with the key rail industry stakeholders NR and TOC. All information shared whether relating to existing assets or proposals for future assets, related projects, views and options have been considered and taken into account in the assessment of the options and production of this report.

2.1.3 A schedule of engagement throughout the GRIP 2 study period is provided in the summary table below:

REPRESENTATIVE	ORGANISATIONS REPRESENTED	NATURE OF CONSULTATION
Lisa Goodman Martin Leggett	Network Rail	Meetings / Teleconferences
Andrew Sidgwick	GOVIA THAMESLINK (TOC)	Teleconference

2.1.4 In particular, the TOC engagement enabled understanding of the operational requirements for a new station building including station security and gateline requirements.

2.1.5 As part of the next GRIP stage, it will be necessary to engage South Cambridgeshire District Council to establish the appropriate routes to Planning Permission and the scope of any required planning assessments. It is also noted that development of 3D Drawings and layouts would be beneficial at GRIP 3 to assist with the planning submission.

2.1.6 It is expected that NR will wish to compare the findings of this report including costing information to inform the future GRIP 3 study, alongside other studies taking place that will inform future investment decisions affecting the surrounding infrastructure including any interim proposals for the existing Waterbeach station.

3 SITE OPTIONEERING STUDY

3.1.1 This study is to identify the best location for the new Waterbeach station.

3.1.2 The proposed scheme is to relocate Waterbeach railway station to the North of its current location, placing it closer to the new centre of the enlarged conurbation of Waterbeach and the adjacent new settlement. The relocation would enable a new modern station facility to be built that could serve the enlarged station catchment. The possibility of improving the existing station has previously been assessed and discounted due to the difficulties associated with providing an acceptable level of service to passengers, revenue protection for the rail industry and significant increases in traffic and congestion through the village as use of the station increases.

3.2 KEY DESIGN PARAMETERS

Station Specific Operational Requirements

- Train length increase from 4 cars to 8 cars
- Safe and Step Free Access with means of accessing the East platform
- DDA compliance. Provision of a footbridge with platform access stairs and lifts. (Ramps could be an alternative to lifts).
- Car parking for at least 100 spaces – location is to be decided in the following GRIP stages in conjunction with the Developers proposals.
- Cycle Storage for at least 200 spaces – location is to be decided in the following GRIP stage in conjunction with the Developer's proposals for a phased station building facility that suits the growth of the surrounding development.
- The current train service specification.

In addition, the station should include future proofing for increased passenger numbers and/or service frequency as follows:

- Passive provision for 12 car trains
- Passive provision for an additional footbridge to connect the New Settlement on the west with land on the east - location is to be decided in the following GRIP stages, (to be coordinated with the National Cycle Route 11 proposals).
- The identification of prospects for a turnback facility

3.2.1 It should be noted that the train service specification is not expected to change and no assumption (other than the future-proofing measures outlined above) has been made for increases in service frequency within this GRIP 2 assessment.

Station Security, Lighting and Telecommunications

3.2.2 The new station security, lighting and telecommunications requirements will be defined by the TOC and outlined at GRIP 3 in the selected single option. The expected requirements, listed here for information only, are as follows:

- SISS (Station Information and Surveillance Systems)
- CCTV (Closed-circuit Television),

- PA (Public Address),
- CIS (Customer Information Systems),
- PHPs (Public Help Points),
- CER (Communications Equipment Room)
- CMS (Cable Management Systems).
- Gateline
- Lighting compliant with Railway Group Standard GI/RT7016 and guidance in RIS-7702-INS.

Accessibility Requirements

3.2.3 The proposed solution should offer better accessibility than the existing station for all modes of travel – especially pedestrians and cyclists, to prioritise sustainable travel. Where possible, shorter distance routes should be offered to pedestrians and cyclists as close to the desire lines as possible.

3.2.4 The station should connect well with existing and proposed access routes within the context of the wider development, seeking to maximise permeability for pedestrians and cycles from multiple origins, encouraging sustainable travel.

3.2.5 Pedestrian access routes need to be DDA compliant with acceptable gradients and adequate width to make them user friendly and inviting for mobility impaired passengers including wheelchair users (and mobility scooters where possible).

3.2.6 Footways should have a minimum width of 2.0m and shared footway cycleways should be a minimum of 3.0m wide. Vehicles access routes should have sufficient width for HGV servicing movements and double deck buses, plus fire appliance vehicles. This should be tested using AutoTrack software.

3.2.7 Adequate drop off and circulation space should be provided within the car park and close to the station building to allow vehicles to set down and exit without causing congestion. Options that minimise the need for vehicles to reverse are desirable in terms of user safety, potentially with a one-way circulation system.

3.2.8 Provision for access by taxis should be included within the design, ideally with a set down area close to the main station building/entrance.

3.2.9 At least two bus stops should be located in easy reach of the main station building with adequate space for buses to exit in forward gear. DIRO (Drive In Reverse Out) layout is not acceptable in an unconstrained situation. Access options that avoid or minimise the need for existing bus services to be significantly diverted away from their service routes are likely to be preferred by the County Council and bus operators.

3.2.10 Any new station requires a secondary means of escape in the event of emergency. For the proposed location, this would be to the east side of the rail line for the eastern platform if no other accessible footbridge is provided. The escape route could potentially be within NR land otherwise this will be reliant on additional farmland to the east of the railway. The secondary means of escape will also need to be DDA compliant.

3.3 REPORT STRUCTURE & APPROACH TO THE OPTIONEERING STUDY

Report Structure

3.3.1 The remainder of this report sets out the technical engineering study completed to review the preferred site location and feasibility of the proposed relocation of the station. As previously mentioned the study is being run in parallel with Network Rail's Kings Lynn-Cambridge 8-car GTR project, reference EDP entry A006. The remainder of this report contains the technical reporting of the GRIP 2 study, set out in the following sections. Supplementary technical details are located in the Appendixes A, B and C:

Appendix A

ANNEX1: BUSINESS CASE

ANNEX 2 PLANNING PROGRAMME

Appendix B

ANNEX 1: ENVIRONMENTAL APPRAISAL AND ACTION PLAN

ANNEX 2: HYDROLOGY INCLUDING FLOOD RISK

ANNEX 3: GEOTECHNICAL PHASE 1 ASSESSMENT

ANNEX 4: SIGNALLING REPORT

ANNEX 5: TRACK REPORT

ANNEX 6: OLE REPORT

ANNEX 7: DRAWINGS

ANNEX 8: SCHEDULE OF QUANTITIES

ANNEX 9: DESIGNERS RISK LOGS

ANNEX 10: INTER DISCIPLINARY DESIGN CHECK (IDC)

ANNEX 11: CONSTRUCTION PROGRAMME

ANNEX 12: FUTURE PROOFING CONSIDERATIONS

Appendix C

ANNEX 1: HAZARD LOG

ANNEX 2: ASSUMPTION REGISTER

Approach to Optioneering

3.3.2 The optioneering methodology focusses on the following primary categories/criteria that determine the feasibility and the relative desirability of the location options:

- **Proximity constraints;** to the existing village and relative to the New Settlement, including the impact on transport routes and travel times, land boundaries (NR railway ownership and Developer land ownership) and potential planning criteria.
- **Engineering constraints**; Track alignment and linespeed, existing infrastructure changes including signalling, telecoms, Overhead Line Equipment (OLE), level crossing locations and level crossing functionality, ground conditions, drainage and civil construction
- **Ecological and Environmental constraints;** covering the survey area considered for the proposed station location.

3.3.3 Optioneering decisions are described in line with the three key criteria above, and in more detail in the following sections of this report.

3.3.4 The site optioneering sifting process has been completed in accordance with NR optioneering processes and has undergone the main stages described as follows:

Stage 1 - Initial review of preferred location options, Item 4.1

Stage 2 - Preferred Southern location detailed review, Item 4.2

Stage 3 - Future proofing review, Item 4.3 and Annex 12

Stage 4 - Constructability and programme review, Item 4.4

4 SITE OPTIONEERING REPORT

4.1 STAGE 1 – COMPARISON OF THE NORTH & SOUTH LOCATIONS

4.1.1 As part of this study the team initially assessed two primary station site locations North and South of lakes as shown in Figure 5 below:

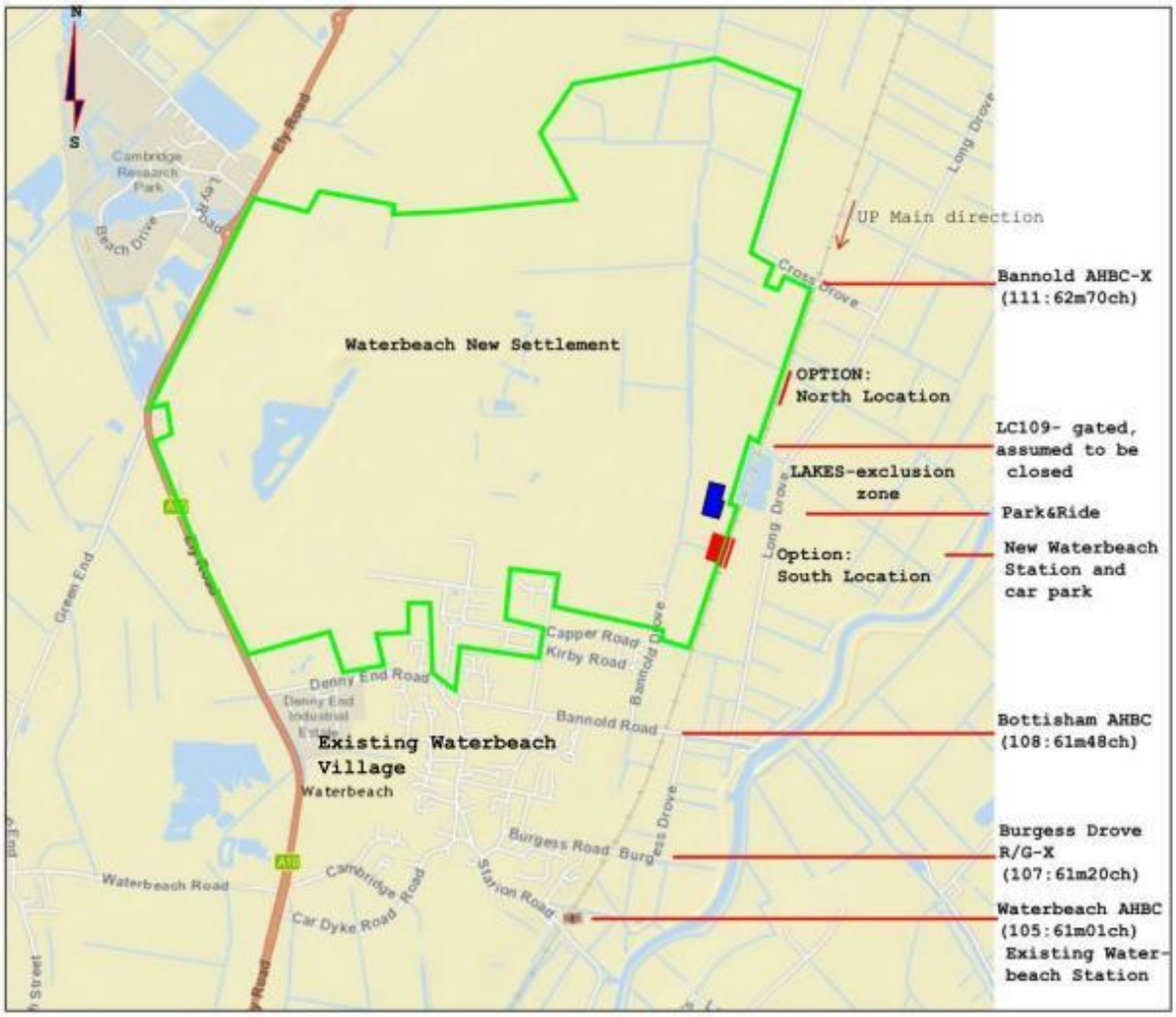


Figure 5 – Waterbeach area map of primary features

4.1.2 **The North Location** has been considered and is identified as being less favorable than the Southern Location for the following reasons:

i. Proximity

4.1.3 This is the least favorable location of the options considered, as it is over 2km away from the fringes of the existing village and at the northern edge of the Waterbeach New Settlement bounded by Cross

Drove. There would be less benefit of having the new station so far to the north as it would be more distant from the proposed town centre for the New Settlement. It would also be further from the existing village, and so would cause additional inconvenience for some existing passengers. The northern option may be reasonably accessible for new residents in the longer term once the new settlement development is completed. However, in capacity terms, the new station is likely to be required at an early stage in the development. The proposed accessibility of the northern station location is shown in figure 6 below. Figures 9 and 10 provide for comparison walking catchment times for the existing station and the proposed station location.

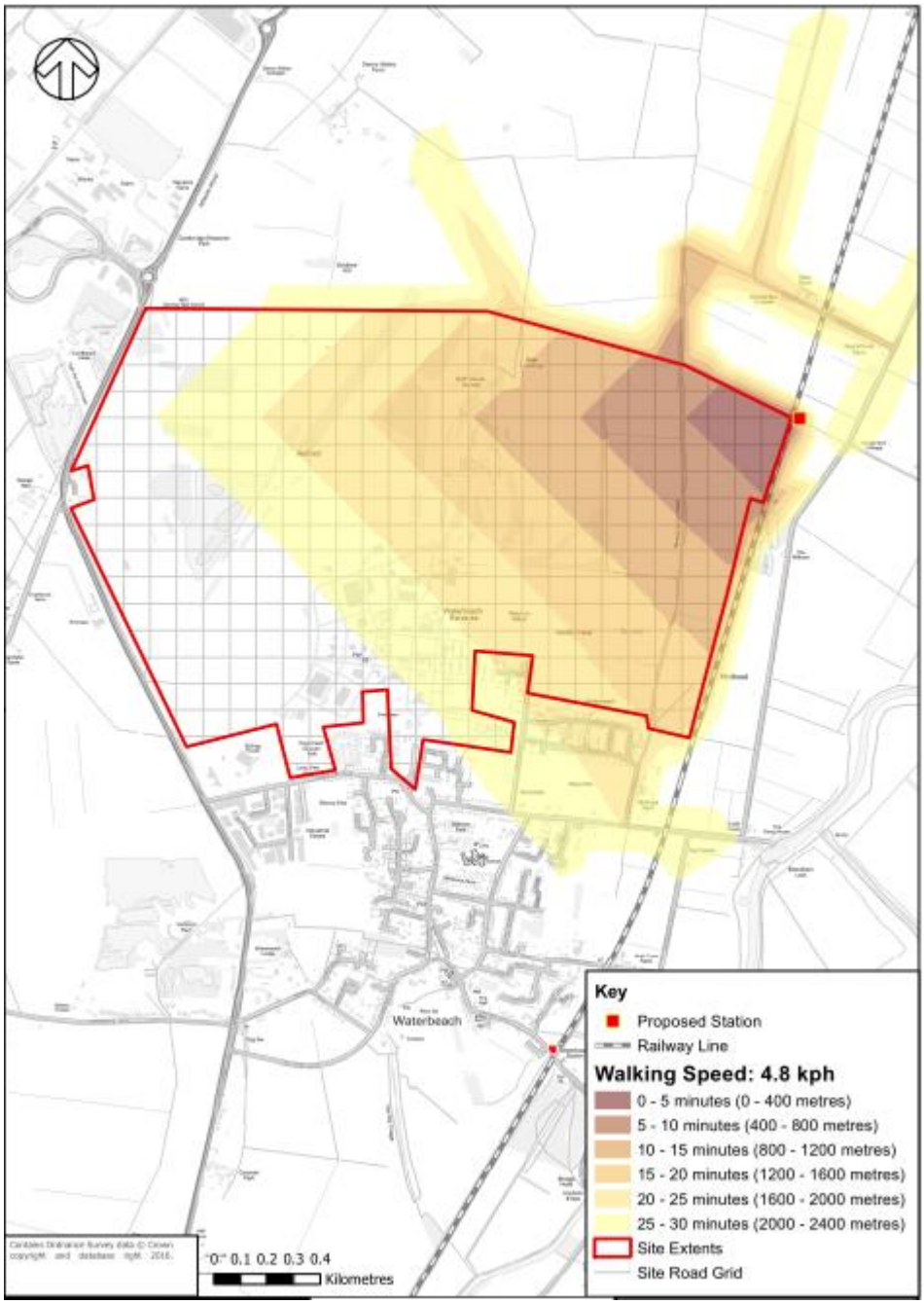


Figure 6: Northern Station location – walking catchment times

ii. Engineering constraints

4.1.4 The North site location brings more complex engineering requirements than the Southern location.

4.1.5 On the north side of this proposed location is Bannolds Automatic Half Barrier Crossing at 62m70ch, which is also the northern limit of the Waterbeach New Settlement. Signalling principles and level crossing standards will not allow the station to be positioned here without major change to the Signalling and crossing controls.

4.1.6 Signalling changes required (these may be seen in red and blue in Figure 7 below) are a new Protecting signal, stopping-non-stopping controls added to Bannolds LC circuitry, Up platform to be built north of signal CA238 or relocate signal CA236 but may impact on the next signal CA232 and so on.

4.1.7 Staggered platforms are not preferred in terms of access and increase in station footprint. Level Crossing LC109 is a User Worked Crossing and not interfaced to the signalling system. Although not considered in this study the next GRIP stage should investigate further with a view to closure.

4.1.8 No matter which location is chosen for the Up platform between the above limits it will not be possible for wrong-direction-working trains (WDW) to call at it. There is no space available back to Bannolds LC to provide similar signalling as that being proposed for the Down line; especially if future extension of the Up platform to 12-car length is also to be considered.

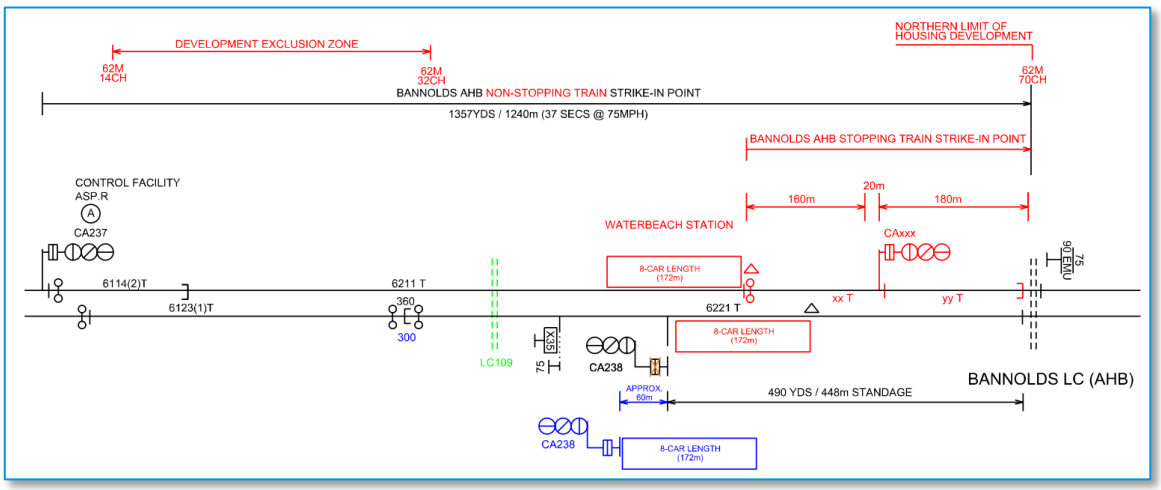


Figure 7 - Northern location station and signals configuration

iii. Ecological and Environmental constraints

4.1.9 There appears to be no discernible difference between the northern and southern locations as both areas are flat agricultural land parceled by drainage ditches and farm tracks and bisected by the railway. The Northern and Southern locations are separated by a zone of wetland and scrub that is noted as Lakes on Figure 8 and described as a Development Exclusion Zone. The Development Boundary skirts the western lake. The railway, which bisects the lakes, cannot have the boundary fencing widened without affecting the habitats within the lakes. The lakes thus are therefore considered to form an unalterable zone between the North and South locations.

4.1.10 Local hydrology risks do not dictate the location of the proposed Station, in either the North or South locations. However, to minimise the extent of flood mitigation, the station and associated public realm transport infrastructure should avoid encroachment in to FZ3 which is south of the southern edge of the Waterbeach New Settlement towards Bannold Road (Bottisham LC)

4.1.11 For the reasons above it was agreed with the Client and Network Rail that the northern location is ruled out and that focus of study would be identifying the South Location that would better serve local and future development.

4.2 STAGE 2- SOUTHERN LOCATION OPTIONEERING

4.2.1 The South Location has been assessed as the preferred option for the following reasons:

i. Proximity

4.2.2 Without a relocation of the existing station, the new settlement will introduce increased traffic to the existing Waterbeach village and the existing Waterbeach station. The proposal to relocate the station and provide new road links is a positive mitigation measure that addresses the existing congestion and parking stress issues in the village, minimises changes in access distances to the station for existing residents, and helps reduce potential negative effects of travel from the New Settlement through the existing village environment.

4.2.3 Figure 8, below, illustrates the proposed access routes from the A10 to the new station by passing to the north of the existing village (Note: The master plan is evolving through the Development Framework Document process and the base image is taken from a point in time in that process. There is a fundamental principle that the station will have direct access to the A10). The new roads will thus remove traffic travelling from the A10 to the old station travelling through the existing Waterbeach village, and the New Settlement residents will have routes to the new station that do not pass through the village. This will have a positive impact on how residents of the future town will travel and will limit the impact of new trips through the village. Further proposal details are provided in the following section of this report.

4.2.4 Figure 9, below, illustrates the walking times to the new station. The average walking times for both the existing village and the Settlement Development are similar, with the maximum walking journey time to the far south western corner of the village being just beyond a 30 minute (2,400m) journey, and the furthest extents of the new settlement to the north west also not within a 30 minute walk.

4.2.5 Figure 10, below, shows the walking journey times to the existing station. The average walking time within the village is currently broadly similar to that of the proposed station, with the furthest extents of the village some 25 minutes' walk from the station. The New Settlement would be almost entirely beyond a 30-minute walk, which would have the effect of encouraging increased cycle, bus and car traffic through the village.

4.2.6 Tables 4.1 and 4.2 allow a comparison between the number of homes within each 5-minute walk journey time band for the existing station location and the proposed station location. For simplicity, an even distribution of homes has been assumed over the new settlement area. In reality, density will be greater around the station and around the town centre, which will increase the number of homes within the immediate proximity of the station, compared to the figures presented. Nevertheless, it remains clear from the data presented in the tables, that the new station location would reduce the overall amount of travel required to access the railway from the new settlement and the village and would thus reduce reliance on private car travel.

