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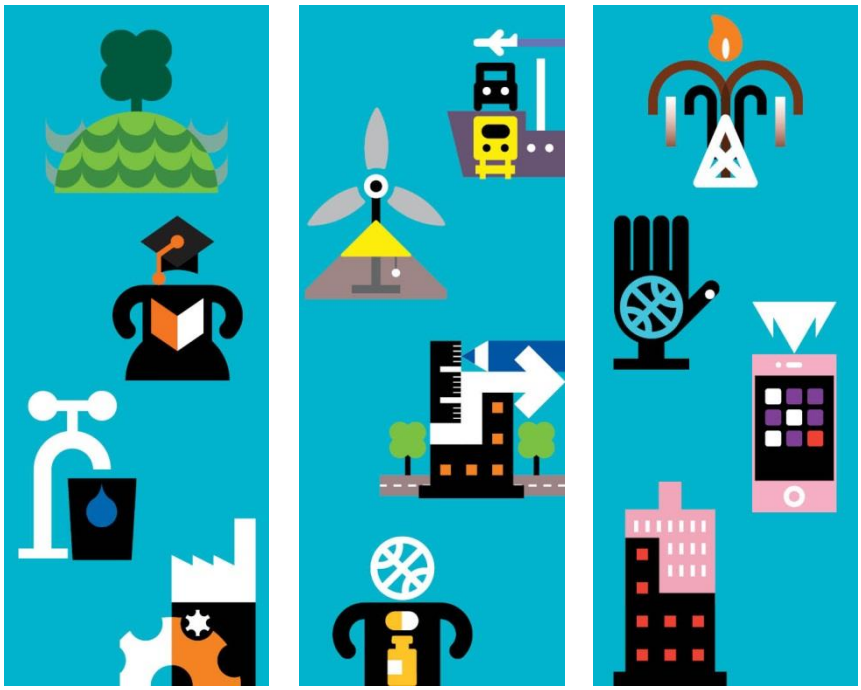

A10(N) Corridor Constraints Study

Constraints Assessment

February 2016

Cambridgeshire County Council

Mott MacDonald

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South Cambridgeshire District Council
Cambridge City Council

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Issue and revision record

Revision	Date	Originator	Checker	Approver	Description
A	17/02/2016	Luis Diaz Luke Coffey	Carl Beet	Paul Ellingham	DRAFT
B	03/03/2016	Luis Diaz Luke Coffey	Carl Beet	Paul Ellingham	FINAL

Information class: Standard

Contents

1 Introduction

1.1 Study Background

Mott MacDonald has been commissioned by Cambridgeshire County Council (CCC), South Cambridgeshire District Council and Cambridge City Council to provide a Corridor Constraint Assessment of the (A10(N)) Ely to Cambridge Corridor. This work builds on previous assessments carried out on the corridor which have informed the Transport Strategy for Cambridge and South Cambridgeshire (TSCSC).

South Cambridgeshire District Council and Cambridge City Council are currently in the process of preparing new Local Plans. The Local Plans provide a framework of policies and land allocations that will guide future development.

The Submitted South Cambridgeshire Local Plan identified significant growth at a New Town north of Waterbeach, and at Cambridge Northern Fringe East (CNFE) adjacent to the A10(N) between Cambridge and Ely. Policy SS/5 allocates land north of Waterbeach for the creation of new town on the site of the former Waterbeach Barracks and adjoining land. The A10(N) is an important transport corridor and provides one of the main strategic links between Cambridge and its north eastern sub-region. Development will start in the plan period to 2031 and continue after that date.

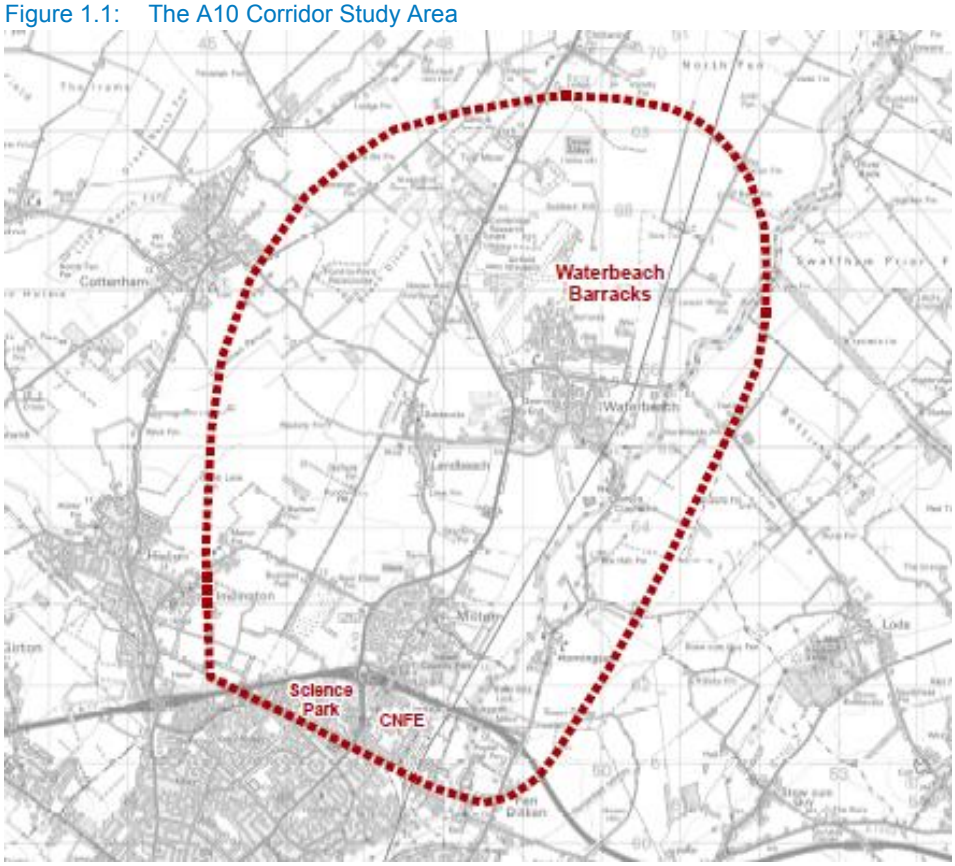
Cambridgeshire County Council, South Cambridge District Council, and Cambridge City Council require a clear understanding of existing environmental, physical and planning constraints within and adjacent to the corridor and whether these could impact the delivery of a range of transport interventions that will support the sustainable delivery of these key housing and employment sites that form part of the development strategy across both areas.