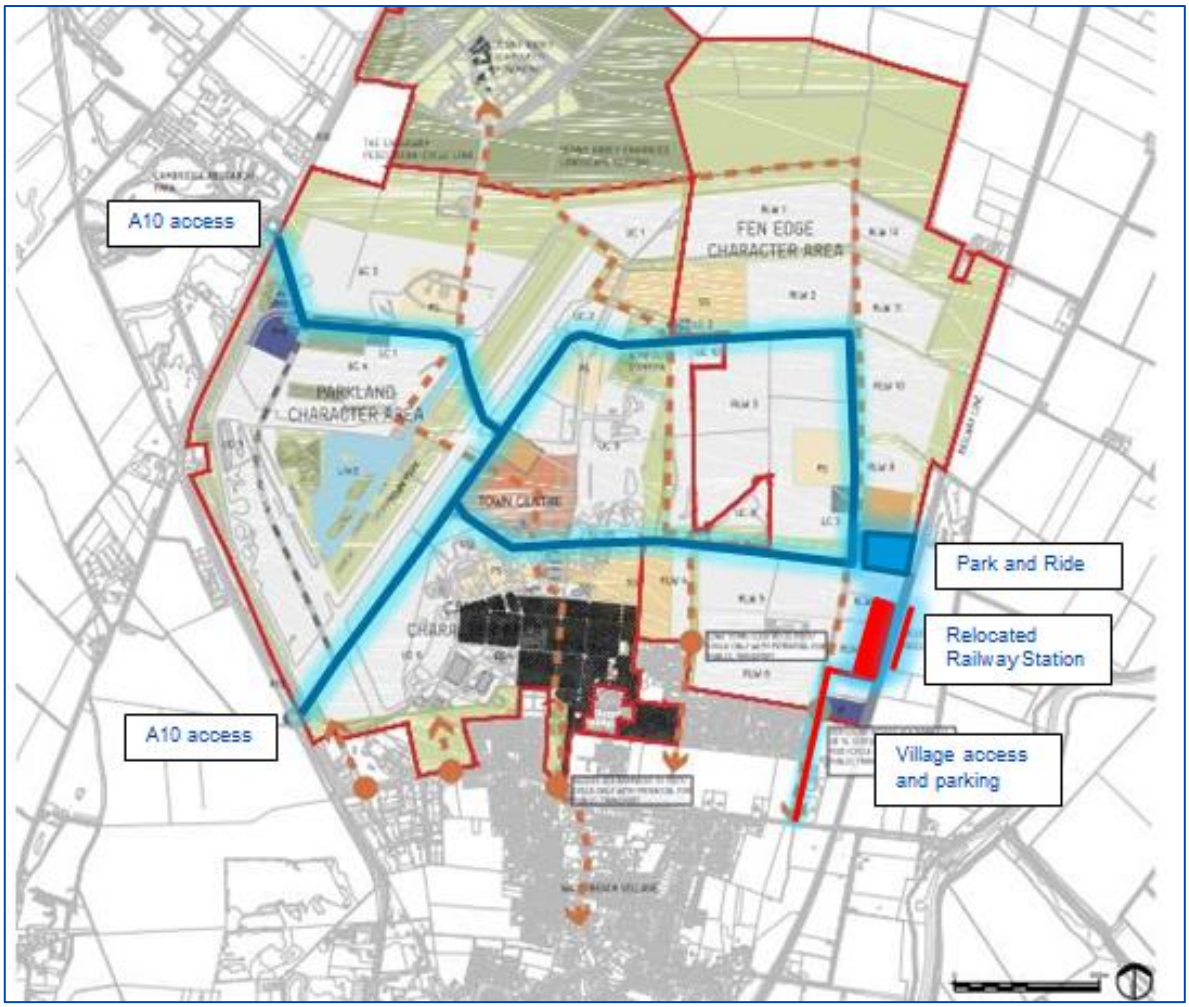


Figure 8 – Emerging Development Plan – Illustrative new Access routes

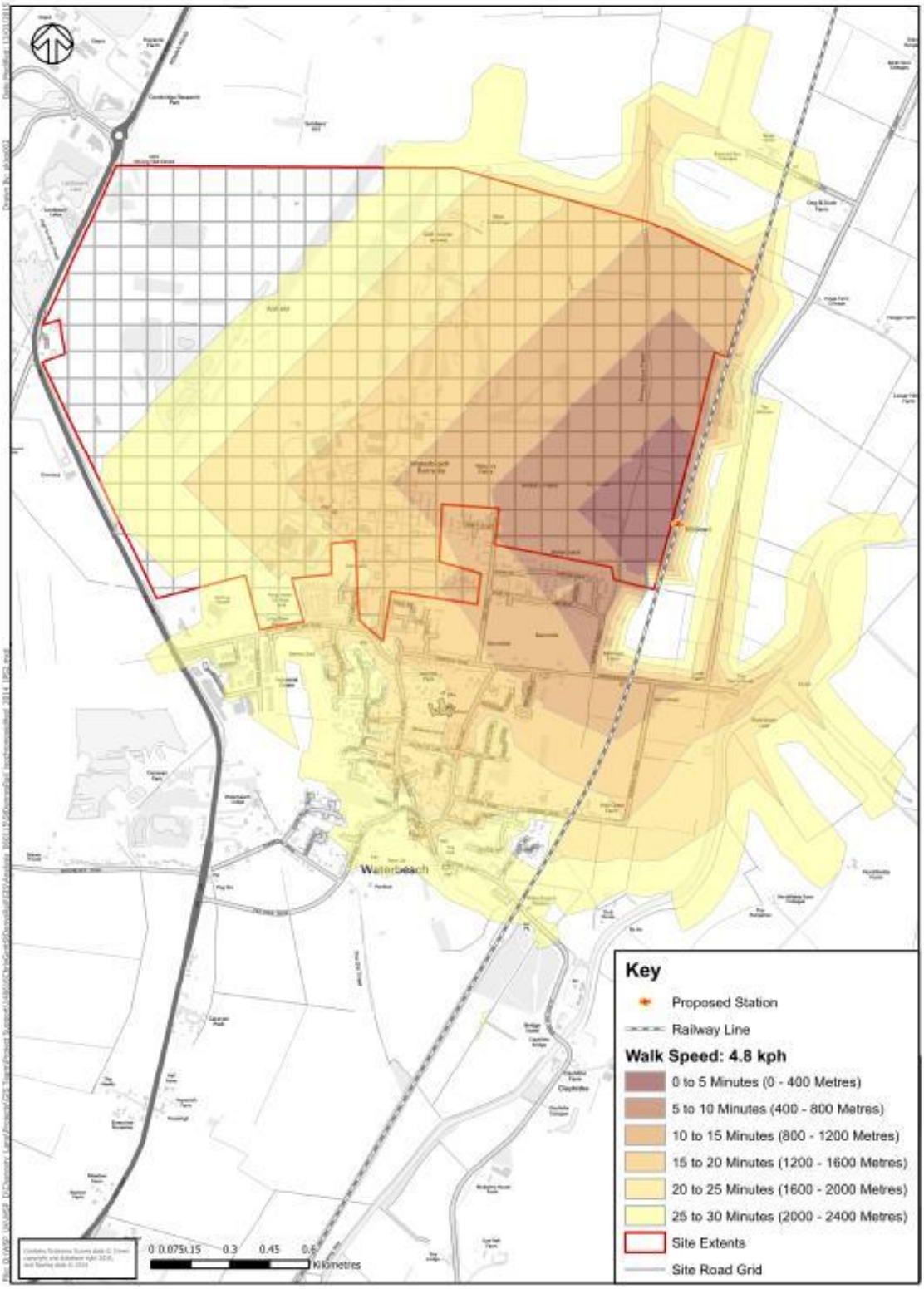


Figure 9- Southern Location Walking Catchment times

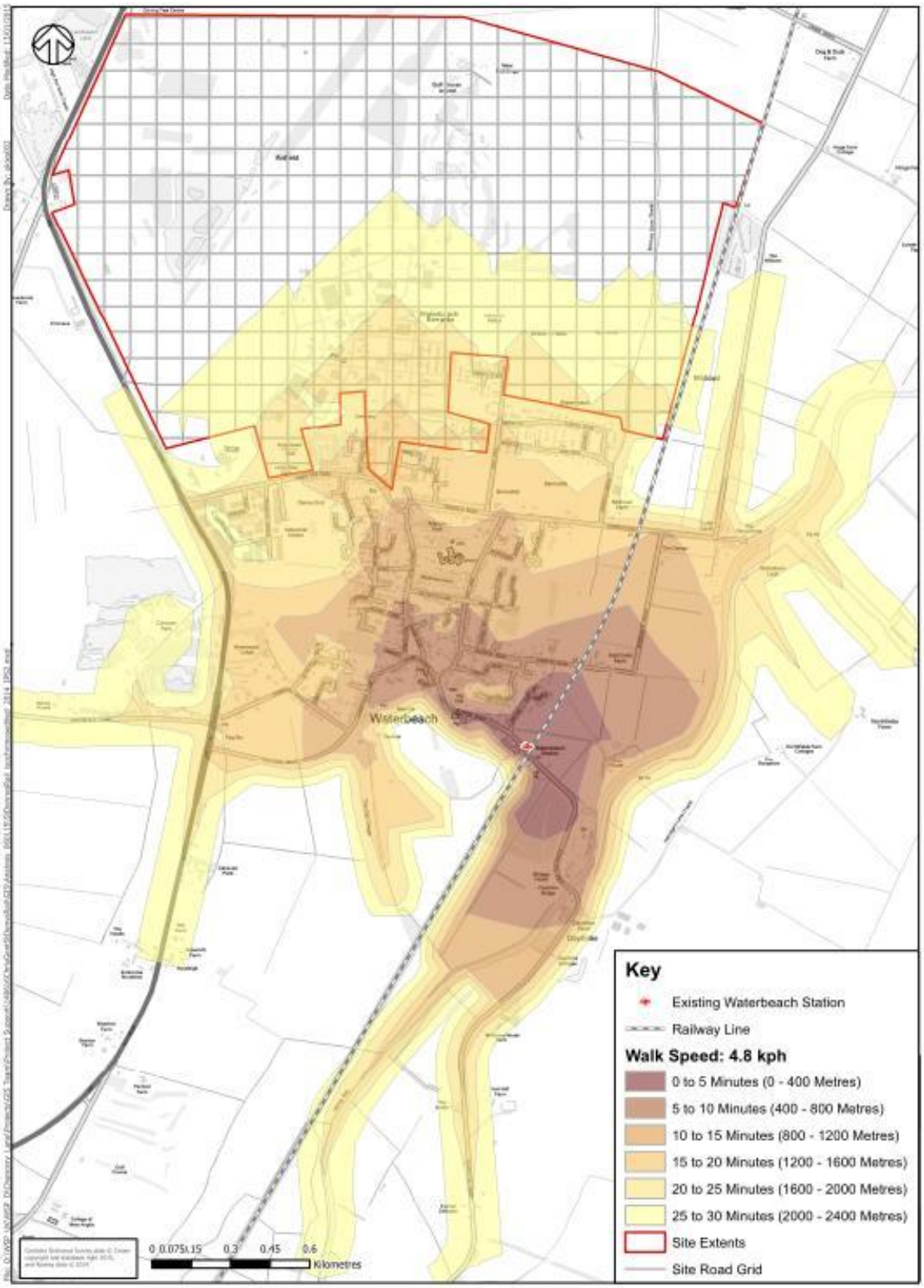


Figure 10- Existing Waterbeach Station Walking Catchment times

Table 4-1 – Number of homes within each 5-minute walk journey time band (existing station)

Walk journey time (minutes)	Existing homes	Consented homes	New Settlement homes	
0-5	93	0	0	**93**
5-10	336	0	0	**336**
10-15	564	0	0	**564**
15-20	475	196	11	**682**
20-25	418	54	240	**712**
25-30	118	0	1087	**1205**
>30	0	0	8662	**8662**
	2004	**250**	**10000**	

Table 4-2 – Number of homes within each 5-minute walk journey time band (proposed station)

Walk journey time (minutes)	Existing homes	Consented homes	New Settlement homes	
0-5	0	0	351	**351**
5-10	84	41	892	**1017**
10-15	268	209	1208	**1685**
15-20	209	0	1490	**1699**
20-25	636	0	1545	**2181**
25-30	597	0	1579	**2176**
>30	210	0	2935	**3145**
	2004	**250**	**10000**	

ii. Engineering constraints

Signalling:

4.2.7 This area is bounded by two existing signals, CA236 on the Up Main and CA237 on the Down Main, and the new platforms can be placed anywhere between them. There is sufficient space to allow for future extension to 12-car standage and any necessary driver's standback allowance (nominally 20m). The sketch in Figure 11 - shows the Up platform to have a southerly limit of approximately 69m before reaching signal CA236. This is coincident with the limit of the Waterbeach New Settlement. Figure 12 shows a summary plan the limits of deviation.

Level Crossings:

4.2.8 The Private User Worked Crossing called Ballast Pit (reference LC109 at 62m32ch - B/6 Risk Rating) is proposed to be closed by Network Rail. The location of the Ballast Pit level crossing is shown on the schematic included as Figure 11 below.

4.2.9 Due to the southern location's proximity to the Level Crossings Bottisham (D/2 risk rating) and Bannolds (D/5 risk rating) a Level Crossing Census and Risk Assessment will be required at the next GRIP stage. The review will determine whether a level crossing upgrade is required, although as no increase in the use of the level crossing is proposed this is considered unlikely at this stage.

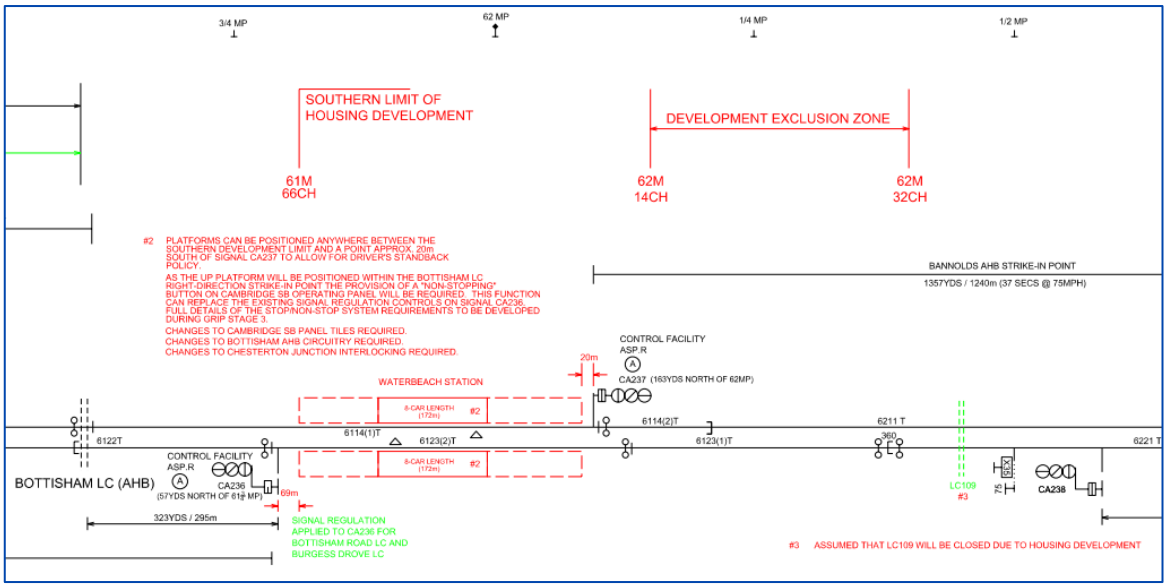


Figure 11- Signalling sketch southern location

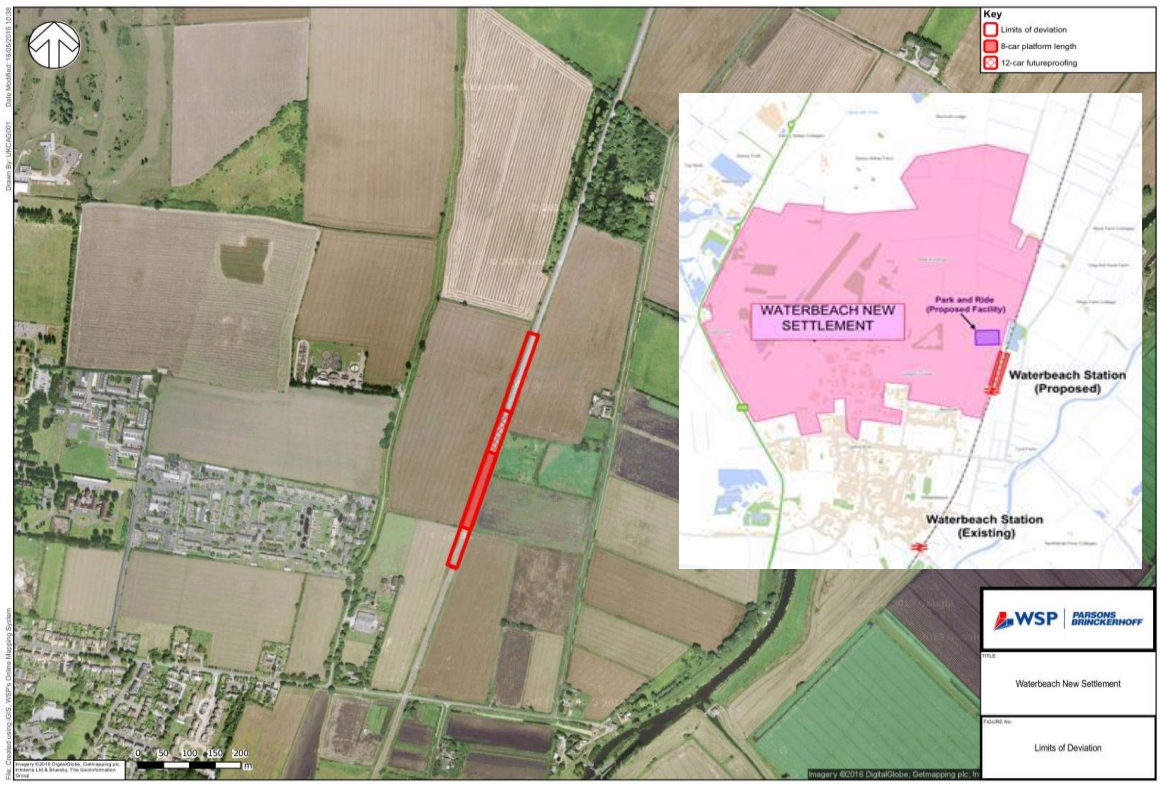


Figure 12- Signalling limits of deviation – Figure 12 details as viewed on an Aerial map

4.2.10 As the Up line platform would be located within the right-direction strike-in zone of Bottisham, Automatic Half Barrier (AHB) level crossing, stopping / non-stopping controls must be added to the level crossing circuitry. Such circuitry requires a means of distinguishing between trains that will stop at the station and those that will approach the crossing at full line speed as the crossing requires approximately 37 seconds of operating time before the arrival of a train.

4.2.11 There is already a protecting signal (CA236) positioned between the proposed station position and the crossing and it may be possible to use the existing Burgess Drove MSL strike-in point treadle to activate the stopping-train circuitry for Bottisham.

4.2.12 Dependent upon the final position of the platform within the limits of deviation shown in Figure 12, it may be possible to position a new operating treadle/track circuit arrangement south of the platform, which would give greater timing accuracy for the AHB sequence/ signal clearance. Alternatively, a plunger can be provided on the station for train crew to operate once station duties are complete. Use of the plunger will start the AHB timing sequence, which will in turn lead to signal CA236 clearing at the correct time. Final details of this arrangement will be decided as part of the GRIP Stage 3 study.

4.2.13 Positioning the station in the southern zone does not affect the operation of Bannolds or Waterbeach level crossings.

Track:

4.2.14 Safe access walkways may require widening and levelling works to the embankment. The walkways will extend to the access points at the nearest level crossing.

4.2.15 If a crossover is required between Up & Down lines, it may be placed at the Cambridge end of the platforms in any configuration. Track would require minimal slewing to install a pair of crossover modular Switches and Crossings (S&C). Ballast depths and formation stability would need to be investigated and, if inadequate, made compliant to receive the S&C at the locations. Insulated Block Joints (IBJ's) would need to be installed to satisfy signalling requirements at the station and crossover.

4.2.16 Standard track components would be used including use of modular S&C to aid construction and reduce possession construction times.

4.2.17 Crossover speed requirements will be dealt with at the next GRIP design stage taking consideration of the operational requirements and train performance assessments. Figure 13 has the local Sectional Appendix Track details.

4.2.18 Platform copers would be set to existing or modified track alignments and would be gauge cleared to vehicles envisaged to use/pass the platforms. Platform lengths will be sufficient for 8-car trains with stopping tolerance; there is sufficient space for passive provision for 12 car trains, if required in the future.

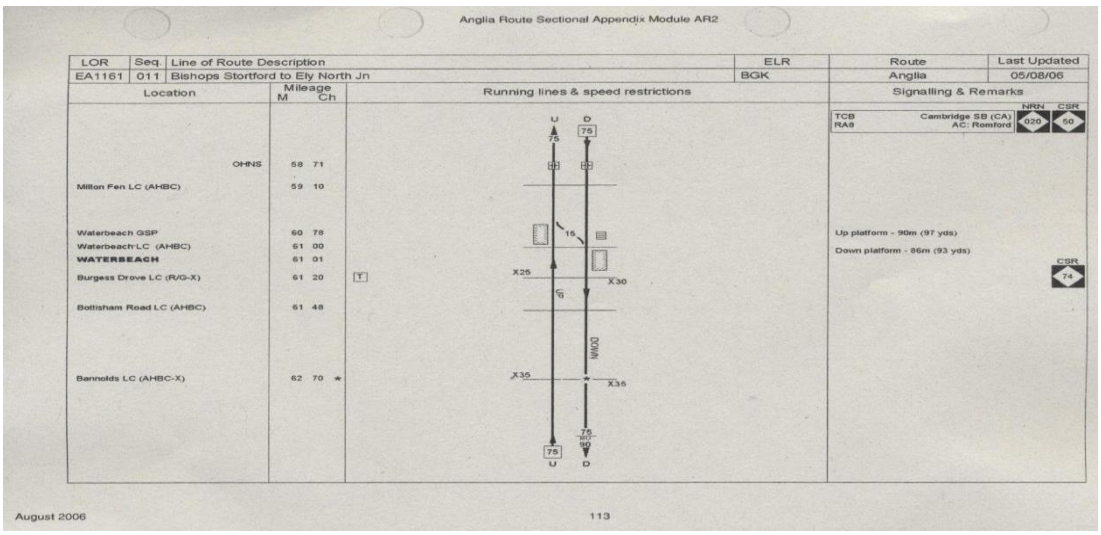


Figure 13 Sectional Appendix extract of the existing layout and speeds

Overhead Line Equipment (OLE):

4.2.19 The existing OLE masts are not suitable to be "embedded" in station platforms as there would be insufficient safety clearance for members of the public standing on the platforms to live parts of the OLE energised as 25kV. The necessary safety clearances (to Railway Group Standard GL/RT1210) for passengers on the platforms is achieved OLE portals and utilising supports (registrations) for the main (contact and catenary) OLE wires which do not project above the platform surfaces.

4.2.20 For the 172m long platforms it is proposed that existing OLE structures C/99/23 to C/99/30 inclusive (4 "pairs" of single track cantilever OLE [STC] masts) be replaced by five number OLE portals. The proposed location for the station is clear of the nearest OLE overlaps so the existing main contact and catenary wires would be retained with no remodelling of OLE tensions lengths. The legs of the portals would be at the rear of the two side platforms.

4.2.21 An OLE contact wire height of 5m above the top of rail is proposed to meet the requirement in standard GL/RT1210 of a minimum clearance of the 3.5m from the platform surface to the horns of the pantograph heads (electrical current collectors on the top of the electric trains).

4.2.22 Due to the proposed OLE contact wire height in the station (5m), the minimum soffit height above rail of the proposed station footbridge would be 6.5m above rail. This allows for OLE system height of 900mm and minimum static clearance from the catenary wires to the bridge soffit of 600mm. The minimum height of the parapets of the footbridge above standing surface would be 1.8m (to meet the requirements of BS EN 50122-1 and GL/RT1210).

4.2.23 An aerial earth wire is proposed to be installed connecting the proposed OLE portal structures to earth/ traction return. This would avoid have to install a cross ducts through the platform for individual earth bonding cables to link each mast portal leg to the traction return rail.

4.2.24 Linking the earths on platform low voltage systems (e.g. platform lighting) to traction return via a single spider plate is the standard solution for stations on 25kV electrified lines, this addresses the possibility of electrical touch potential and safety issues along the platforms.

iii. Ecological and environmental

Topography:

4.2.25 The topography of the site is open, and generally flat with no discernible changes in level other than the railway, which is elevated by approximately 1.0 to 1.2metres above the surround ground on an embankment (subject to confirmation by measured survey). See Figure 14 below.

4.2.26 The site is bounded as follows;

- To the West by Bannold Drove – a vehicle access comprising of a metalled surface from Bannold Road to the point of access to the Waste Water Treatment Works (WwTW), then un-made farm track inaccessible by car to the north.
- To the East by agricultural land leading on to Long Drove public highway.
- To the South by agricultural land leading on to Bannold Drove.
- To the North by a wooded copse and wetland, southern edge measured at 62m14ch. The proposed Development Boundary skirts the western lake.

Railway:

4.2.27 This section of Cambridge to Ely railway is twin track, running North-South. The track is straight and flat with no sidings or passing loops.

Land usage:

4.2.28 The whole of the site is laid out for the production of arable crops.

Hydrology:

4.2.29 The site is located within the ratable catchment of the Waterbeach Internal Drainage Board (IDB). The IDB is responsible for managing the local surface water drainage networks, and is the approving authority for all new development works that require a connection to the IDB controlled drains. It should be noted that any works within 9m of a drain would be subject to approval.

4.2.30 The site is bounded by IDB drainage ditches to the West of the site (ditches 1A & 1B), and one land drainage ditch bisecting the study area, Ditch 2. Drainage ditch No.2 originates at the field boundary with the railway, and flows due West. No incoming field drains were observed outfalling in to the ditch forming a connection with Ditch 1a at Bannold Drove.

4.2.31 The development site needs to make provision within the spatial planning sufficient land to accommodate the requisite volume of surface water attenuation that will be required to balance the flows from the site prior to discharge to the off-site drainage network.

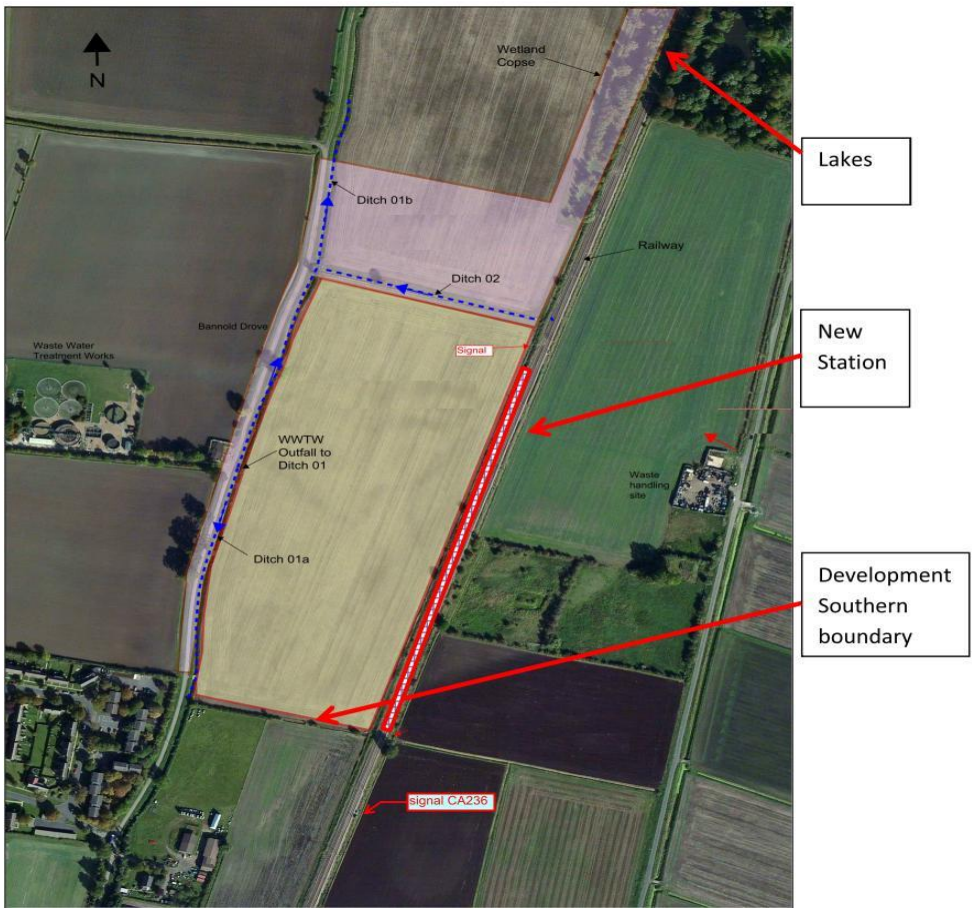


Figure 14 – General topographical features

Flood Zone and Flood Risk:

4.2.32 A desktop evaluation indicates that the proposed New Waterbeach station would be classified as follows: Essential transport Infrastructure and therefore compatible with development in Flood Zone 2 (FZ2). Definition of FZ2 is Land having a between1 in 100 to 1 in 1000 annual probability of river flooding. There is no possibility of the sea flooding this location.

4.2.33 Figure 15 below shows that the Flood Zone ratings improve from Zone 3 near the existing station on to the fringes of Zone 2 at the proposed station location. Local Hydrology does not therefore dictate the location of the proposed Station at either the Southern or the Northern locations. As a minimum, the proposals should avoid encroachment in to FZ3 (dark blue areas).

4.2.34 The drainage designs for the station and car park to be undertaken at later GRIP stages will need to take into account the Flood Risks and IDB constraints. The designs for the infrastructure including the car parks, housing and roads should seek opportunities to reduce the overall level of flood risk in the area and beyond. This can be achieved through green infrastructure and appropriate application of sustainable drainage systems.

4.2.35 Ground conditions favour infiltration, however, risk of ground water flooding and designation as Secondary Aquifer may restrict the use of infiltration features. The next GRIP stage will investigate and conclude these issues.

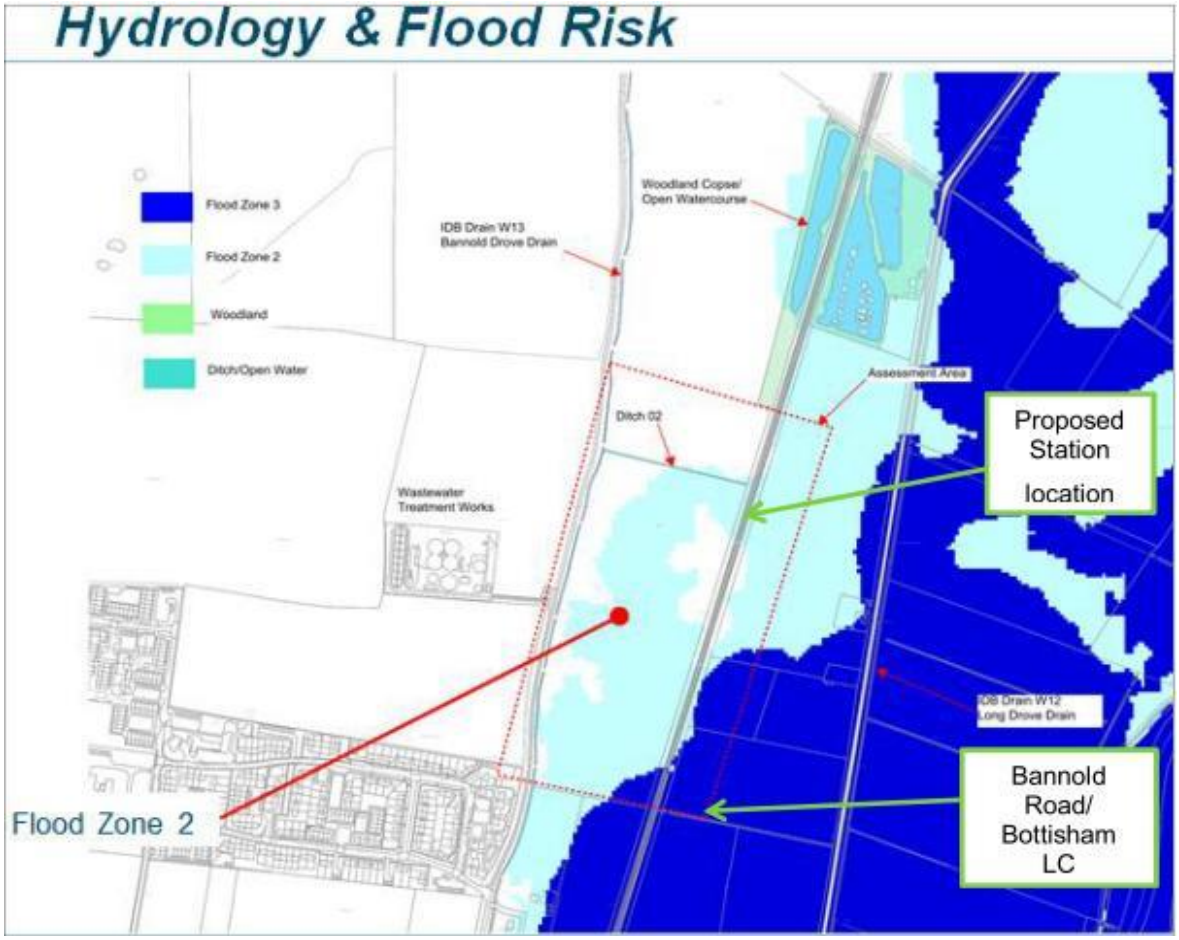


Figure 15 Environmental Agency source - Flood Risk map

iv. Geotechnical assessment

4.2.36 A desktop study has been carried out using information from the British Geological Society (BGS) database.

4.2.37 The new station location is just north of the recorded peat deposits, and thus ground bearing shallow foundations are considered suitable, as they would bear on the River Terrace gravel deposits. The water table is anticipated to be shallow and is therefore likely to affect the stability of any deep excavations (e.g. installation of services). See figure 16 below:

CONDITION	COMMENTS
Geology	• Drift – River Terrace Deposits • Solid – Gault Clay overlying the Lower Greensand formation Historical borehole logs indicate the First Terrace deposits are circa 3.0 to 3.7 m thick, with the underlying Gault Clay extending down to circa 20 to 25 m below ground level (bgl). An area of peat and alluvium is shown to the south of the proposed station location.
Site History	The Ordnance Survey maps obtained (earliest dated 1886) show the railway in its current alignment and the proposed development areas to be given to agriculture.
History of adjacent areas	Features of interest identified in the surrounding areas are as follows: • The Willows – Residence associated with two bodies of open water which straddle the railway immediately to the north of the proposed railway station. Shown from the 1886 map to the present day. • Sewage treatment works - shown on the 1952 map to the present day approximately 250 m to the west of the proposed railway station. • Waterbeach Barracks – airfield constructed in 1940 for use by RAF Bomber Command, approximately 1km west of the proposed railway station.
Ground Stability Hazards	The risk of natural or manmade voids, collapsible ground, running sands, compressible ground, ground dissolution, and landslides classified as 'No Hazard' or 'Very Low'. The potential for shrinking or swelling clay is described as 'moderate'.
Radon	The site is in a lower probability radon area and no radon protection measures are required within new developments.

Figure 16 - Ground conditions data

4.2.38 An intrusive ground investigation is recommended in future GRIP stages (GRIP 3 or 4) to provide further local track bed and trackside area ground information. This will to add to survey data previously carried out by Mott MacDonald Ltd. to determine the type and degree of contamination present at the site. See Item 6.

4.2.39 Further survey information will enable a generic risk assessment to be undertaken and also identification of the soil properties to allow for geotechnical development constraints to be identified.

4.3 STAGE 3 - FUTURE PROOFING OF SOUTH LOCATION SITE

4.3.1 The study brief requested a review of future proofing the station for 12 car trains and the opportunity to provide a turnback facility. The detailed analysis of these options is contained in Appendix B Annex 12.

4.4 STAGE 4 - CONSTRUCTABILITY AND PROGRAMMED OPTIONEERING

4.4.1 A construction programme has been set-out based on known activities and current understanding of engineering and operational requirements, platform types and possession assumptions.

4.4.2 A Construction programme covering various platform types is provided in Appendix B Annex 11. An extract is provided below to illustrate the perceived linkages and estimated timeline:

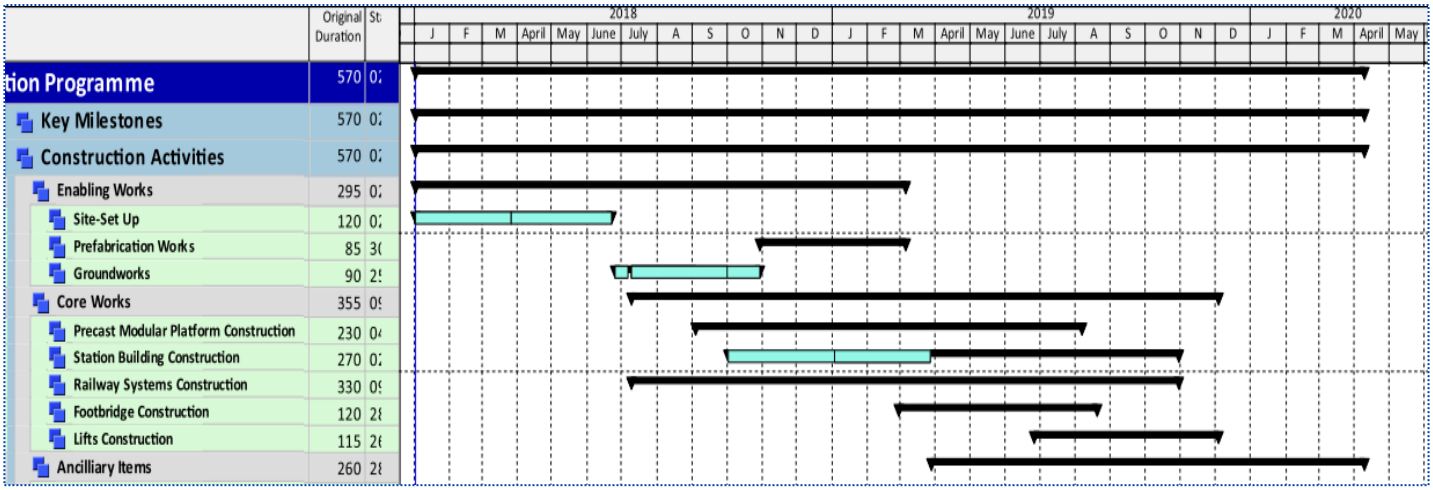


Figure 17 -High level programme example

4.4.3 Site access and enabling works are proposed to commence in January 2018. Trackside works (1-year duration) are proposed to begin in June 2018. Station Construction completion is programmed for December 2019.

4.4.4 Possession requirements should be planned up to 2 years in advance in line with the Network Rail guidance for Engineering Access. Possessions will be reconfirmed at T-45 weeks and T-26 weeks prior to the first core possession. .

4.4.5 As can be seen it is very high-level programme, expressed in terms of months and three prime activities – Enabling, Core Works, and Auxiliary Items. The Enabling is a precursor to any works occurring on or near the railway – such as new access roads (there are none currently near the proposed location), preparing landscaping the topography of level differentials and services diversions. Concurrently prefabrication would be started for all the modular elements.

4.4.6 Some on-site works could commence during the Enabling period such as foundations, diversion of services, relocating the OLE, systems and track modifications if required. By liaising with NR it may also be possible to utilize existing possessions with other projects or those used for maintenance of the line.

4.4.7 A more detailed review as to what possessions are required for each activity for each of the options should be undertaken in accordance with NR and Developer requirements. Future possession planning will be undertaken in GRIP 3.

4.4.8 Generally, survey work could be undertaken under Line blockages, Rules of the Route (RoR) night time possessions, excavation for foundations could be undertaken on midweek nights and the large civil engineering aspects on disruptive weekend possessions of 27 or 52 hours depending upon the type of work. Large disruptive possessions should be avoided wherever possible due to cost impact.

4.4.9 Baseline data acquisition consist of:

- Geotechnical Investigation – supplement the Mott MacDonald Ltd. land surveys with intrusive investigations within the lineside within the embankment to establish the embankment structural properties and track bed details. Track bed details are only required for the future proofing where turnbacks are being considered.
- Services survey- a ground level visual supplemented by Ground Penetrating Radar (GPR) for tracing buried services.
- Records search – NR to provide utilities record search report.
- Engagement with D&B contractors to check robustness of programme and invite efficiencies

4.4.10 An opportunity exists to use possessions already envisaged for the existing Waterbeach Station platform extension works. The type and durations of which will need identifying, the recommendations actioned to address risk, and, will be dependent on acquiring site access and the planning permissions.

4.4.11 The programme has identified activities that are linked and activities that could proceed without affecting the lineside construction of the platforms and footbridge. It is noted that the following are linked:

- Access roads need to be constructed in advance of any lineside construction
- The OLE replacement should precede any lineside platform works as they clash with the new platforms.
- Services identified as clashing with the proposed platforms and bases should be diverted in advance of any lineside construction.
- The footbridge, stairs, lift shaft and motor room require foundations to be in place before delivery of the superstructures to site. Maximum prefabrication of these elements should be considered to minimize the number of track blockades and to avoid working at height. Consider having the lift cabin installed in the lift shaft before lifting the shaft into place.
- If following the track survey the track alignments are found to require improvement the track tamps and alignment should be carried out before any platform installation to ensure the correct gauge clearance is met.

It is noted the following are not linked to the lineside construction works:

- The New Station buildings
- Cycle footbridge
- Car park and the Park & Ride facility

4.4.12 As the land adjacent to the station proposed location is undeveloped, prefabricating the platforms behind the fence line is feasible. Access roads will be required to both sides of the railway boundary to deliver and prepare the platforms for installation. The access road on the East side would revert to farmland once construction is complete. The West side access would be absorbed by the station highways requirements.

4.4.13 The platform foundations would be prepared in fenced green zone working environment. The platforms could then be either slid or lifted into position in weekend blockades. The result would be that there should be little difference between the modular systems and the new EPS system due to the reduction in the required number of possessions. The modular system would need to be checked that it is stable in the Flood Zone 2 during periods of flooding and provide ground anchors if necessary.

4.4.14 The table overleaf, Figure 18, lists the risks and opportunities that could affect the construction choices and length of the construction programme.

4.4.15 Careful consideration of the risks and opportunities, such as addressing the recommendations as early as possible and maximising prefabrication and off-site construction will minimise the impact on the operational railway and the requirement for working within the limited possession windows. This has the potential to reduce the construction programme duration and will need to be investigated further at the next GRIP stage.

Activity	Risk	Current Assumption	Notes/Recommendation	Possessions
Ground investigation (GI)	Revise foundations and program loss, and cost increase	All ground bearing shallow footings	Carry out GI before detail designs (GRIP 5) to confirm construction activity and durations-Opportunity for programme improvements	None required – CESS safeguarded working is possible
Footbridge construction	Installation and commissioning longer than 120d	Program reflects common Industry duration	Engage with Design & Build (D&B) fabricator for prefabrication options and preinstalling lift. Selection of cladding materials for prefit and transportation.	Possessions required for all elements lifted – LMR(2), stairs (2), Lift shafts (2), Pier/lobby (2), Bridge(1),
Cable routes	Foundation clash, cannot move due to no slack, fragile condition, fibre or MOD	Does not clash – foundations can be built around services	Carry out services search, survey mapping, cable identification and condition survey	ROR - MWN surveys
OLE foundations	High water table flooding deep foundation	Concrete foundations, coffer dam, dewatering. Replacement works before platform constructions	Piled saving on overall construction time, less risk, requires GI	All OLE mast and contact wire works is in possession. Concrete foundation – CESS safeguarded working is possible, no possessions Piling quicker but requires possessions – 10 MWN ROR workings
Platform construction-modular	Revise foundations and program loss, and cost increase	All ground bearing shallow footings	Carry out GI before (GRIP 5) detail designs to confirm construction activity and durations	None required – CESS safeguarded working is possible. Nosing installing in ROR possession.
Platform – Solid front wall, - Cross Wall & plank, - Polystyrene (EPS)	Revise foundations and program loss, and cost increase. Flood risk to EPS type.	All ground bearing shallow footings	Carry out GI before (GRIP 5) detail designs to confirm construction activity and durations. EPS requires a solid section at/near bridge supports to satisfy derailment loading	Possessions (105) required for front side foundation construction EPS type (weekend disruptive possessions 4 number) for foundation capping and full construction.
Mechanical, Electrical and Public Health & Comms cable routing		No under track crossing works – assumed routing via bridge soffit is accepted		None (MWN for cable pulling)
CISS Testing &Commissioning		Testing & commissioning at MWN		None
Signal Sighting			For portals, Bridge, ancillary checks – signal sighting by Signal Sighting Committee on track	COSS/IWA red zone working
Access Roads	Construction of access roads not in time	Access provided full length of platforms both sides of railway	Suitable for heavy crane loading and large element storage	None required
Existing Waterbeach station platform demolition	Hidden services delaying removal of structures	Access provided full length of platforms both sides of railway	Carry out services search, survey mapping, cable identification	Possessions (20) required for front wall and platform removal

Figure 18-Table of risks and opportunities

Key
MWN= Mid- Week Nights working in possession (MWN 5 hours, Saturday night 8 hour)
ROR= Rules of Route – (no train movement – night time possession)
SISS= Station Information and Surveillance Systems
COSS/IWA = Controller of Site Safety/ Individual Working Alone

5 STATION DETAILS

5.1.1 This section contains high-level details of the Waterbeach New Station to be built in the Southern location with further requirements and design to be established during station optioneering at GRIP 3. Details assessed at this stage are to ensure land requirements are understood and land secured alongside all necessary permissions in order to de-risk the station delivery in timescales that satisfy both NR and other interested/ key stakeholders.

5.1.2 The New Station design will be developed and single station option agreed during GRIP 3 to meet key design parameters as set out in Item 3.2 of this report.

5.1.3 It is likely that the New Station will be further expended at a later date to cater for increased patronage and future station use as the New Settlement increases in size.

5.1.4 The TOC is to provide a schedule of station requirements for GRIP stage 3. This will include a requirement for a gateline to control revenue collection and other specific operational requirements.

5.2 LAYOUT

5.2.1 The station layout will have to comply with Network Rail Standards. Factors considered are largely set out in the Design Parameters Item 3.2 of this report. Here we have listed the key factors covered at GRIP stage 2. This proposal meets these requirements based on information available to date but requires further exploration and validation at the later GRIP stages:

- Linespeed is 75mph. A side platform requires 2.5m minimum width.
- The proposed locations considered have near straight and near level track. The track alignment needs to be confirmed at the next GRIP3 stage from an accurate survey.
- Similarly, due to near straight track, signal sighting of the signals at the proposed standback positions should be achievable; however, the single option proposal will require a signal sighting assessment to be carried out.
- Platform evacuation from lineside platforms will have Emergency Escape route provisions such as end of platform gates and authorised walking routes away from the railway. Island platforms may require additional bridges at platform ends or refuges if the risk assessments allow.
- For future proofing a central turnback: The position of the cycle footbridge should be considered to be over the platform end to allow for a possible island platform stair connection to be made to provide a Secondary means of escape.

5.2.2 Factors and Surveys to be considered and carried out at the next GRIP stages:

- Station Safety and security, which includes Fire Safety, Operational Safety and personal safety.
- Physical mitigations to reduce trespass.
- Station accessibility for all users.
- Station capacity assessments, MOIRA and a demand forecasting model are to be developed for this station. Platform sizing and entrance and exit widths to be assessed by a Pedestrian Flow analysis from the peak passenger numbers.
- Station intermodal exchange and wayfinding signage between station and outside areas and modes of transport. External provisions of car parks, Park & Ride, Cycle way and walking routes, bus routes and access routes to the village and the A10 highway.

- Topographical survey to establish ground levels.
- Geotechnical investigation to establish the details of the track support zone and deeper soil parameters to establish and verify the suitability of the selected foundation options including water table measurements.
- Flood levels assessment with regard to impact on platform type and construction methods.

5.2.3 An indicative station layout from the civils General Arrangement drawing of two side platforms (3m wide, 172m in length, local widening for the bridge structures), a central AFA footbridge (single span with 2 lifts and 2 stairs located centrally), station building (size and requirements to be determined by TOC and phased with Developers requirements), external landscaped car parking (100 cars), a separate cycle and pedestrian footbridge linking the cycle routes to bus interchange and access routes are shown in Figure 19 below:

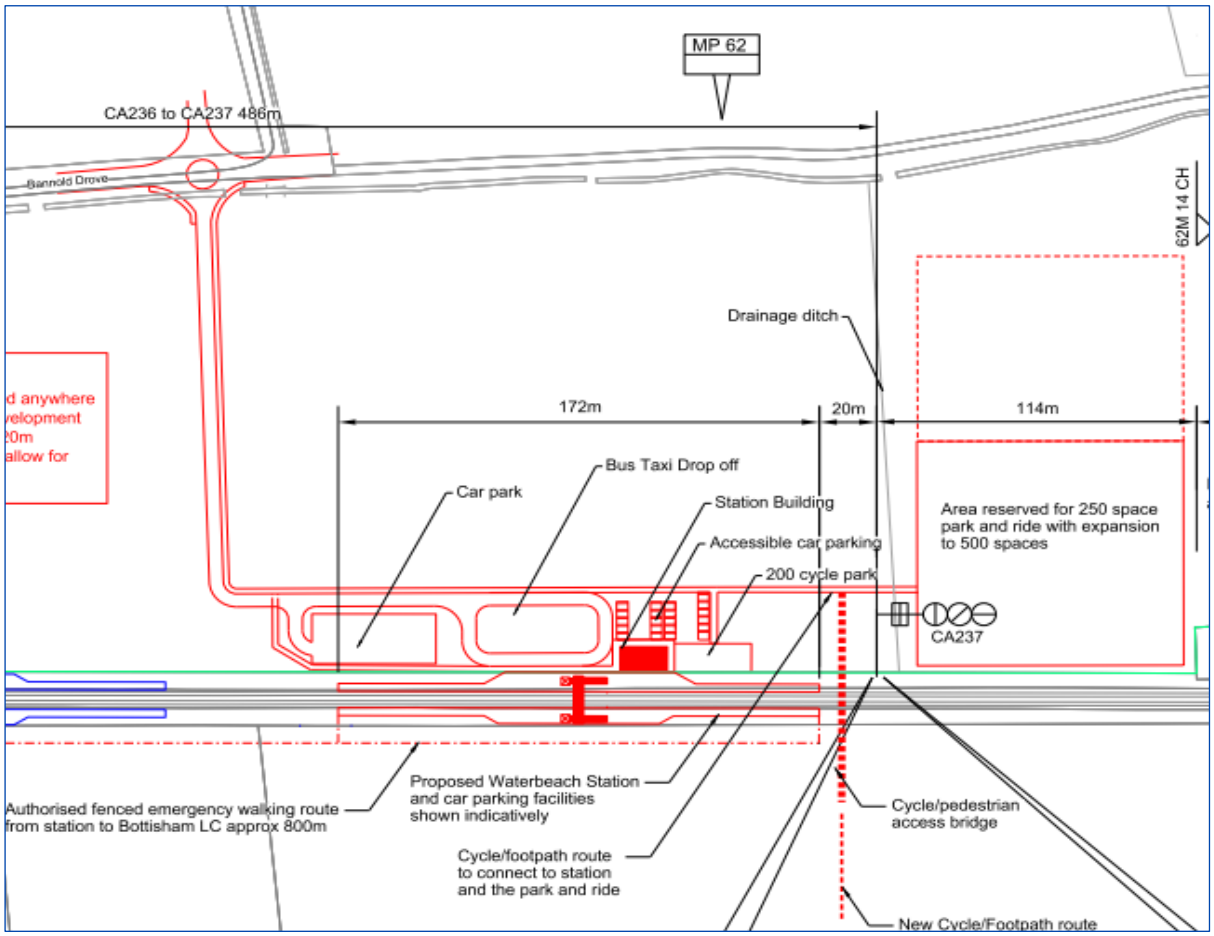


Figure 19-Station and car park facility impression

5.3 ACCESS FOR ALL (AFA)

5.3.1 The DfT requires all licensed passenger train operators and station operators to comply with the Code of Practice (CoP) 'Accessible Train Station Design for Disabled People'. This CoP is designed to identify the appropriate standards and rules to be used.

5.3.2 The generic configuration for a two platform station with an AFA footbridge, stairs and lift system will appear as shown on the sketch and 3d drawing below – See Figures 20 and 21. Noting details as shown are based on preliminary information and subject to surveys and station design, which are to be carried out later GRIP stages.

5.3.3 The AFA structure shall be compliant with the NR standard designs for rail station footbridges and appearance to be agreed with Stakeholders and Planning Authority. Design solutions and choice of structures will be determined in consultation with stakeholders and to suit the platform ergonomics once passenger modelling and Fire Strategy has been agreed. The impact of future proofing for a central turnback to be considered on the position of the AFA Bridge and the required secondary escape measures.

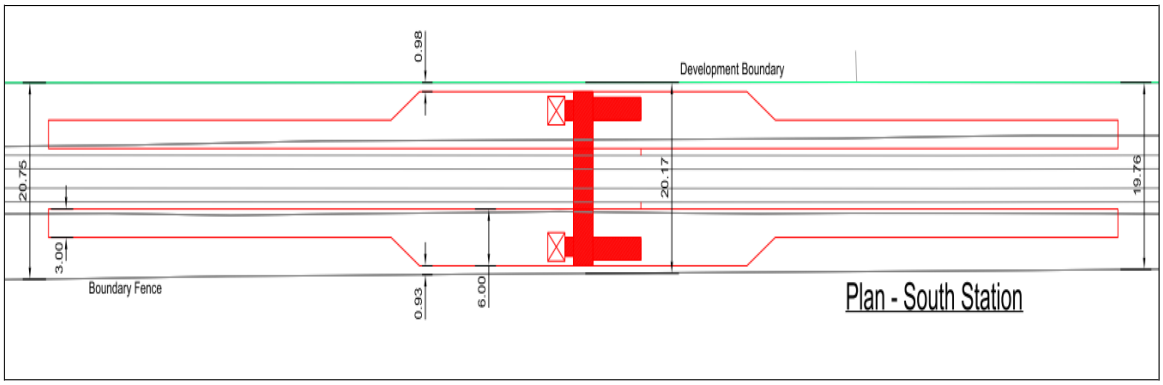


Figure 20 Generic platform configurations with AFA footbridge lifts and stairs

5.4 SECURITY

5.4.1 The Station requirements will be defined by the TOC and outlined at GRIP 3 in the selected single option. Requirements will include Station Information and Surveillance Systems, Closed-circuit Television (CCTV), Public Address (PA), Customer Information Systems (CIS), Public Help Points and a Gateline.

5.4.2 The design of these systems will be heavily dependent on the architectural design and the NR and TOC aspirations for the Telecommunications systems.

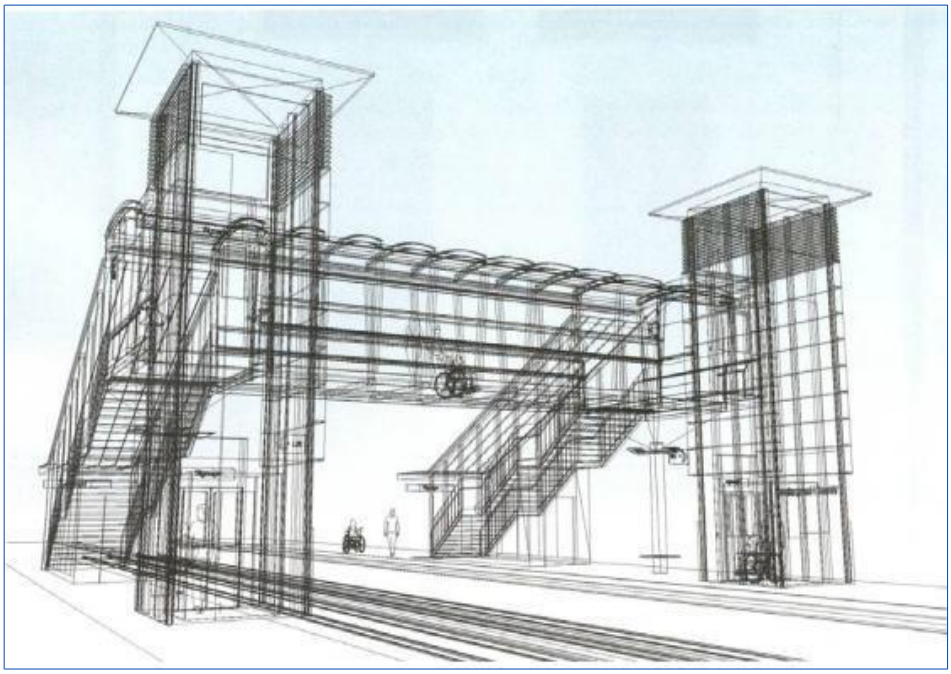


Figure 21 - AFA footbridge with lifts and stairs, 3D impression (extract from CoP)

5.5 PLATFORM LIGHTING

5.5.1 Requirements for lighting are set out in Railway Group Standard GI/RT7016 and Guidance on lighting of station is provided in RIS-7702-INS. The design will take into account the impact on the wider area, if close to other party boundaries. Power supply requirements and measurements are to be carried out in GRIP 3 for the selected option.

5.6 PASSENGER CAPACITY

5.6.1 A demand forecasting model is to be developed for the single option at GRIP 3. The station platform sizing and entrance and exit widths are to be projected from the peak passenger numbers. NR will provide a passenger forecast for the station as a basis for the analysis.

5.6.2 The generic layout given in Figure 20 above has assumed a 3m platform width with a widened section in the middle half of the platform length of 6m width will be more than sufficient for the projected numbers and up to 12 cars. This will have to be validated at later GRIP stages once the impacts on platform sizing from the Fire Strategy Risk assessments are known. An increase in width may result in the rail boundary to be widened.

5.7 PASSENGER EVACUATION ROUTES

5.7.1 Figure 22 below shows a proposal for Emergency and Fire Escape routes in the event of a train fire. The green zones are the escape routes behind the platforms and the blue zones are considered train fire locations that effectively 'block' the platform.

5.7.2 The proposal shown in figure 22 has a single AFA bridge. A train fire could result in the footbridge being inaccessible. A Secondary Means of escape from the platform will be required. This can be provided by another footbridge or by the provision of platform gates located at the end of the platforms. An operational methodology will need to be put in place for the back of platform escape gates to be remotely unlockable in the case of emergencies. A Maglok fitted to the gate and linked to the Fire Alarm system to automatically release the gate is a feasible proposal. A safe walking route alongside the east side railway boundary fence towards the Bottisham LC on Bannold Road approximately 400m due south would be provided. An alternative could be to provide the two escape routes shown towards Long Drove.

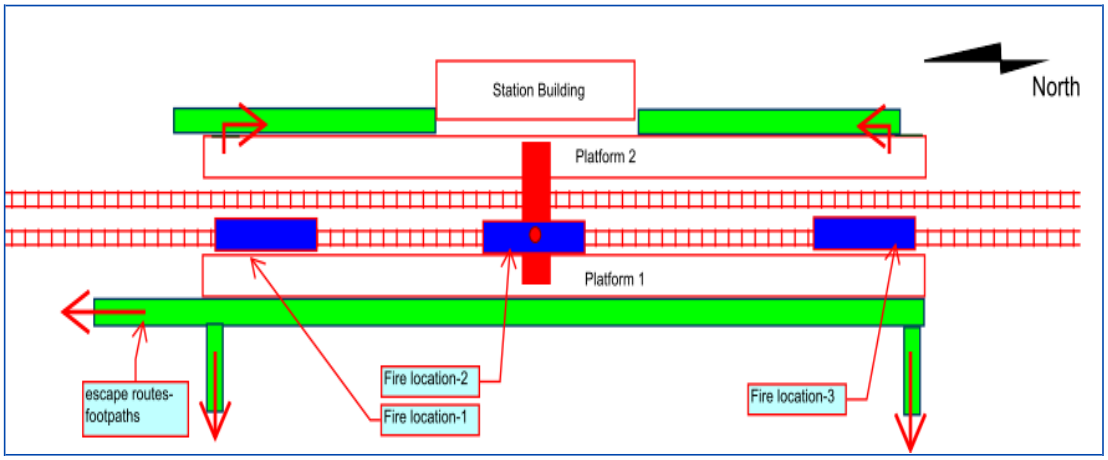


Figure 22-Potential exit routes

5.8 VEHICLE ACCESS

5.8.1 There are several options for access which have been considered as part of this feasibility study as set out below. The proposed access would need to be suitable for cars, taxis, buses and Heavy Goods Vehicles for servicing. Ideally segregated provision would be made for pedestrian and cycle access:

- → The new station can be connected to the existing village of Waterbeach via a new link to the existing public highway at Bannold Drove, including pedestrian and cycle access.
- → A new link suitable for all users could be provided via Cody Road.
- → New vehicle access routes within the wider New Settlement development, connecting to the rail station from the North.

5.8.2 The station will be provided with a car park larger than the existing car park at the current station, (given observed overflow parking on the surrounding highway network at the existing station), a car park of at least 100 spaces is expected to provide sufficient capacity to cater for the existing demand.

5.8.3 Additional spaces to accommodate future development within the New Settlement would be needed beyond this to cater for the new residents. This is envisaged to be provided within a Park and Ride site to the North of the existing and could be configured as decked parking to save space if additional capacity is required.

5.8.4 The vehicle access would have a dedicated bus and taxi drop-off/collection point, 20 wheelchair accessible parking spaces and 200 cycle parking spaces.

5.8.5 An illustrative access arrangement and layout has been prepared showing the station location and facilities, see Figure 23 below. Access is located outside Flood Zone 3 area, within Flood Zone 2. Bannold Drove could be widened within the public highway boundary to allow two-way vehicular movements and new roads within the proposed New Settlement will be constructed to provide access to the station. A 3m wide shared footway/ cycleway as shown could also link the station to the village.

5.8.6 As the development of the New Settlement is built out, appropriate incremental improvements in access and facilities may be introduced, including further station building facilities, additional cycle parking, and a park and ride car park to capture southbound traffic from the A10 that would otherwise be heading in to Cambridge.

5.8.7 The construction of a new town to the north of the current village will bring additional facilities, including public transport services. It is expected in the longer term that a new rapid transit busway will connect Waterbeach to Cambridge and that other more "local" services would be provided. These high frequency services would tie in with the rail timetable to minimise interchange penalties making "rail plus bus" an attractive option.

5.8.8 A larger park and ride station car park will be designed to provide adequate facilities to create a transport hub at the location of the future station. The original smaller size car park will be retained along with its access along Bannold Drove for dedicated use by village residents. The main car park will be accessed via the A10 and the Waterbeach New Settlement. An emerging Development Framework Document for the final development is in progress.

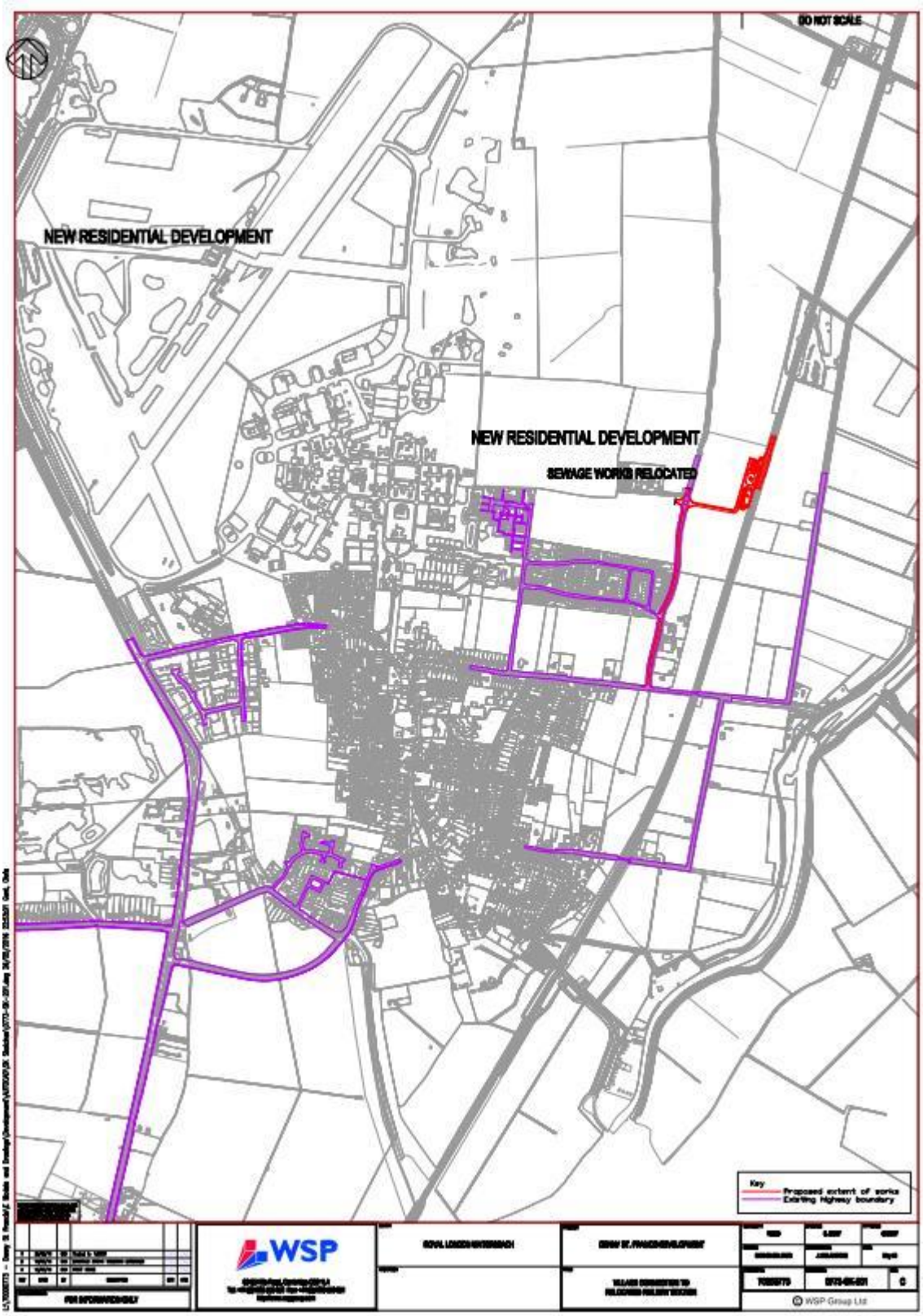


Figure 23 Phase 1 development proposals

6 NEW STATION COSTS

6.1 NETWORK RAIL GRIP2 CONSTRUCTION ESTIMATE

6.1.1 Network Rail has produced a cost estimate for the station, which is included in Appendix A, Annex B. The estimation uses a detailed Bill of Quantities, following a new process that was put into place after the Hendy Review and which is designed to ensure that NR can no longer underestimate the cost of a project. Risk, Contingency and Network Rail fees are then added on to provide the Estimated Project Outturn.

6.1.2 The costs used in the Bill of Quantities are taken from recently built costs where available and contractors estimates where not.

6.1.3 The headline costs are presented in Table 6-1, below.

Table 6-1 – Network Rail Cost Estimate

Cost Element	Cost
Direct Construction Costs	£ 11,873,316
Indirect Construction Costs	£ 4,272,043
Project / Design Team Costs	£ 4,056,620
Possessions	£ 1,291,629
Point Estimate	**£ 21,493,607**
Risk	£ 8,597,443
Proposal Estimate	**£ 30,091,050**
NRFF	£227,998 - £3,916,146
IRF	£0 - £602,483
Estimated Project Outturn	**£31,704,509 - £35,995,150**

6.2 POST GRIP 2 FIRST PHASE VALUE ENGINEERING EXERCISE

6.2.1 Within this cost estimate there are a number of assumptions that increase costs that could be readily reduced, postponed, or eliminated; the following sections describe revised assumptions that will be investigated during the GRIP3 process.

STATIONS AND PROPERTY

6.2.2 Network Rail do not require a station building (£1.5M) or a gateline £0.5M) at first opening of the station. In fact, the revenue generated by the station would be insufficient to fund a manned station at such an early stage and thus provision of a station building would not be attractive to a Train Operating Company (TOC) unless other external funding (i.e. the developer) pays for the operational cost. To this end, it would make sense for the station building and ticket barrier facilities to follow in a second phase when a number of new homes have been built within the new settlement.

6.2.3 The station building and gateline do not need to be installed by Network Rail contractors and could be procured through a standard civils route.

REVISED ASSUMPTION: STATION BUILDING AND GATELINE EXCLUDED FROM FIRST PHASE

PLATFORMS

6.2.4 Assumed to be piled, whereas expected to be shallow foundations – this will provide savings on both construction cost and possessions.

6.2.5 The platforms are assumed to have 2/3 coverage by canopies (£1.5M), which could be reduced, although better shelter would be one of the major improvements over the existing station.

REVISED ASSUMPTION: NO CHANGE UNTIL GRIP 3 ESTIMATE FOR ROBUSTNESS

PRELIMS, OVERHEADS AND PROFIT

6.2.6 These items are based on a fixed percentage for rail projects (prelims 20.9%, OHP 15.1%). For items that could be delivered by non-rail contractors (Station building, construction accesses, permanent accesses etc.) these percentages could be reduced (prelims c.15%, OHP 10%)

REVISED ASSUMPTION: PERCENTAGES CHANGED FOR LATER PHASE ACTIVITIES (STATION AND GATELINE)

DESIGN COSTS AND PROJECT TEAM COSTS

6.2.7 Design and project team costs are set at 15.8% and 18.36% respectively. Typically for Civils work they would be 12.5% and 10.0%, respectively.

REVISED ASSUMPTION: PERCENTAGES CHANGED ASSUMING CONSULTANTS DESIGN AND PM

POSSESSIONS

6.2.8 The Network Rail Estimate assumes seven no. 27-hour possessions. There is no reduction for the possibility of piggyback possessions, single line working, or overnight working (8-hour possession).

6.2.9 If, as expected, pilling is not required for the installation of the platforms, then the possession requirements will reduce drastically.

REVISED ASSUMPTION: ALLOWANCE FOR POSSESSIONS REDUCED TO £400,000

RISK

6.2.10 Assumed at 40%. This can be reduced at GRIP 3 by going through a Quantitative MRRA to obtain the project specific risk profile. For the time being, given the relatively straightforward nature of the project and the detail of the estimate, the alternative assumption is 25%

REVISED ASSUMPTION: 25%

NRFF AND IRF

6.2.11 The Network Rail Fee Fund and the Industry Risk Fund are non-returnable insurance premium charges payable to Network Rail based on the value of work undertaken by NR. These charges can be minimised by taking out costs as described above and by engaging external parties (designer/contractor) to deliver the station.

6.2.12 Assumed that with delivery remaining external to Network Rail through the Aspro Route the charges will be approximately 1/3 of the maximum.

REVISED ASSUMPTION: £1.3M NRFF AND £0.2M IRF

6.2.13 Table 6-2, below, provides a summary of the alternative assumption costs.

Table 6-2 – Alternative Assumption Cost Estimate

Cost Element	Cost
Direct Construction Costs	£ 8,690,721
Indirect Construction Costs	£ 3,126,939
Project / Design Team Costs	£ 2,355,412
Possessions	£ 400,000
Point Estimate	**£ 14,173,072**
Risk	£ 3,543,268
Proposal Estimate	**£ 17,716,340**
NRFF	£ 1,300,000
IRF	£ 200,000
Value Engineered Estimated Project Outturn	**£ 19,216,340**

6.3 ADDITIONAL CIVILS WORK REQUIRED FOR FIRST PHASE STATION

6.3.1 Access to the station, including the improvement of Bannold Drove and car parking, cycle parking and access plaza is not included within the Network Rail cost estimate or the Alternative Assumptions cost estimate. In addition, a temporary haul road on the east side of the railway is not included within the Alternative Assumptions cost estimate, as this can be delivered more cost effectively by a non-specialist contractor.

6.3.2 The Bannold Drove improvements are calculated based on the provision of a 3.5m wide single lane with 20m long passing places every 200m. The costs are estimated based on new full depth construction, which would be required if the alignment along Bannold Drove is unachievable and the access route needs to be relocated adjacent to the west side of the railway. Should an acceptable layout be achievable on Bannold Drove itself, the construction costs would reduce.

6.3.3 The access plaza assumes taxi and bus drop off, 200 car parking spaces and 200 cycle parking spaces.

6.3.4 Summary costs for each of these items are provided in Tables 6-3, 6-4, and 6-5, below, and summarised in Table 6-6:

Table 6-3 – Bannold Drove improvements

Cost Element	Cost
Construction Costs (inc. OH&P)	£ 1,423,500.00
Employers Indirect Costs	£ 470,287.50
Optimism Bias and Risk	£ 1,590,781.50
	£ 3,484,569.00

Table 6-4 – Associated Civils Work (Car parking, cycle parking, bus and taxi facilities, and access plaza)

Cost Element	Cost
Construction Costs (inc. OH&P)	£ 1,212,600.00
Employers Indirect Costs	£ 272,835.00
Optimism Bias and Risk	£ 1,247,765.40
	£ 2,733,200.40

Table 6-5 – East Side Haul Road

Cost Element	Cost
Construction Costs (inc. OH&P)	£ 133,900.00
Employers Indirect Costs	£ 30,127.50
Optimism Bias and Risk	£ 137,783.10
	£ 301,810.60

Table 6-6 – Summary Additional Civils Work

Cost Element	Cost
Direct and Indirect	£ 3,543,250.00
Optimism Bias and Risk and Contingency	£ 2,976,330.00
	£ 6,519,580.00

6.4 ESTIMATED FIRST PHASE PROJECT OUTTURN

6.4.1 Table 6-7 provides the combined estimate of the Network Rail works and the Civils works for the first phase station.

Table 6-7 – Summary First Phase Cost Estimate

Cost Element	Cost
Network Rail works	£ 19,216,340
Additional civils works	£ 6,519,580
	£ 25,735,920

6.5 ADDITIONAL CIVILS WORK REQUIRED FOR SUBSEQUENT PHASES

6.5.1 Once the station is operational, additional phases of development could include the provision of a station building and gateline and the provision of a 500 parking space park and ride facility. The cost estimates for these additional items are presented in Tables 6-8 and 6-9.

Table 6-8 – Station Building and Gateline

Cost Element	Cost
Construction Costs (inc. OH&P)	£ 2,003,594
Employers Indirect Costs	£ 450,809
Optimism Bias and Risk	£ 2,159,874
	£ 4,614,277

Table 6-9 – 500 Space Park and Ride

Cost Element	Cost
Construction Costs (inc. OH&P)	£ 2,614,300
Employers Indirect Costs	£ 588,217
Optimism Bias and Risk	£ 2,690,115
	£ 5,892,632

6.6 ESTIMATED END STATE PROJECT OUTTURN

6.6.1 Once the station is operational, additional phases of development could include the provision of a station building and gateline and the provision of a 500 parking space park and ride facility. Table 6-10 provides a summary of the estimated total project cost.

Table 6-10 – Summary End State Construction Cost Estimate

Cost Element	Cost
First Phase Works	**£ 25,735,920**
Station Building and Gateline	£ 4,614,277
500 Space Park and Ride	£ 5,892,632
	£ 36,242,829

6.7 ESTIMATING ASSUMPTIONS AND EXCLUSIONS

- The estimate base date is 3Q16
- The estimate excludes VAT
- The Network Rail Fee Fund and Industry Risk Fee are presented as a range because the type of agreement between NR and the third party developer is not yet known
- Network Rail specific risks are set out within the Network Rail New Waterbeach Station Estimate Report.
- Land costs excluded
- Inflation excluded
- Risks including but not limited to:
  - Further survey works, site investigation or the like
  - Costs in connection with archaeological investigations and finds
  - Costs in connection with soil contamination or remediation
  - Costs in connection with abnormal ground conditions arising from any future site investigations
  - Lowering or diversion of any existing sewers, drainage or services
  - Further earthworks, landscaping works or the like

7 SURVEY STRATEGY

7.1 PROPOSED SURVEYS

7.1.1 The recommended surveys below should be actioned before or on GRIP3 commencement:

- Geotechnical Investigation – supplement the Mott MacDonald Ltd. land surveys with intrusive investigations within the lineside to establish the embankment structural properties and track bed details. Track bed details are only required for the future proofing where turnbacks are being considered.
- Services survey- a ground level visual survey supplemented by Ground Penetrating Radar for tracing hidden routes.
- A Detailed Topographical survey of the railway including track alignment
- Records search – NR to provide utilities record search report.

7.1.2 The following surveys and actions are to be carried out during GRIP 3 stage:

- A site visual inspection by engineers
- A Telecoms inspection will be undertaken along the route
- Environmental Phase 1 habitat survey.
- Both Bottisham and Bannolds Level Crossings require Level Crossing Census and Risk Assessment updates due to transport changes.
- Bottisham Level Crossing requires an asset condition survey due to predicted control changes
- Ballast Pit Level Crossing LC109 is proposed to be closed. A formal consultation on its closure is required at the next GRIP stage.
- Engagement with D&B contractors to check robustness of program and invite efficiencies

7.2 SURVEY STRATEGY

Survey Planning and Site Access:

7.2.1 We plan to survey on and from non-rail land.

7.2.2 An approved supplier registered Track Safety Provider (TSP) will be appointed to provide the core planning activity and assist in WPP preparation for surveys needing NR access.

SURVEY	NR ACCESS	ACCESS ARRANGEMENT
Topographical – Brownfield and Greenfield areas outside NR boundary	N	Licenses via Landowner (RLW Estates)
Topographical – Track	Y	Possessions, CPP by NR, WPP by GRIP3 Designer
Track Service Identification	Y	Possessions, CPP by NR, WPP by GRIP3 Designer
Geotechnical – Track Level	Y	Possessions, CPP by NR, WPP by GRIP3 Designer
Geotechnical – non NR	N	Licenses via RLW Estates
Topographical – non NR	N	Licenses via RLW Estates
Buried Services – non NR	N	Licenses via RLW Estates
Traffic, Pedestrian, Parking	N	Licenses via RLW Estates
Environmental	N	Licenses via RLW Estates
Electrical Services	Y	Possessions, CPP by NR, WPP by GRIP3 Designer

Figure 24-Survey access requirements

***Survey Methodology**:*

7.2.3 Concurrent with the Ground Investigation we propose that a combined topographic and utilities survey be undertaken enabling the existing ground level to be accurately recorded, services to be spatially located, signal posts, OLE and other equipment located and identified and ground investigation intrusive positions to be located.

7.2.4 The laser scanning shall comply with NR standards and guidance: NR-L2-TRK-3100 and NR-GN-TRK3103.

7.2.5 Services mapping shall be carried out in accordance with PAS 128:2014 Specification for underground utility detection, verification and location. A new buried services search would be requested. Networking contact and dialog would be undertaken with the utility companies. The mapping works shall also include (where safe to do so) the lifting of covers with barriers, cones and signs erected as necessary, with regard to pedestrian and traffic movements.

7.2.6 We believe there is no track drainage. If it is found to exist the existing track drainage system will be surveyed which will comprise of the lifting of existing catch pit lids to assess the current conditions of each chamber, obtaining reduced levels of the pipe inverts and checking current alignments of the drainage runs. Site records will include photographs.

7.2.7 Ground Investigation: Ground survey scope for the station location includes track bed hand pitting, window sampling, contamination and asbestos tests and installation of standpipes to record ground water levels.

7.2.8 Environmental surveys will include an extended phase 1 habitat survey, a baseline noise survey and built heritage survey. Desk based assessment would be undertaken initially for contaminated land and archaeology and depending on the results on-site surveys may then be required.

7.2.9 Trackside Electrical survey will be preceded with a mini desktop study to determine the location of existing equipment and power supplies. This will use information from the eB database to obtain relevant signalling and electrical and power records and ratings. Site surveys inclusive of load monitoring, confirmation of supply characteristics, within the equipment, cable sizes, distribution etc.

8 CONCLUSIONS

8.1.1 A new station at Waterbeach located North of the existing station within the Waterbeach New Settlement development boundaries would offer significant benefits to the rail industry and local community for the following reasons:

- Anticipated improved operational safety at the existing Waterbeach Station level crossing due to closure of the existing station and consequent reduction in traffic.
- Potential to provide a modern high quality station with a wider range of facilities including wheelchair accessible lifts and pedestrian bridge.
- Improved route accessibility for cars, buses, cyclists and pedestrians.
- Significant traffic flows associated with the station will be removed from the narrow streets of the village. In addition, antisocial parking associated with the station including unregulated parking on residential streets, on footways, at junctions, and illegal parking on double yellow lines will be removed from the area around the station, improving the walking and cycling environment for village residents.
- Increased car parking capacity at the new station.
- Potential provision of a Park & Ride system could reduce car commuting to Cambridge, reduce parking congestion in the village and ease congestion on the existing Park & Rides on the outskirts of Cambridge.
- The preliminary business case shows a strong financial benefit over a 60-year appraisal. The overall BCR assuming no changes in service patterns is over 6, and the Return on Capital Employed is 1.89. Subject to an appropriate remuneration agreement with the DfT, the ROCE measure suggests that there will be sufficient new TOC revenue over the 60-year appraisal period to contribute significantly to, if not pay for entirely, the costs of privately financing the construction of the proposed new station.
- The geotechnical desk study has found the ground materials to be absent of underlying peat and thus considered as competent for shallow foundations.
- The hydrology risk assessment has found the flood risk reduces northwards – the proposed location is classified as Flood Zone 2.
- The location allows for future proofing to 12 car trains.
- Alternative turnback arrangements have been identified as feasible to assist future proofing of train operations.

Construction Planning Aspirations:

8.1.2 To achieve a predicted Station Construction completion by December 2019 enabling works should be commencing January 2018 and Trackside works (I year duration) proposed to begin June 2018.

8.1.3 Possession requirements should be planned up to 2 years in advance in line with the Network Rail guidance for Engineering Access. Possessions will be reconfirmed at T-45 weeks and T-26 weeks prior to the first core possession.

8.1.4 There may be an option to stage the New Station build, if this was taken forward to suit the Developers longer construction period then the following staging would be possible:

1) Lineside station Minimal requirement – Platforms & access between and matched car park.

2) Next Stage – Proposed station building and revenue protection.

3) Next Stage – Park and Ride facility, which substantially improves parking facility.

4) Next stage – Future provisions for the station (island platform turnback, 12-car etc).

Next steps

8.1.5 The progression of the next design stage GRIP 3 study would need to consider the design and survey requirements listed below. Early commencement of these activities will reduce and mitigate construction risk and will make valuable information available to the investors and key stakeholders supporting this New Station Development:

- Geotechnical Investigation to supplement the Mott MacDonald land surveys information.
- Intrusive investigations within the within the lineside embankment to establish the embankment structural properties and track bed details. (Track bed details are only required for the future proofing where turnbacks are being considered).
- Topographical surveys of the surrounding land area and track area.
- A surface water drainage strategy will be required for the land development.
- Services survey- a ground level visual survey supplemented by Ground Penetrating Radar (GPR) for tracing buried services.
- Records search – NR to provide utilities record search report.
- Engagement with Design & Build contractors to check robustness of programme and invite efficiency / value management workshops.
- Due to the New Waterbeach Station relocation, the adjacent Level Crossings at Bottisham and Bannolds are impacted and a Level Crossing Census and Risk Assessment need to be carried out at the next GRIP stage. The review will determine whether level crossing upgrades are required.

LIST OF ANNEXES

APPENDIX A

ANNEX1: BUSINESS CASE

Title- UPDATE TO TECHNICAL REPORT 1 - NEW RAILWAY STATION OPTIONS

Revision -First issue 17 June 2016

ANNEX 2: PLANNING PROGRAMME

APPENDIX B

Technical studies

ANNEX 1: ENVIRONMENTAL APPRAISAL AND ACTION PLAN

ANNEX 2: HYDROLOGY INCLUDING FLOOD RISK

ANNEX 3: GEOTECHNICAL PHASE 1 ASSESSMENT

ANNEX 4: SIGNALLING REPORT

ANNEX 5: TRACK REPORT

ANNEX 6: OLE REPORT

ANNEX 7: DRAWINGS

ANNEX 8: SCHEDULE OF QUANTITIES

ANNEX 9: DESIGNERS RISK LOGS

ANNEX 10: INTER DISCIPLINARY DESIGN CHECK (IDC)

ANNEX 11: CONSTRUCTION PROGRAMME

ANNEX 12: FUTURE PROOFING CONSIDERATIONS

APPENDIX C

ANNEX 1: HAZARD LOG

ANNEX 2: ASSUMPTION REGISTER

APPENDIX TEN – LETTER FROM STEPHEN KELLY (SCDC) TO DFT ON STATION SUPPORT

South Cambridgeshire Hall
Cambourne Business Park
Cambourne
Cambridge,
CB23 6EA
www.scambs.gov.uk

South Cambridgeshire District Council

James Conway
Senior Planning and Investment Manager, Rail Network Services (London & South East)
Department for Transport
Great Minster House
33 Horseferry Road
London
SW1P 4DR

Planning & New Communities
Contact: Stephen Kelly
Email: stephen.kelly@scambs.gov.uk
Direct dial: 01954 713350

Our ref:
Your ref:
Wednesday 1st February

Dear James Conway

Re: Proposed relocation of Waterbeach railway station

As the local planning authority for Waterbeach, South Cambridgeshire District Council wishes to express its support for the provision of a new railway station at Waterbeach to replace the existing station, and supports its allocation of land for development at Waterbeach that will enable 9000 new homes to be delivered to Cambridgeshire.

By way of background, you will be aware that a relocated station for Waterbeach is proposed in the Council's Draft Local Plan (policy SS/5 Waterbeach New Town) and Cambridgeshire County Council's Transport Strategy in connection with the development of a new town to the north of the existing Waterbeach village. The Council, as local planning authority, is to produce a Supplementary Planning Document (SPD) covering the design and delivery of the new town, including relocated station. As the relocated station will be a key component of the vision for a sustainable settlement, the Council considers that bringing certainty to the delivery of the railway station will be of significant assistance in this process; including promoting sustainable transport.

I am aware the Department has met with RLW Estates and its advisors who are promoting the relocated station together with Network Rail and that you are familiar with the proposal that has been developed to GRIP 2 level in conjunction with Network Rail. It is this proposal that we support and wish to see developed through GRIP levels 3 to 5 to enable construction of the station to start as soon as possible.

We are aware of the limitations of the existing station in terms of safety and capacity which would be exacerbated by added demand from any surrounding development. The constraints of the existing station to support sustainable growth in Cambridgeshire is restricted by limited parking for cars and cycles, inadequate interchange with bus services and dependence by rail customers on the level crossing. It is also clear that the existing station cannot realistically be improved.

Accordingly a relocated station is needed which would provide DDA compliance, longer platforms (which could be extended further), modern facilities (lighting, CCTV etc) and extensive shelter for passengers, especially along the southbound platform. Furthermore the relocated station would

be similarly located in relation to the existing village and bring environmental improvements to the village as a whole. We acknowledge there will be issues associated with closing the existing station and consider that these should be explored sooner rather than later.

We understand RLW Estates is firstly; providing the funding to bring the proposal for the new station to GRIP 5 level, secondly; providing the funding for a planning applications which would complement the preparation of the SPD by securing the status of the new station and thirdly is intending to engage with the Department to enter in to a financial arrangements which would enable the construction and commissioning costs of the new station to initially be privately funded.

For these reasons stated above, we now consider that the development of the proposals for the relocated station should be provided as soon as possible and wish to meet with and explore with the Department ways to secure early agreement on the measures required by the Station Change, Networl s Act 2005 procedure administered by the Department, Network Rail anc Road, as appropriate.

Yours sincerely,

Stephen Kelly

Director of planning & Economic Development

APPENDIX ELEVEN – DENNY ABBEY AND ITS SETTING: ANALYSIS AND RECOMMENDATIONS FOR THE WATERBEACH NEW TOWN (NOVEMBER 2014)

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Waterbeach New Town Evidence Base

DENNY ABBEY AND ITS SETTING:
ANALYSIS & RECOMMENDATIONS FOR THE WATERBEACH NEW TOWN

Version: 1.4
Version date: 17 November 2014
Comment: Final

LDĀDESIGN

Designers of the London 2012 Olympic Parklands

Waterbeach New Town Evidence Base

Denny Abbey and its Setting: Analysis and Recommendations for the Waterbeach New Town
17 November 2014

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This document has been prepared and checked in accordance with ISO 9001:2008.

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1.0 Introduction

1.1. Background to the Commission and Appointment

In June 2013, LDA Design and Headland Archaeology were appointed by Turnstone Estates Ltd. to assess and describe how the setting of Denny Abbey contributes to its significance and to provide advice in regard to the masterplanning of the northern portion of the Waterbeach New Town, specifically with reference to Denny Abbey, which falls within the Area Action Plan (AAP) boundary for the new town development, which is illustrated on the *'South Cambridgeshire Proposed Submission Policies Map: July 2013 Inset Map H. Waterbeach New Town'* (Inset Map H).

1.1.1. Landscape and Heritage Appraisal of Denny Abbey and its Setting

The '*Landscape and Heritage Appraisal of Denny Abbey and its Setting*' describes how the setting of Denny Abbey contributes to its significance. The appraisal was prepared in consultation with English Heritage, South Cambridgeshire District Council and the Farmland Museum and directly addresses Policy SS/5, the supporting text to which records that an *"Assessment of the setting of Denny Abbey using English Heritage's guidance on Setting of Heritage Assets will be required in view of the importance of conserving and where possible enhancing the remote rural and historic setting of Denny Abbey, a nationally important heritage asset, will be a key element of the plan, including having regard to key views and landscape character."*

1.1.2. This Report and Relationship to the Statement of Common Ground

This report has been developed as a companion document to the '*Landscape and Heritage Appraisal of Denny Abbey and its Setting*' and should be read in conjunction with it.

The purposes of this report is to provide a measure of analysis and agreement on key parameters, both to help define the northern extent of proposed development and the capacity of the new town and to provide a further step in confidence building regarding the protection and enhancement of Denny Abbey and its setting.

In doing so it underpins the Statement of Common Ground (SOCG) between various interested parties on matters related to Denny Abbey and its setting and will have an important role in informing the Waterbeach New Town AAP and the masterplanning of the proposed new town.

The key role of this report and the SOCG is to achieve common ground with interested parties in advance of examination where Policy SS/5 will be examined, whilst leaving significant and extensive detail to be addressed in the AAP.

With reference to Policy SS/5, the report's two main objectives are to:

- Define the northern limit of the built up area for the Waterbeach New Town to maintain an appropriate setting for Denny Abbey and the location of major land uses to establish an appropriate relationship between the abbey and the proposed new town.
- Describe the character of land uses, including strategic landscaping and green infrastructure necessary to provide appropriate screening of the Waterbeach New Town in views from Denny Abbey; protect key views including to and from the abbey to protect

the historic significance of the abbey; and contribute to the character, amenity, connectivity and ecological value of the landscape.

In addition it also looks to:

- Establish the principles underpinning access arrangements to and around Denny Abbey to improve people's enjoyment of the abbey and the adjacent Farmland Museum.

In meeting these objectives, the report addresses issues related to Denny Abbey highlighted in Policy SS/5 of the South Cambridgeshire Proposed Submission Local Plan (refer to Section 2 below and **Appendix 1**).

To provide a broader contextual understanding of Denny Abbey and the Farmland Museum, consideration is also given to it as a visitor destination (**Appendix 2**) and as a green infrastructure asset (**Appendix 3**).

1.2. Structure of the Report

Following this introduction, **Section 2** presents extracts of Policy SS/5 in the South Cambridgeshire Proposed Submission Local Plan relevant to consideration of Denny Abbey and its setting. The full policy is presented in **Appendix 1.**

With reference to the '*Landscape and Heritage Appraisal of Denny Abbey and its Setting*', **Section 3** describes the heritage significance of Denny Abbey and the contribution that setting makes to its significance.

Section 4 presents analysis of the opportunities meet the objectives set out previously.

Section 5 presents six recommendations for how the proposed Waterbeach New Town development should respond to the opportunities identified and described in Section 4.

Supporting figures and further information are presented as appendices at the end of this report.

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2.0 Waterbeach New Town: Policy Context

Policy SS/5 in the South Cambridgeshire Proposed Submission Local Plan[ii] , the policies and proposals in which cover the period 2011 to 2031 and beyond, proposes a new town on the former Waterbeach Barracks and land to the east and north of the barracks site. The full Waterbeach New Town policy is presented in **Appendix 1**.

Extracts of the policy relevant to Denny Abbey are summarised below.

Paragraph 1 of the policy records that the final number of dwellings will be determined in an Area Action Plan (AAP) which will have regard to:

- *"The location and distribution of development in the town; and*
- *The land outside the town necessary to maintain an appropriate setting for Denny Abbey Listed Building and scheduled monument."*

With reference to the Site, Paragraph 6 states that [*inter alia*] an AAP will be prepared for the area shown on the Policies Map and will address issues and requirements including:

- *"Establish the built up area of the settlement within the Major Development Site, and location of major land uses, having particular regard to ensuring and appropriate relationship with Denny Abbey listed building and scheduled monument".*

With reference to measures to address landscape, townscape and setting of heritage assets in the surrounding area and deliver a high quality new development, Paragraph 6n (i) of the Policy records:

- *"Strategic landscaping within the Major Development Site to deliver high quality environs and:*
  - *Provide an appropriate screening of the town in views from Denny Abbey in order to protect the historic significance of the Abbey..."*

Paragraph 6o adds that:

- *"Measures to conserve and enhance the significance of Denny Abbey Grade I listed building and scheduled monument, including the contribution made by its setting, the extent and nature of separation from built development and formal open spaces, and protection of key views including to and from the Abbey"*

With reference to the delivery of a significant network of green infrastructure, Paragraph 6u adds that:

- *"Provision and retention of woods, hedges, and water features which would contribute to the character and amenity of the town and help preserve and enhance the setting of Denny Abbey, managed to enhance their ecological value"*

With regard to measures to promote cycling and walking, Paragraph 6ff refers to a review of *"...the access arrangements to Denny Abbey".*

Paragraph 3.36 (of the supporting statement to Policy SS/5) records that the Policies Map identifies the Major Development Site, which will accommodate the built development of the new town.

It adds that this does not mean the whole of the area will be developed and that large parts of it will remain undeveloped and green after the settlement is complete to provide open spaces

within the new town and a substantial green setting for the new town, Denny Abbey and Waterbeach village. It goes on to record that *"Areas to the north of the town within the area to be covered by the AAP will ensure that it will remain physically separate from Denny Abbey"* and that and *"Assessment of the setting of Denny Abbey using English Heritage's guidance on Setting of Heritage Assets will be required in view of the importance of conserving and where possible enhancing the remote rural and historic setting of Denny Abbey, a nationally important heritage asset, will be a key element of the plan, including having regard to key views and landscape character."*

The AAP Boundary and Major Development Site is set out on the 'South Cambridgeshire Proposed Submission Policies Map: July 2013 Inset Map H. Waterbeach New Town'.

As illustrated the Proposed AAP Boundary includes the former Waterbeach Barracks, farmland, a golf course and the full extent of the Denny Abbey Scheduled Monument.

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3.0 Denny Abbey's Heritage Significance

3.1. Introduction

The complex of medieval monastic buildings, earthworks and deposits at Denny Abbey together form a heritage asset that is both highly important and well understood. The core buildings are Listed and the pasture fields surrounding the abbey, including the surviving historic earthworks, are protected as a Scheduled Monument. The abbey and adjacent Farmland Museum are open to the public.

Section 3 of the '*Landscape and Heritage Appraisal of Denny Abbey and its Setting*' describes the heritage significance of Denny Abbey and the contribution that setting makes to its significance.

The following sections summarise the findings of the appraisal for ease of reference.

Reference should be made to the full appraisal for further details, including information regarding the Scheduled Monument, Listed Buildings and non-designated heritage assets, find spots and events.

The appraisal also presents a chronological overview of the landscape around Denny Abbey, analysis of historic maps, a review of the Historic Environment Record (HER) and a description of local landscape character and views.

3.2. Heritage Significance of Denny Abbey

3.2.1. Archaeological Interest

Whilst the surviving buildings form the most visible evidence of medieval and post medieval use and occupation of the site, the main precinct, which occupies a raised platform, includes the below ground remains of ancillary buildings constructed at various times by the three religious communities (Denny Abbey was a monastic priory complex which was home to three successive religious orders from the 12th to the 16th centuries). Some are visible as a series of earthworks, including a causeway that joined a route that connected the religious community to Waterbeach and possibly to the main route between Cambridge and Ely, part of which may be preserved in a further stretch of causeway earthworks to the north of the abbey. Other earthworks represent field and stock enclosures, rectangular fishponds and perhaps garden plots.

Archaeological evidence and earthworks also provide evidence of occupation and use of the site prior to the arrival of the Benedictine monks in the 12th century. The evidence points to some form of late Iron Age/Roman period occupation of the site, albeit it is not possible on the available evidence to draw any firm conclusions about earlier pre-historic use of the site or the continuity of settlement at Denny from the later Roman period to the medieval period.

Excavations have also demonstrated the high potential for the survival of archaeological remains and that in the past waterlogged deposits have provided samples of seeds and beetles which can help to reconstruct environmental conditions and interpret the lifestyle of inhabitants of Denny.

The archaeological interest therefore primarily lies in the potential to recover further evidence of how the site functioned during the different periods of use by religious orders, as

well as its use during the Iron Age and Roman period, in part to understand its relationship to other known settlement and farming sites in the locality. Further excavation may also reveal information about the earlier prehistoric and early medieval use or settlement of Denny to determine whether there is a continuity of use and settlement beyond that which is already known. The potential for environmental information in waterlogged deposits is also significant – offering the potential to develop a greater understanding of the character and use of the landscape during different episodes of occupation, as well as the lives of the occupants of Denny.

3.2.2. Architectural and Artistic Interest

The surviving built fabric at Denny presents physical evidence of three successive religious orders which occupied the site, its post Dissolution use as a farm, and later works to reconfigure the buildings to expose earlier fabric by the removal of later additions such as partition walls.

The earliest upstanding remains are those of the original Benedictine Abbey church of cruciform plan (c.1150) and include the blocked chancel arch and ambulatory arches on its eastern façade. This church was used for a short period before the site was transferred to the Knights Templar who modified the church and added buildings to form a home for aged and infirm members of the order. Again evidence of this period of use can be seen in the fabric of the surviving buildings including the (blocked) west doorway with its now badly worn chevron detailing.

It is perhaps the remains of the Order of St Clare that are of most architectural interest - this being the only known Franciscan nunnery in England to have surviving architectural remains and the only example of an existing monastic site being converted to Franciscan uses. The nunnery was established by the Countess of Pembroke, by moving nuns from their base at Waterbeach. The remains visible today include the private apartments of the Countess of Pembroke who was given permission to lodge at the site. Other alterations included the demolition of the 12th century chancel and the insertion of a first floor. The sill of a window allowing views into the church from the Countess' apartments also survives. The Refectory (c.1340) is also a notable survival from this period of use. This building would have been joined to the other parts of the abbey via a cloister but is now detached from the remaining church buildings.

Religious use of the site ended at the Dissolution and its abandonment in 1539. Its re-use as a farm house is again recorded in the fabric of upstanding buildings. The church was incorporated into a farmhouse and the Refectory became used as a barn. Evidence of this period can be seen in the 16th century red brick of the gable wall of the south transept, hearths and large chimney stack, as well as interior details. A further barn was constructed in the 17th century from re-used medieval limestone, ashlar blocks and gault brick. Later alterations during its period of domestic use are also evident including 18th and 19th century windows. The site has also seen the construction of further, largely unremarkable agricultural barns and outbuildings (now forming the core of the Farmland Museum and working farm). However, of some interest is Walnut Tree Cottage, which dates from the 1860's. Whilst not of significant architectural merit in itself it has been restored to represent a typical farm labourer's home of the late 1940's.

Since the site was placed in the care of the Ministry of Works, works have concentrated on the removal of Post Dissolution partitions to show how the buildings were when the Countess of Pembroke's alterations had been completed.

Therefore, the architectural and artistic interest of the site lies primarily in the surviving fabric of the various upstanding buildings dating to three periods of occupation and use by different religious orders. For the most part, the architecture of the remaining external fabric is unremarkable in design and execution, albeit fine carving is evident on some details such as doorways and columns. However, the surviving buildings are of interest in the way that they display changing architectural styles over the long period the buildings were occupied and how built fabric was adapted and reused, initially by religious communities, then as a working farm, and now more recently as a visitor attraction combining the remaining abbey structures and agricultural buildings and accommodation now associated with the Farmland Museum.

When considering the extent of demolition and remodelling by successive occupants the quality and legibility of the surviving medieval built fabric is somewhat remarkable.

3.2.3. Historic Interest

Documentary evidence for Denny Abbey is described as 'exceptional' allowing links to be established between physical medieval and post medieval remains to historic events and individuals with some degree of confidence.

The original church, dedicated to St James and St Leonard, was established by Benedictine monks as a dependent priory of Ely Cathedral which is located a few miles to the north around the middle of the 12th century. The choice of an isolated site at the fen edge conforms to our understanding of a detached and contemplative monastic community. It is also possible that visible evidence of previous occupation (in the form of earthworks dating to the Roman period), its proximity to the main Ely to Cambridge route and location on a dry platform raised above the surrounding fenlands but close to the River Cam may also have contributed to the selection of the site.

The abbey would have been an important economic and agricultural unit in the landscape and the selected site benefits from its proximity to areas of dry land (for crops), lower lying pasture and the rich water born resources of the Fens. The river would have also been economically important, both as a communications route and a key transport route for the movement of building materials and other commodities to and from the abbey. Barnack stone is known to have been used in the construction of the abbey (as well as Ely Cathedral and most high status buildings in the area) and would have been transported on sleds to the River Welland and loaded on to barges which travelled down the River Nene and other fenland waterways[1]. It is not known which routes Barnack and other stone used to construct the abbey buildings reached Denny. However, the Cam is a strong candidate. No evidence for a waterway directly linking the Cam to the abbey site has been found to date, and whether the course of the river lay closer to Denny during the Medieval period. It may be that material was loaded and unloaded at Waterbeach and transported to and from the abbey by cart, along the track ways, parts of which survive today.

[1] www.naturalengland.org.uk/ourwork/conservation/designations/nnr/barnackhistory.aspx

The short-lived Benedictine occupation was followed by the Knights Templars, and then by the Poor Clares. There is documentary evidence confirming the details of the third ecclesiastic order to occupy the site and in particular to Mary de Valence, the widowed Countess of Pembroke who founded it. In addition to having details of when the manor of Denny came to be transferred to the Countess (1327) and its absolute acquisition (1336), it is also possible to date the full transfer of nuns to Denny Abbey from Waterbeach in 1351, following an earlier unsuccessful attempt. The close association between the Countess and Denny Abbey continued for the rest of her life. She had dispensation for lodgings at the abbey and undertook significant works to convert most of the abbey church into a house – a transformation which would be completed following the Dissolution and which is visible in the surviving fabric of the abbey. The Countess was buried at Denny following her death in 1377.

Documentary evidence also provides details of Denny Abbey's more recent history. Following the break with papal authority, Henry VIII ordered the closure of English monasteries and the sale of their lands and contents. Denny was acquired by Edward Elrington, a property speculator, in 1539. Elrington dismantled several buildings for their valuable stone. It is suggested that his total destruction of the site may have been avoided because part of the old church had already been converted into a house.

Denny Abbey passed from Elrington to the King in 1544 in exchange for other lands and was fully adapted and modified for use as a farmhouse and barn. It remained with the Crown until 1628 when it was transferred to the City of London to repay a debt. The guide book to Denny Abbey highlights other individuals and families to whom the site belonged. These included Thomas Hobson (1544-1631) and the Bacon's who are thought to have leased the farm to successive tenants. Thomas Bacon commissioned an engraving of the Refectory in 1730.

In 1947 Denny Abbey came into the care of the Ministry of Works and in the late 1960's, following the departure of the last farm tenant, archaeological investigations were undertaken and later additions were removed to reveal more of the monastic structures. English Heritage took over guardianship in 1984.

In 1997 the Farmland Museum opened. The museum complements the abbey's earlier monastic history by telling the story of Cambridgeshire life and how farming practices have changed over time. Farming has been a constant feature of Denny. Agriculture would have been an important part of the local economy from at least the Roman period, which is thought to be the earliest period of settlement of the site. As noted earlier, the various religious orders to occupy Denny would have all relied on the surrounding land for food and as a means of income.

Agriculture came to be the main concern of the occupants of the abbey after the end of religious use of the site in 1539. Several existing buildings including barns and workers cottage, as well as evidence of the adaptation of former abbey structures for agrarian uses remain from different periods and show how farming practices have evolved over time. The area around Denny continues to be farmed. Modern farm buildings located close to the Farmland Museum are still in use.

In addition to representing a record of medieval and post medieval religious and secular life, it is judged that Denny may also have a more emotional resonance for local communities and visitors. The fabric of surviving buildings demonstrates nearly four hundred years of

continuous religious devotion. Denny also displays evidence of domestic and agricultural uses of the site for an almost identical stretch of time post Dissolution and for several hundred years before the establishment of the first Benedictine church from at least the Roman period; a complex identity that is reconciled in its current form as a visitor attraction telling the dual story of religious and farming life.

3.3. Contribution of Setting to the Heritage Significance of Denny Abbey

The positive contribution that setting makes to the significance of Denny Abbey primarily reflects our understanding of the relationship between the medieval history of the site and the current landscape setting.

When the original Benedictine Abbey was founded on the site in the 12th century, Denny was a small area of slightly raised and dry land on the fen edge west of the River Cam and north of Waterbeach. It is anticipated that the site would have contained visible earthworks related to occupation during the Roman period. The site was made accessible from the south by a short causeway linking to a track or road to Waterbeach. A further causeway linked Denny to tracks to destinations to the north east. The exact course of the River Cam and the relationship of the site to the river at the time are not known.

The choice of an isolated site at the fen edge conforms to our understanding of a detached and contemplative monastic community, but also reflects more pragmatic considerations. The proximity of the site to the River Cam, the main route between Cambridge to Ely and the availability of land for growing crops and grazing animals as well as access to rich fenland resources would have also been important to the Benedictine founders of the first church on the site. The isolated, but well- connected and productive landscape context of the site persisted through the religious use of the abbey site up to the suppression of the Franciscan nunnery in the 16th century.

The subsequent draining of the fens radically changed the setting of Denny. The site was no longer an isolated area of farmed drier land surrounded by fen. It was (and continues to be) surrounded by farmland characterised by linear dykes and large geometric fields. More recent changes further altered the local landscape, with the introduction of an airfield to the south and spreading industrial/commercial development to the west.

Despite these factors, Denny Abbey still exists in an essentially rural landscape, detached from settlement. This is what the present-day visitor experiences approaching and viewing the surviving medieval buildings. Whilst limited by intervening vegetation, views out from the abbey are largely to agricultural land and whilst sometimes difficult to appreciate, the subtle raised platform on which the abbey is located and the lower lying, former fenland landscape bordering the River Cam is still discernible.

It is this present-day landscape, with its links back to the medieval fen edge and fen that contributes to the significance of Denny Abbey.

The various factors that contribute to this significance are described below:

3.3.1. Heritage Assets

Whilst there is archaeological evidence of activity in the area around Denny Abbey from the prehistoric to modern period, it is judged that the most significant contribution made by heritage assets to the significance of Denny Abbey relates to evidence for Iron Age/ Roman

period settlement and infrastructure, and activity contemporary with the occupation of the abbey by religious orders during the medieval period and its later use as a farm.

Roman Period

Soldiers' Hill (ID5521) and a site to the south of the abbey (ID11565) lie in relatively close proximity to Denny. Both were found to contain earthworks and material dating to the Roman period and the latter may link to cropmarks of enclosures to the west of the abbey. It is judged that, together with the alignment of the Roman road, Akeman Street, (preserved at least in part in the course of the modern A10) these assets contribute to the significance of Denny Abbey. They provide tangible evidence, in close proximity to the abbey, of Roman period settlement extending beyond the earthwork remains on the raised platform which are visible remnants of the earliest known significant occupation of the Denny abbey site.

Medieval Period

The absence of substantial archaeological records for the medieval period in the area surrounding Denny Abbey demonstrates the more isolated and remote character of the site during this period and its attractiveness to the Benedictines who established the first church on an area of raised landform on a platform of dry land surrounded by permanently or seasonally wet fen. Despite this, the medieval middens and occupational debris (ID 11566 and ID 11566A), found a short distance to the east of the abbey, are judged to contribute to the significance of Denny Abbey. These assets have yielded evidence of the lives of the occupants of the abbey and suggest the extent of the area that was utilised by the contemporary religious community. The medieval remains and causeway at Bannold Lodge (ID CB14627) are also judged to contribute to the significance of Denny Abbey – the causeway is particularly important as it is thought to be a continuation of the Denny Causeway and as such suggests how the religious communities were connected to the world beyond the abbey precinct.

Post Dissolution Period

With regard to the Post Dissolution use of the abbey as a farmhouse, the only features judged to contribute to the significance of the abbey are the Listed Gate Piers (ID 1127361) at the entrance to the site of the A10. The Grade II Listed Gate Piers are thought to have been erected in 1814 using a 14th century moulded pier of the Franciscan church. The piers are surviving fabric from the Franciscan church and inform our appreciation of the long period of time over which medieval fabric was re-used to create the farm and farm buildings following the Dissolution. The ornate piers indicate a degree of prosperity at the time of their erection and also confirm that the abbey site was accessed from the west at some point during the 19th century, rather from the south-east which had been the main point of access from the medieval period up to this time.

3.3.2. Views to and from Denny Abbey

The principle contribution that setting makes to the significance of Denny Abbey is through the general aesthetics of the place and in particular views to the site from the surrounding landscape and views from Denny to its landscape setting.

Analysis of local landscape character, the historic landscape and contemporary views to and from the abbey has highlighted elements and features that make a positive contribution to

the ability to appreciate the significance of Denny Abbey and those that make a negative contribution and detract from its significance.

Views to Denny Abbey from its Immediate Surroundings

Views from the immediate surroundings of Denny Abbey provide an opportunity to inspect the abbey buildings and other structural remains at close proximity. Such views contribute to the significance of Denny Abbey as they allow visitors to observe variations in building materials and architectural detailing meaning that the various episodes of construction (and demolition) are legible. The remains of all three main periods of ecclesiastical use are visible in the external fabric, as are Post Dissolution alterations and evidence of later works associated with the Ministry of Works and later custodians of the site.

It is judged that whilst views to the older barns and other agricultural buildings provide an opportunity to understand the site's continued relationship to farming, more modern utilitarian farm buildings and ephemeral features (such as the bookshop, visitor reception and water tower) detract from the significance of the asset.

Views to Denny Abbey from its Current Landscape Setting

The area of visible earthworks underlying rough pasture and hay meadows (broadly consistent with the extent of the Scheduled Monument), currently forms the landscape setting of the abbey. Views from this area are presently not available to visitors due to access not being permitted. However, analysis indicates that views from locations to the south, west and north contribute to the significance of the asset as they provide an opportunity to view the core abbey structures and their relationship to each other and the visible earthworks that surround them. Whilst fine architectural detailing on the abbey buildings are generally not legible at this distance, broad differences in materials and architecture are discernible, as are earthwork features and rubble wall enclosures. As such views from these broad orientations provide an opportunity to understand the evolution of the site and how the abbey and later farm occupied the central area on the slightly raised platform of land. Of particular note is the view from the south which is orientated northwards along the former causeway which was the approach to the abbey from Waterbeach. This contributes to the significance of the asset as it enables the abbey to be seen from the same orientation as visitors to the abbey during the medieval period.

Other views within this area that do not include the abbey are also worthy of note. For example the earthwork causeway, orientated towards Bannold Lodge, and Soldiers' Hill are both legible features in the landscape. Views of these features make an important contribution to the way that the abbey site is understood. The northern causeway is the remnant of a route from which the abbey was accessed from the north and Soldiers' Hill is a surviving (albeit damaged) area of earthworks that yielded Roman artefacts and is located adjacent to the alignment of the likely route to the abbey from Waterbeach.

Again, it is noted that whilst views to the older barns, and other agricultural buildings provide an opportunity to understand the sites continued relationship to farming, more modern utilitarian farm buildings, Denny Abbey Farm and ephemeral features (such as the bookshop, car park, water tower and visitor reception) detract from the significance of the site where they appear in views.

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Views to Denny Abbey from the Wider Landscape

Views to Denny Abbey from publically accessible locations in the wider landscape to the south, east and north are similarly restricted at present. However, analysis indicates that viewing opportunities from some locations contribute to the significance of Denny Abbey as they show the relationship of the Denny Abbey site to its surrounding landscape context.

From locations generally beyond the area of the Scheduled Monument, only the upper portions of the main abbey structures are visible and as such the architectural significance of the abbey cannot be appreciated. Similarly the earthworks are not discernible – often being obscured by surrounding vegetation. However, these distant views do allow the sites relationship to the landscape to be revealed. Whilst not immediately legible, due to the effects of trees and vegetation merging across the visible horizon, the raised platform on which the abbey is located is discernible, in part emphasised by the higher frequency of trees and shrubs on the platform which contrasts to the flatter and more open fenland farmland surrounding it. Whilst the character of the contemporary landscape surrounding Denny Abbey is very different to that of the medieval period, this distinction between the raised platform of land on which the abbey sits and the surrounding former fenland can be interpreted in views which aids a broad interpretation of the abbey site as being detached from its surroundings.

It is noted that whilst views to the wider landscape provide an opportunity to understand the sites relationship to its landscape setting, the appearance of modern structures such as the Waterbeach Waste Management Park and Cambridge Research Park and (covered) storage compounds/lighting columns at RAF Waterbeach detract from the significance of the asset where they appear in views. Such features are overtly associated with modern (20th century) land-uses that have no relationship to what is judged to be significant about Denny Abbey.

Locations from which to view the abbey from the west are also restricted due to limited public access. However, views from the main approach road are possible. Views from the approach road allow the abbey to be viewed in its wider landscape context. The orientation of this view further contributes to the significance of Denny Abbey as it provides the opportunity to experience views of the abbey from the access route that existed from the middle of the nineteenth century (analysis indicates that there was no access to Denny Abbey from the west up until the creation of this route, first recorded on the Sale Particulars map of 1855).

The presence of the gate piers (possibly erected in 1814) and the gently curved alignment of the access road suggests that this new route was designed to provide the principal access to the abbey. Current evidence suggests that the erection of the gate piers pre-dates the access road. However, further investigation may help identify whether these features are in-fact contemporaneous and whether they formed part of wider enhancements to the farm and landscape around the abbey; the Sales Particulars map of 1855 illustrates avenues of rows of trees in the area around the core abbey structures.

Views from Denny Abbey to the Wider Landscape

Whilst restricted by intervening buildings, walls and vegetation from several locations, views from Denny Abbey to its landscape setting also make a notable contribution to the significance of the asset.

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Where they are possible, views across and beyond the area of earthworks, defined broadly by extent of the Scheduled Monument, allows the sites location on a raised platform of land and how this sits within the wider fen edge and former fenland landscape to be appreciated.

Whilst views eastwards from the area of lawn adjacent to the east façade (from the area of the demolished church) are largely truncated and offer only glimpsed views to the surrounding landscape, views from windows in rooms restored to exhibit the Countesses lodgings on the second floor provide an opportunity to survey the immediate landscape setting of the abbey and the surrounding fenland farmland. Whilst the views are across a landscape that was created following the Dissolution, they do enable something of the remote, rural character of the abbey site to be appreciated. It is noted that such views would not have been possible from the Countesses lodgings at the time of her occupation of the abbey and are from windows associated with the later farmhouse. The interpretation board on the site records that the stone window ledge below the window located in the archway is thought to be where the Countess watched the nuns' services in the new church she had built.

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4.0 Analysis of Opportunities

Refer to

Figure A: Analysis of Opportunities – Concept Plan

4.1. Analysis

Both national and local policy promotes the preservation of heritage assets and their significance, which may lie in the asset itself or in the setting of the asset, or both.

The degree to which any particular asset merits protection reflects an assessment of the balance between the importance of the asset and the level of harm to its significance on the one hand and the benefits of the development proposal on the other.

Whilst there is no question of physical harm to the heritage asset resulting from built development associated with the proposed Waterbeach New Town, the key issues for the AAP and masterplan to address are described in Policy SS/5.

As noted previously Policy SS/5 has informed the objectives for this report and provide a framework for the analysis of opportunities described below and illustrated on *Figure A: Analysis of Opportunities – Concept Plan.*

4.1.1. Defining the Northern Limit of the Waterbeach New Town to establish an appropriate relationship between the Abbey and the proposed new town.

The extent of the AAP and Major Development Site is set out in Policy SS/5. This report seeks to agree with relevant parties:

- An appropriate and clearly defined northern limit of built development based on an understanding of Denny Abbey and its setting.

4.1.2. Conserving and Enhancing the Significance of Denny Abbey through the Appropriate Treatment of its Setting and Managing Views

Denny Abbey should be retained in an essentially rural setting, where it can be experienced as a separate, self-contained cluster of buildings and associated earthworks. This could be achieved by:

- Defining an area, that is separate to the new town, of enhanced heritage setting around Denny Abbey, covering the abbey and principal earthworks and encompassing heritage assets that contribute to the significance of the asset.
- Developing an integrated heritage, landscape and ecology masterplan for the area of enhanced heritage setting around Denny Abbey to deliver multifunctional benefits and long term protection of the asset.
- Establishing a multi-functional strategic landscape buffer between the northern extent of buildings in the new town and the enhanced heritage setting of Denny Abbey to provide visual screening, habitat and public open space.
- Establishing appropriate land uses to the east of Denny Abbey for habitat offsetting, drainage attenuation and provision of public open space to maximise the efficient use of developable land and maintain the open nature of the landscape.

Views to the west from the abbey have been compromised by development along the A10. There is an opportunity to address this by:

- Establishing new planting to the west of Denny Abbey to screen/filter views to detracting features along the A10.

4.1.3. Improving Access to and Interpretation of Denny Abbey

Denny Abbey, its enhanced heritage setting and the Farmland Museum should be accessible (on foot or by bicycle) from Waterbeach village and the Waterbeach New Town. The views to and from Denny Abbey should also be enhanced to improve the visitors understanding of the remaining structures, earthworks and its setting. There is an opportunity to improve access to and understanding of Denny Abbey by:

- Creating a green infrastructure corridor along the historic route from Waterbeach to Denny Abbey through the heart of the proposed new town development.
- Providing access along defined inner and outer walks to explore the earthworks and area of enhanced heritage setting to gain views to the abbey, its area of enhanced heritage setting and open landscape context to the east.

5.0 Recommendations

Refer to

Figure B: Recommendations

It is not the purpose of this report to present a detailed masterplan for the Waterbeach New Town or for the proposed area of enhanced heritage setting around Denny Abbey.

However, with reference to the analysis presented in Section 4, and to the findings of the '*Landscape and Heritage Appraisal of Denny Abbey and its Setting*' a number of recommendations are made in relation to the proposed new town development and treatment of the area around Denny Abbey.

The recommendations made here are to be agreed with relevant interested parties as part of the SOCG. However, details of landscape and urban design may be refined through the AAP.

5.1. Recommendation 1: Northern Limit of Built Development

The line defining the northern limit of built development ensures that Denny Abbey is physically separated from the proposed new town and retains its separate identity.

Figure B illustrates the proposed line which has been defined following site assessment and analysis of views to and from Denny Abbey.

Towards the A10, the line is approximately 650m from the core of abbey structures at the heart of the Scheduled Monument and extends further south (to approximately 750m from the core abbey structures) to create an area of undeveloped land around Solders' Hill and either side of the green infrastructure corridor following the former route between Waterbeach and the abbey (see Recommendation 5). Whilst views from the abbey to the south are screened and filtered by intervening vegetation, notably within and fringing the Scheduled Monument, screen planting proposed as part of the strategic landscape buffer (see Recommendation 2) will further reduce the potential for views to built development south of the line as defined.

East of Soldiers' Hill and to the north of the existing airfield, the line defining the northern limit of built development extends parallel to an existing east-west field boundary, offset to the south to accommodate a belt of screen planting that forms part of the strategic landscape buffer (see Recommendation 2). Visual analysis indicates very limited views to areas south of this line from the abbey as a result of intervening vegetation within and fringing the Scheduled Monument and along adjacent field boundaries. Whilst views from the abbey to the east are limited, screen planting proposed as part of the strategic landscape buffer (see Recommendation 2) will further reduce the potential for views to built development south of the line as defined.

There remains scope to further refine the line defining the northern limit of built development through the APP. Consideration should also be given to urban design guidance as part of the AAP, for example related to building heights and massing as measures to further minimise potential visual effects of built development on views south and east from Denny Abbey.

5.2. Recommendation 2: Strategic Landscape Buffer

The strategic landscape buffer lies to the north of the line defining the northern limit of built development.

In addition to screening views to development associated with the proposed new town from Denny Abbey through the provision of a belt of native tree and understory screen planting, appropriate to the character of the fenland edge landscape, the landscape buffer should deliver a range of additional benefits including new semi-natural habitat and drainage attenuation. Areas for informal access and public open space could also be provided within the landscape buffer, where such uses would not compromise its other core functions.

Existing trees and hedgerows will be retained and protected as part of the landscape buffer where possible.

There remains scope to further refine the character and functions of the strategic landscape buffer through the APP. For example, consideration should be given to the character of the area surrounding Soldiers' Hill to ensure the setting of this asset and its relationship to Denny Abbey are enhanced.

5.3. Recommendation 3: Area of Enhanced Heritage Setting around Denny Abbey

The area of enhanced heritage setting around Denny Abbey, as defined on *Figure B*, lies to the north of the northern limit of built development (see Recommendation 1) and would not be part of the new town's public open space. It is physically separated from the new town by the strategic landscape buffer (see Recommendation 2) and its extent includes Soldiers' Hill, Gate Piers, Roman earthworks and medieval middens which are judged to contribute to the significance of Denny Abbey.

The precise nature of land use, habitats, access and interpretation should be determined and defined as part of a masterplanning exercise run in conjunction to that of the Waterbeach New Town and in tandem with the development of a long term management strategy for the area of the Scheduled Monument. Areas of land within the Scheduled Monument should continue to be grazed but as part of a regime that allows the earthworks to remain legible and that maintain their integrity.

The area beyond the Scheduled Monument could be designed and managed to demonstrate traditional farming methods and include hay meadows and areas of grazing for heritage breeds. Other land uses such as a 'physic garden', orchard and apiary should also be considered. Historic and archival analysis should be used to provide appropriate historical justification for selected land uses.

An 'events space' could be created in the area outside the Scheduled Monument to host enactments or temporary exhibitions which would help increase visitors' understanding and enjoyment of the site. Consideration should also be given to providing uncontrolled 'open' access with occasional interpretation boards and signage or establishing mown paths as part of designed walks around the site. This may include 'inner' and 'outer' walks to provide access to key viewing opportunities around the abbey and an opportunity to walk along all or part of the causeway earthwork to the east and north east of the abbey subject to this use not compromising its integrity.

Consideration should also be given to relocating the existing visitor car park and establishing a new, purpose-built visitor reception, café and toilet facilities in a more convenient and less visually sensitive location. Other land uses and buildings associated with the adjacent working farm should be screened and features of no historic value or function removed to limit the extent of visual clutter. Fencing and other boundary features of no heritage value should be removed and the area of earthworks and the surrounding fields brought under a single management regime to create a contiguous landscape setting for the abbey, particularly to the south, from where the best views of the abbey structures can be obtained.

Native trees and shrubs should be managed as part of a long term strategy to create or enhance positive views to the surrounding landscape and contribute layers of screening in views to features that detract from the significance of the site (such as the Cambridge Science Park and Waterbeach Waste Management Park). The approach to masterplanning and long term management should recognise the need to maintain and enhance the distinction between the 'detached' character of the raised platform on which the abbey is located and the landscape surrounding it.

There remains scope to further refine the character and define the long term management of the area of enhanced heritage setting through the APP. For example it could be managed separately, possibly by English Heritage, Farmland Museum or a specially created Trust.

5.4. Recommendation 4: Area of Multi-functional Open Space

The area to the north of the northern limit of built development/ strategic landscape buffer (see recommendations 1 and 2) and east of the area of enhanced heritage setting around Denny Abbey (see recommendation 3) is not widely visible in views from Denny Abbey. However, it is sensitive to any form of vertical development because of the potential to compromise views from the abbey.

A distinction is made between two zones within the defined area of multi-functional open space.

To the north of a line parallel to the existing access track to Bannold Box Cottages and that extends eastwards from the northern limit of the strategic landscape buffer/screen planting, the open character of this area should be maintained and the land utilized to provide public open space and drainage for the new town.

Features such as car parking, permanent structures such as changing rooms and grounds maintenance stores and flood lighting will not be located in this area, albeit there will be provision for sports facilities such as goal posts, pitch covers and cricket nets. Access infrastructure should be designed to minimise visual effects and should remain unlit in this area.

Car parking, principal access infrastructure, permanent structures, floodlighting and visually intrusive elements could be accommodated to the south of the line defined.

Tree and shrub planting and long term management should be used to enhance local landscape character and to maintain and enhance the distinction between the 'detached' character of the raised platform on which the abbey is located and the landscape surrounding it.

There remains scope to further refine the character and functions of the two areas of multi-functional open space defined on the plan through the APP.

5.5. Recommendation 5: Multi-functional Green Infrastructure Corridor

The green infrastructure corridor follows the course of the existing track which links to the causeway earthwork adjacent to the abbey and that may have at one time provided the access route between the monastic community and Waterbeach.

It forms a key element of the masterplan, providing a pedestrian and cycle route and generous belt of linear semi-natural habitat from the new town to Denny Abbey.

There remains scope to further refine the character and functions of the multi-functional green infrastructure corridor through the APP, for example to reconcile the character of the route with its surroundings and notably how it responds to the northern edge of built development, strategic landscape buffer, screen planting and area of enhanced heritage setting around Denny Abbey.

Consideration should also be given to establishing the most appropriate location and extent of a possible Denny Abbey pay perimeter, and therefore whether this pedestrian/cycle link should be entirely open or whether some access controls are required. Any proposals should be planned and designed to respect and not harm the significance of the causeway.

5.5.1. Recommendation 6: Structure Planting Along the A10

Native tree and shrub understory planting, appropriate to the character of the fenland edge landscape should be implemented to screen views of Cambridge Research Park, Waterbeach Waste Management Park and traffic on the A10 from Denny Abbey and its immediate environs.

6.0 Next Steps

Once agreed through the SOCG, the six broad recommendations described above should be refined as part of the AAP, drawing on further design studies as required.

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7.0 Appendices

Appendix 1.	Proposed Submission South Cambridgeshire Local Plan Policy SS5: Waterbeach New Town
Appendix 2.	Denny Abbey as a Visitor Destination
Appendix 3.	Denny Abbey as a Green Infrastructure Asset
Appendix 4.	Figures

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Appendix 1: Proposed Submission South Cambridgeshire Local Plan - Policy SS5: Waterbeach New Town

1. A new town of 8,000 to 9,000 dwellings and associated uses is proposed on the former Waterbeach Barracks and land to the east and north as shown on the Policies Map. The final number of dwellings will be determined in an Area Action Plan (AAP) having regard to:

a. The location and distribution of development in the town; and

b. The land outside the town necessary to maintain an appropriate setting for Denny Abbey listed building and scheduled monument.

2. The new town will be developed to high standards of design and layout which draw on its Fen edge location. The new town will be kept separate from Waterbeach village by an extension to the Cambridge Green Belt.

3. It will be developed to maintain the identity of Waterbeach as a village close to but separate from the new town. Appropriate integration to be secured by the provision of suitable links to enable the residents of Waterbeach village to have convenient access to the services and facilities in the new town without providing opportunities for direct road access from the wider new town to Waterbeach other than by public transport, cycle and foot.

4. It will deliver an example of excellence in sustainable development and healthier living, which will make a significant contribution to the long term development needs of the Cambridge area. It will deliver high quality public transport links to Cambridge, including a new railway station, to enable a high modal share of travel by means other than the car.

5. No more than 1,400 dwellings will be completed by 2031, except as may be agreed by the Local Planning Authority to be necessary to maintain a 5 year supply of deliverable housing sites.

6. An AAP will be prepared for the area shown on the Policies Map. The AAP will establish a policy framework for the site, and will address issues and requirements including:

The Site:

c. Establish the built area of the settlement within the Major Development Site, and the location of major land uses, having particular regard to ensuring an appropriate relationship with Denny Abbey listed building and scheduled monument;

d. Consider the relationship and interaction with Waterbeach village, and the Cambridge Research Park;

e. The provision of all built development and formal open space uses within the Major Development area shown on the Policies Map.

The Phasing and Delivery of a Mix of Land Uses:

f. Residential development of a mix of dwelling sizes and types, including affordable housing, to achieve a balanced and inclusive community;

g. Employment provision to meet the needs of the town and provide access to local jobs, and support the continued development of the economy of the Cambridge area;

h. Shops, services, leisure and other town centre usesfj of an appropriate scale for a town whilst avoiding significant impacts on vitality and viability of surrounding centres, and not competing with Cambridge as the sub regional centre;

i. A town centre supported by local centres, to ensure services and facilities are easily accessible to residents;

j. Community services and facilities, including health and both primary and secondary school education;

k. Open space, sports and leisure facilities;

l. Appropriate provision and design of waste / recycling management facilities.

Measures to Address Landscape, Townscape and Setting of Heritage Assets in the Surrounding Area, and Deliver a High Quality New Development:

m. Design principles to deliver a high quality development responding to local character, but also with its own identity;

n. Strategic landscaping within the Major Development Site to deliver high quality environs and:

i. provide an appropriate screening of the town in views from Denny Abbey in order to protect the historic significance of the Abbey, and

ii. maintain the village character of Waterbeach;

o. Measures to conserve and enhance the significance of Denny Abbey Grade I listed building and scheduled monument, including the contribution made by its setting, the extent and nature of separation from built development and formal open spaces, and protection of key views including to and from the Abbey;

p. Assessment, conservation and enhancement of other heritage assets as appropriate to their significance, including non-designated assets such as Car Dyke and the Soldiers' Hill Earthworks.

q. Identification and mitigation to sensitive receptor boundaries, with regard to noise, including the A10, proposed railway station and recreational activities, to ensure no significant adverse impact on quality of life / amenity and health using separation distances or acoustic earth bunding rather than physical barriers if appropriate and where practicable;

r. Ensure there is no significant adverse impact on local air quality and or mitigate as necessary with a Low Emissions Scheme.

Delivery of a Significant Network of Green Infrastructure:

s. Provide a high degree of connectivity to existing corridors and networks;

t. Include areas accessible to the public as well as areas with more restricted access with the aim of enhancing biodiversity;

u. Provision and retention of woods, hedges, and water features which would contribute to the character and amenity of the town and help preserve and enhance the setting of Denny Abbey, managed to enhance their ecological value;

v. Consider the multifunctional value of spaces, e.g. amenity, landscape, biodiversity, recreation and drainage;

w. Requirement for a full programme of ecological survey and monitoring, to guide a Biodiversity management plan to provide appropriate mitigation and enhancement.

Significant Improvements in Public Transport:

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x. A relocated Waterbeach station to serve the village and the new town;

y. A Park and Ride site on the A10 to intercept traffic from the north of Waterbeach, served by a new segregated Busway link to Cambridge;

Measures to Promote Cycling and Walking:

z. A network of attractive, direct, safe and convenient walking and cycling routes linking homes to public transport and the main areas of activity such as the town centre, schools and employment areas;

aa. Direct, segregated high quality pedestrian and cycle links to north Cambridge, surrounding villages and nearby existing facilities such as the Cambridge Research Park;

bb. A Smarter Choices package including residential, school and workplace travel planning.

Highway Improvements:

cc. Primary road access to the A10;

dd. Additional capacity to meet the forecast road traffic generation of the new town, particularly on the A10 and at the junction with the A14;

ee. Measures to mitigate the traffic impact of the new town on surrounding villages including Waterbeach, Landbeach, Horningseas, Fen Ditton and Milton;

ff. Review the access arrangements to Denny Abbey.

Sustainability:

gg. Sustainable design and construction measures. The AAP will identify opportunities to exceed standards established by the Local Plan. These measures could include combined heat and power provided from the adjacent Waterbeach Waste Management Park.

Infrastructure Requirements:

hh. Requirements for delivery of improvement to any existing infrastructure which will be relied upon by the new town as well as the provision, management and maintenance of new infrastructure, services and facilities to meet the needs of the town.

Arrangements for Foul Drainage and Sewage Disposal:

ii. Provision, management and on-going maintenance of sustainable surface water drainage measures to control the risk of flooding on site and which will reduce the risk of flooding to areas downstream or upstream of the development.

Community Development:

jj. Measures to assist the development of a new community, such as community development workers.

Site Preparation:

kk. Site wide investigation and assessment of land contamination and other issues resulting from former land uses, including military use, to ensure the land is suitable for the proposed end use and is not presenting a risk to the environment;

ll. To ensure that all ordnance is removed from the site in ways that ensure the development can take place without unacceptable risk to workers and neighbours including major disruption to the wider public off site.

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Delivery:

mm. The process for achieving delivery, including the requirements on developers;

nn. Requirements for engagement and consultation with local people and stakeholders.

3.34 Land north of Waterbeach is allocated for the creation of a sustainable new town. It provides the opportunity to reuse an extensive area of previously developed land to meet the housing and employment needs of the Cambridge area. It will aim to be an exemplar in sustainability and high quality design, building on the knowledge gained from other new settlements being delivered in the district.

3.35 This is a long term development opportunity. Development will take place towards the end of the plan period, and much of it beyond the plan period. In order to create a comprehensive policy framework, and to allow the nature of the town to be established with the local communities and stakeholders, an Area Action Plan (AAP) will be prepared by the Council in close cooperation with stakeholder which will cover the area shown on the Policies Map. This will form part of the development plan, and have the status of a Development Plan Document. The policy establishes principles that will need to be addressed in the AAP, and subsequently by developers. A full range of detailed assessments will be required, initially at a level appropriate to inform the AAP, and ultimately as part of any planning application.

3.36 The Policies Map also identifies the Major Development Site, which will accommodate the built development of the new town. This does not mean the whole of the area will be developed. Large parts of it will remain undeveloped and green after the settlement is complete to provide open spaces within the new town and a substantial green setting for the new town, Denny Abbey and Waterbeach village. Areas to the north of the town within the area to be covered by the AAP will ensure that it will remain physically separate from Denny Abbey. Assessment of the setting of Denny Abbey using English Heritage's guidance on Setting of Heritage Assets will be required in view of the importance of conserving and where possible enhancing the remote rural and historic setting of Denny Abbey, a nationally important heritage asset, will be a key element of the plan, including having regard to key views and landscape character.

3.37 Delivery of large areas of green infrastructure will also enable the enhancement of biodiversity within the town, whilst providing a network of open spaces for new and existing communities. Maintaining separation with Waterbeach village is also necessary to avoid coalescence and the Green Belt has been extended in the vicinity of Bannold Road to ensure this. The nature of the remainder of the transition between Waterbeach village and the new town will be addressed through the AAP.

3.38 A new town will require a significant amount of new infrastructure, including schools, shops, services and facilities to meet the needs of the town. It is important that the services, facilities, landscape and infrastructure needed by this development are not only provided to a high quality, but that they are properly and effectively implemented, managed and maintained if they are to meet the needs of the community as they arise and in the long term.

3.39 A fundamental requirement for this site is that it will be highly accessible and permeable to all its residents on foot, by cycle and public transport, to support sustainable transport, recreation and health. The site offers particular opportunities to deliver public transport improvements, including the relocation of Waterbeach railway station to a location where it will also be convenient for people living in Waterbeach village making rail travel highly attractive. Segregated provision for buses both

within the town and to link the new town to the public transport network in Cambridge will be required and similarly for cycle use. This will provide for quicker journeys, encourage maximum use by residents of the new town and improve safety. The existing A10 is at capacity and road improvements will be required, including measures to address capacity at the Milton junction with the A14.

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Appendix 2: Denny Abbey as a Visitor Destination

Introduction

This section of the report briefly describes the facilities and attractions at Denny Abbey.

Denny Abbey and the adjacent Farmland Museum form separate but complementary attractions, sharing facilities such as the car park and pay-point.

The English Heritage Guide[iii] presents material about both attractions.

It is noted that groups and school bookings are welcomed and a number of volunteer and educational events, ranging from art fairs to medieval re-enactments, are programmed throughout the year.

The Abbey

Denny Abbey is an English Heritage attraction, forming one of numerous paid entry destinations across England. The abbey and Farmland Museum is open daily from 1 April to 2 November from 12 noon to 5pm on weekdays and from 10.30am to 5pm on weekends and Bank Holidays.

Admission is free to English Heritage members but to non-members access to the abbey and museum is £5 for adults, £3 for children and £13.00 for families (2014 prices). A concession rate of £4 is also available. Entrance is through a small visitor reception building to the south of the abbey that doubles as gift shop which also sells tea and coffee and ice cream when the main Farmland Museum tearoom is not open.

The English Heritage Guide provides details of a tour around the abbey, to orientate visitors, to provide details about the history of the site and to interpret the remaining structures and visible earthworks. The tour is restricted to the main abbey buildings, Refectory and their immediate surroundings. No provision is made to access the surrounding earthworks or locations to view the abbey at distance (other from the access road). The guide also contains information on the Farmland Museum.

In addition to the guide book, information is provided on laminated A4 information sheets available on-site. To the east of the main abbey structures the footprint of the demolished church is set out as a paved area within the lawn area. Interpretation boards are also provided within and outside the abbey. Located to the south side of the abbey, from where visitors begin the tour, a free standing board explains that the abbey is located on a gravel island that would have been surrounded by marshy fen. It adds that excavations at the site indicate that the earthwork ditches and platforms are the remains of a Romano-British settlement. Information about the medieval earthworks is also provided. Reference to the raised causeway (the former entrance to the site from Waterbeach) and fishponds are described. It adds that *"The great Abbey in the midst of the fen would have been an impressive landmark"*.

Interpretation boards within the abbey present a chronological overview of the development of the abbey buildings and its later use as a farm house. Some rooms also include recreations of abbey life and also later use of the abbey buildings as a farm.

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Farmland Museum

The Farmland Museum, founded in 1969 in Haddenham, moved to Denny Abbey in 1997. The collections and activities at the museum reflect many aspects of rural life in Cambridgeshire and farming through the ages.

The museum includes collections of farming apparatus and machinery and recreations of typical scenes including an early to mid-20th century shop, Fenman's hut, farrier's workshop and dairy.

The museum facilities also include the 'Docky Box' tearoom (open weekends only), a small equipped playground, picnic area and the Delanoy Visitor Centre which includes toilets and a classroom workshop for visiting groups.

Walnut Tree Cottage dates from the 1860's and is furnished to reflect the typical home of a farm labourer in the late 1940's. The cottage is a 'two up two down' arrangement with later additions. Access to the living room, kitchen wash room, bedrooms and garden with outside lavatory is possible. A small domestic garden is located adjacent to the cottage.

Access

Vehicular access for visitors to the Denny Abbey and Farmland Museum is via a surfaced road from the A10 to the west of Denny Abbey. Visitor parking is to the southwest of the abbey with overflow parking to the southeast.

The access road is also a footpath which terminates at Denny Abbey. There are no public rights of way beyond the abbey complex to the wider landscape and visitor access is restricted to the abbey, Walnut Tree Cottage, Refectory and Farmland Museum.

Visitors are not able to access the area of earthworks surrounding the abbey. However, views to these earthworks are possible from the entrance drive and car park/immediate curtilage of the abbey.

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Appendix 3: Denny Abbey as a Green Infrastructure Asset

Introduction

This section of the report summarises references to Denny Abbey in the Cambridgeshire Green Infrastructure Strategy (2011). It highlights its potential as a visitor attraction and in particular its role in promoting the history of the landscape and drainage of the fens.

The Cambridgeshire Green Infrastructure Strategy has been used as part of the evidence base for the Proposed Submission Local Plan. It identifies several overarching themes, reflecting the main types of green infrastructure (GI) assets in the county.

Heritage is one of the seven themes underpinning the Strategy. The Strategy recognises that the historic environment is a finite and non-renewable resource which cannot be recreated or relocated. It also records that specific historic and archaeological sites and the broader historic environment make an important contribution to sense of place, sense of time and local identity and distinctiveness.

Within the heritage theme a number of opportunities for GI to address are identified, including:

- *"Local history and archaeology contribute to a good quality of life through informing and engaging local communities, and promoting healthy access to the countryside by making available places to visit.*
- *Information on the heritage of new and old settlements helps create a sense of connection and community and of place and pride.*
- *There is an opportunity to restore and enhance heritage assets (including those "at risk") through Green Infrastructure projects.*
- *Heritage assets provide landscape features and landmarks to add interest to Green Infrastructure and publicly accessible open space.*
- *The historic environment also acts as gateways to the countryside, particularly by Registered Parks and Gardens e.g. Wimpole Hall and Denny Abbey and Farmland Museum.*
- *High biodiversity value e.g. ancient woodlands, historic parks and gardens...".*

Strategic Areas

The countywide Strategic GI network has been divided into six distinct geographical areas. Denny Abbey is referred to in the supporting text for Strategic Area 6: Cambridge and Surrounding Areas.

The area is centred on Cambridge and links to the surrounding countryside and sites such as Milton Country Park and the Gog Magog Hills. The area extends westwards along the Bourn Brook to encompass Cambourne, the Wimpole Estate and the ancient woodlands around Gamlingay and neighbouring villages that lie on an elevated, relatively well-wooded clay plateau. Anglesey Abbey, Denny Abbey and the Farmland Museum, and Wicken Fen lie to the north east of the area.

Tourism is described as an important component of the economy in this area and it adds that GI sites can contribute and support this sector. With regard to investment in this strategic area, the strategy records that there could be significant opportunities for heritage by *"using*

assets which are associated with Cambridge, housing developments and the network of historic linear features and sites (such as Devil's Dyke, Denny Abbey and Wandlebury) across the strategic area."

Target Areas

Within each of the strategic areas, smaller 'target areas' are identified that highlight locations where concentrations of multiple green infrastructure themes, as well as other issues such as major housing growth areas, exist. Target areas do not cover the entirety of each strategic area but rather are intended to provide a prioritised overview of where work to develop the Strategic Green Infrastructure Network can be focussed. They can be thought of as 'hotspots' where green infrastructure opportunities are concentrated.

Denny Abbey is referred to Target Area 4.4: Ely Ouse. One of the seven opportunities within the target area to inform future project development includes the promotion of the history of the landscape and drainage of the fens linking to neighbouring historic attractions including Denny Abbey.

Local Authority Issues and GI Priorities

The Strategic Network for Cambridgeshire has been developed across Local Planning Authority (City and District Council) boundaries, having been based on the geographic distribution of key Green Infrastructure Themes and other countywide issues and assets.

Local Planning Authorities are described as having a key role to play in the delivery of green infrastructure and have identified key issues and green infrastructure priorities relevant to their area, which are supported by the Strategic Network.

Denny Abbey is located within South Cambridgeshire. In the assessment of issues and opportunities specific reference is made to the Farmland Museum and Denny Abbey in regard to these assets offering heritage opportunities along with other sites that are multi-functional (combining historic and wildlife interest) and forming part of a wider historic pattern of routes, fields and other land uses. It adds that heritage can also increase public understanding and enjoyment of an area through information boards and signs.

It goes on to state that *"Green Infrastructure should be an integral part of new settlements and growth sites in the district, mitigating the impacts of climate change, delivering a range of other objectives, and linking to the wider Green Infrastructure network. Links between Cambridge, the fringe sites, the surrounding area, and across and around the City will be key."*

The priorities for green infrastructure in South Cambridgeshire are listed as follows:

- *"Providing Green Infrastructure to meet the needs of the expanding population of the district, Cambridge and sub-region.*
- *Securing new and enhanced Green Infrastructure and improved links to the wider network as part of the major developments on the Cambridge fringes and at Northstowe.*
- *Seeking opportunities with all new developments to incorporate and link to Green Infrastructure.*
- *Connecting and reinforcing habitats and landscape features.*
- *Conserving, enhancing and increasing the enjoyment of the district's rural and historic character.*
- *Improving access to Green Infrastructure across the District.*
- *Engaging with and supporting people, groups and initiatives to help deliver Green Infrastructure.*

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- *Making real improvements to places and quality of life.*
- *Reducing the causes and impacts of climate change."*

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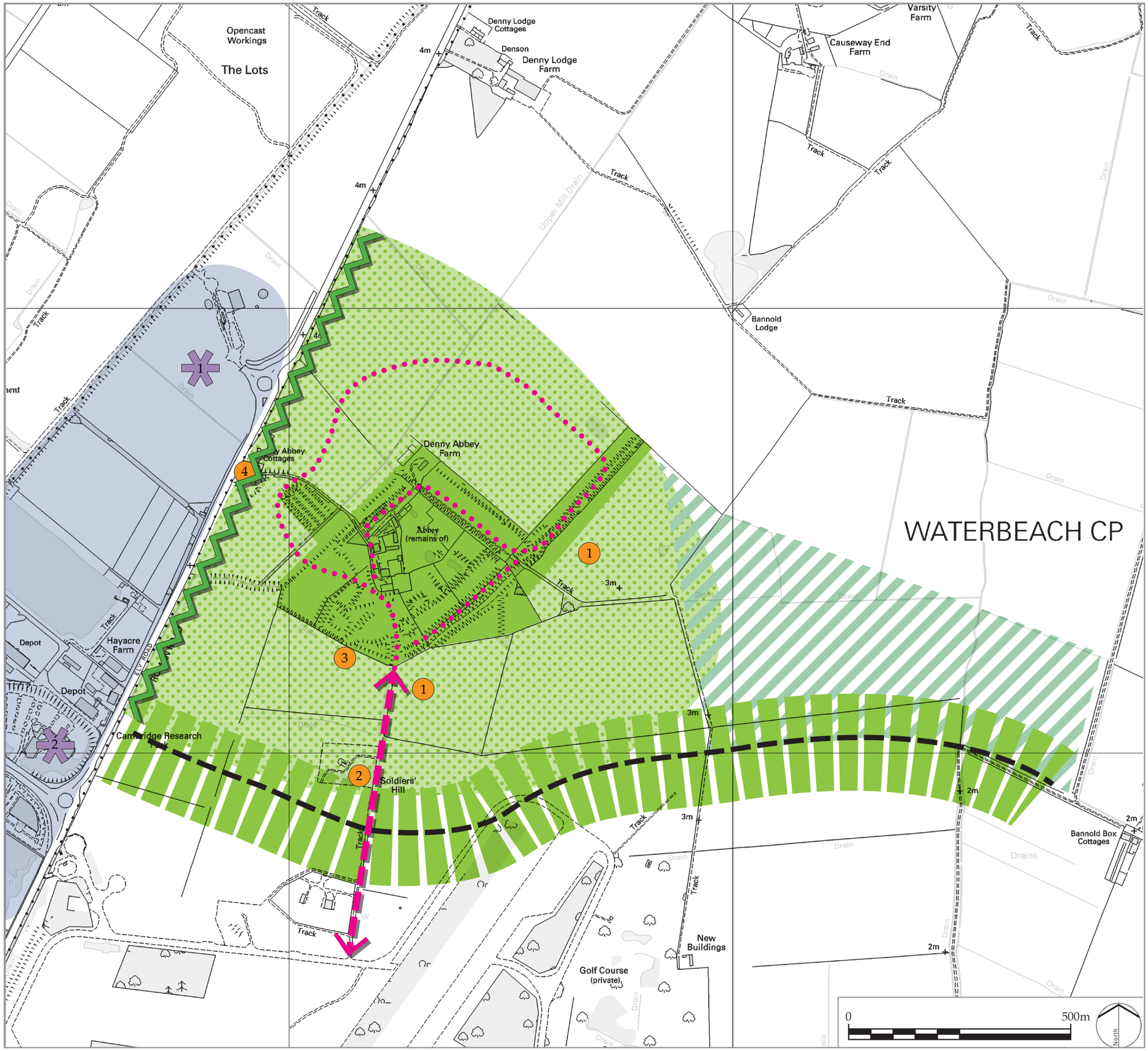
Appendix 4: Figures

X:\JOBS\3321_08_Denny Abbey_Setting\5graphics\Plans_Images\3321_08_A_Opportunities.indd



WATERBEACH CP

LEGEND

Extent of Scheduled Monument

Analysis

Detracting features along A10
1. Waterbeach Waste Management Park
2. Cambridge Science Park

Heritage assets that contribute to significance of Denny Abbey
1. Medieval Middens (ID11566 / ID11566A)
2. Soldiers' Hill (ID05521)
3. Roman pottery / partial earthwork (ID011565)
4. Gate Piers (ID1127361)

Defining the Northern Limit of the Waterbeach New Town to establish an appropriate relationship between the Abbey and the proposed new town

Northern limit of built development

Conserving and Enhancing the Significance of Denny Abbey through the Appropriate Treatment of its Setting and Managing Views

Area of enhanced heritage setting - shown conceptually

Integrated heritage, landscape and ecology masterplan for area of enhanced heritage setting

Multi-functional strategic landscape buffer

Public Open Space, habitat and drainage attenuation

Screen planting to address views to detracting features along A10

Improving Access to and Interpretation of Denny Abbey

Green Infrastructure Corridor

Inner and outer walks through area of enhanced heritage setting for richer and more varied visitor experience (indicative)

REV.	DESCRIPTION	APP.	DATE
B	Updated to refer to Analysis and Recommendations Report	IH	15/09/14
A	Amendments following comments by English Heritage September 2013	IH	03/10/13

LDĀDESIGN

PROJECT TITLE

DENNY ABBEY AND ITS SETTING:
ANALYSIS AND RECOMMENDATIONS

DRAWING TITLE

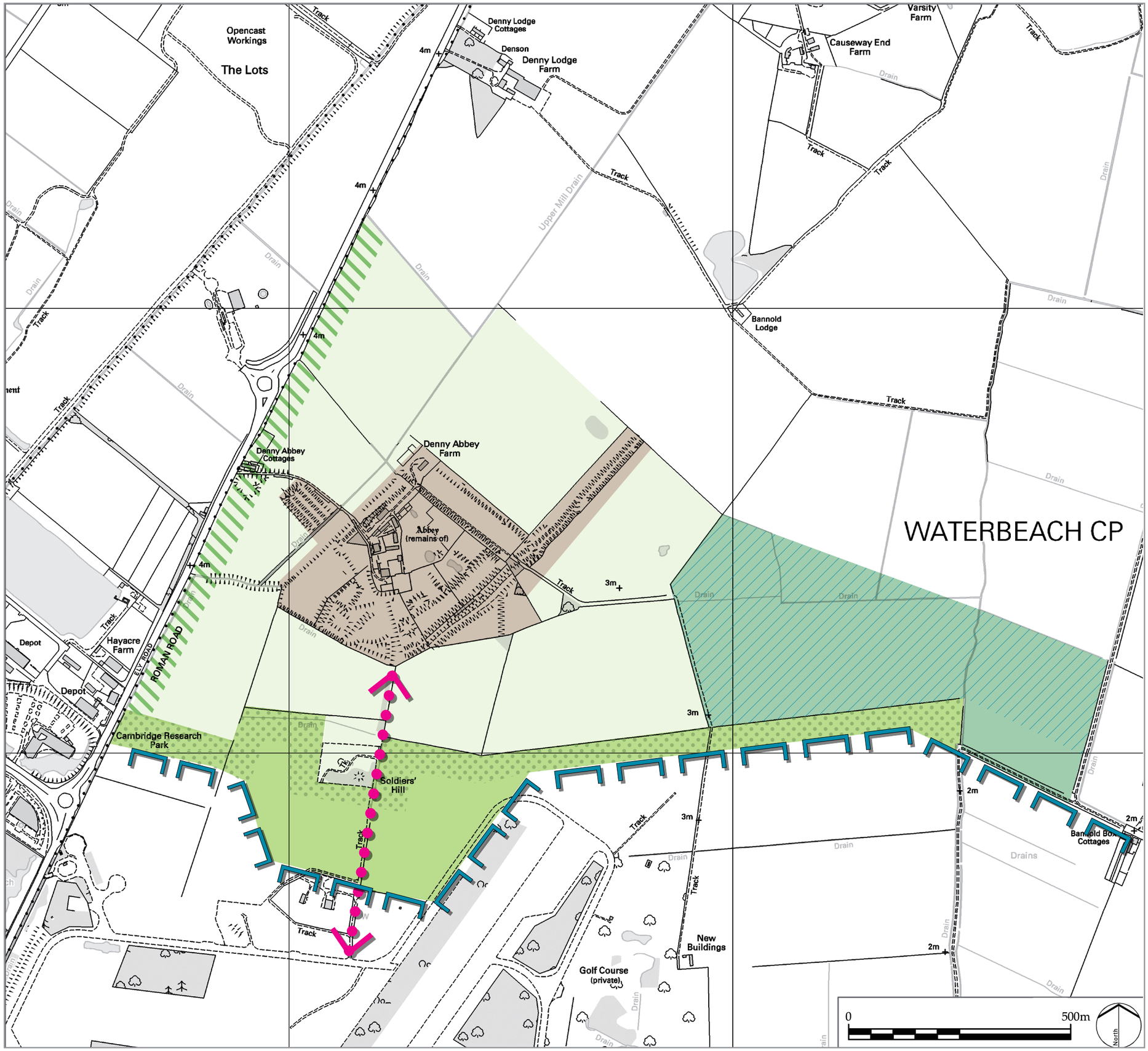
Figure A: Analysis of Opportunities - Concept Plan

ISSUED BY	Oxford	T: 01865 887050	
DATE	October 2013	DRAWN	SMc
SCALE@A3	1:8,500	CHECKED	IH
STATUS	Final	APPROVED	RT

DWG. NO. 3321_08_A

No dimensions are to be scaled from this drawing.
All dimensions are to be checked on site.
Area measurements for indicative purposes only.

Sources: Ordnance Survey



WATERBEACH CP

LEGEND

- Extent of Scheduled Monument
- Northern limit of built development of the proposed new town
- Strategic landscape buffer
- Area of enhanced heritage setting around Denny Abbey
- Screen planting (forming part of strategic landscape buffer)
- Area of multi-functional open space (no carparking / floodlighting / changing rooms)
- Area of multi-functional open space
- Green infrastructure corridor
- Structure planting along A10

REV.	DESCRIPTION	APP.	DATE
E	Northern limit of built development line amended	IH	17/11/14
D	Area of multi-functional open space amended	IH	07/11/14
C	Update following meeting on 31/10/2014	IH	03/11/14
B	Updated to refer to Analysis and Recommendations Report	IH	15/09/14
A	Amendments following comments by English Heritage September 2013	IH	03/10/13

LDĀDESIGN

PROJECT TITLE

DENNY ABBEY AND ITS SETTING:
ANALYSIS AND RECOMMENDATIONS

DRAWING TITLE

Figure B: Recommendations

ISSUED BY	Oxford	T: 01865 887050	
DATE	October 2013	DRAWN	SMc
SCALE@A3	1:8,500	CHECKED	IH
STATUS	Final	APPROVED	RT

DWG. NO. 3321_08_B

No dimensions are to be scaled from this drawing.
All dimensions are to be checked on site.
Area measurements for indicative purposes only.

Sources: Ordnance Survey

17 November 2014
Waterbeach New Town Evidence Base

Appendix 5: References

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[i] LDA Design Consulting LLP (4 October 2014) Landscape and Heritage Appraisal of Denny Abbey and its Setting [Version 1.5, FINAL].
[ii] South Cambridgeshire District Council (July 2013) South Cambridgeshire Local Plan Proposed Submission.
[iii] Richard Wood (2012) Denny Abbey and Farmland Museum.