Mott MacDonald has also been commissioned to carry out a more detailed A10(N) corridor transport study, which at time of writing is underway. This will develop transport options for the corridor in more detail, and provide greater clarity on the package of any mitigation measures needed.

1.2 The Study Area

Figure 1.1 shows the extent of the A10 Corridor study area.

Figure 1.1: The A10 Corridor Study Area



Source: Mott MacDonald

The study area covers the key development sites that are likely to have an impact on the surrounding area including Waterbeach New Town, Cambridge Northern Fringe East and Cambridge Science Park as well as existing strategic transport infrastructure such as the A10(N), A14 and the Cambridge to Ely railway line. The study area also contains local parallel routes adjacent to the corridor and is intended to provide a robust framework for the constraints assessment covering 4,720 Ha approximately.

1.3 Report Purpose and Approach

In order to provide further evidence regarding deliverability of the A10(N) Corridor transport interventions identified within the Local Transport Plan/TSCSC and reflected in the Local Plan, this study has been commissioned to understand the current constraints along the corridor and to consider how these can be appropriately addressed.

The purpose of this report is therefore to present additional evidence to demonstrate that the transport infrastructure necessary to support the sustainable new settlement north of Waterbeach can be delivered without impediment by constraints within the likely route corridors.

The study uses a range of exiting data sets, primarily from Local and National Government Agencies and Departments in order to identify and assess areas that are likely to present a constrain to the delivery of the necessary transport infrastructure.

1.4 Scope of Works

In order to undertake the corridor constraint assessment Mott MacDonald has been requested to complete the following tasks:

- Prepare mapping of the potential corridors/delivery envelopes for potential transport interventions.
- Prepare Mapping of the existing physical, environmental and planning constraints covering the following core areas:
  - Green Belt
  - Agricultural Land
  - Heritage/ Archaeological considerations
  - Environmental and ecological designations and considerations
  - Physical considerations (e.g. contamination, land stability)
  - Townscape and landscape impact
  - Amenity Considerations (e.g. noise, lighting)
  - Impact on footpaths and bridleways
  - Flooding and drainage measures
  - Other planning policies
- Analysis using ArcGIS 10.3 software covering the following aspects:
  - Buffering of proposed/outline route alignments.
  - Comparison and mapping of potential interventions against constraints.
  - Points of interaction and possible solutions/mitigation measures.
- Preparation of an Impact assessment.
- Recommendations

1.5 Report Structure

This structure of this report will be as follows:

- **Chapter 2** discusses the current planning policy relevant to this study.
- **Chapter 3** provides an overview of the previous transport studies undertaken along the A10 Corridor.
- **Chapter 4** discusses the methodology used for this study.
- **Chapter 5** summaries the key findings of the constraints assessment.
- **Chapter 6** conclusions and recommendations.

2 Planning Policy Framework

2.1 Introduction

The A10 (N) Corridor Constraints Study provides an assessment and understanding of the existing environmental, physical and planning constraints that could impact on the delivery of the identified transport infrastructure between Waterbeach Barracks and north Cambridge. The infrastructure is principally related to the South Cambridgeshire District Council administrative area, through a small portion of the infrastructure will likely impact within the Cambridge City Council's area, and this is reflected within the defined Study Area (see Section 4.2).

This chapter of the A10 (N) Corridor Constraints Study provides a summary of the planning and transportation policy context related to the provision of a busway between Waterbeach Barracks and north Cambridge. It focusses on relevant planning policies in relation to Cambridgeshire County Council and South Cambridgeshire District Council. It also considers the current policy context for Cambridge City Council and the transport policy framework in the form of the Cambridgeshire Local Transport Plan and the Transport Strategy for Cambridge and South Cambridgeshire.

2.2 Statutory Development Plan

2.2.1 South Cambridgeshire District Council

The current adopted statutory Development Plan for the administrative area of South Cambridgeshire District Council is currently comprised of the following documents:

- Cambridgeshire & Peterborough Minerals and Waste Plan
  - Core Strategy Development Plan Document (July 2011)
  - Site Specific Proposals Development Plan Document (February 2012)
- South Cambridgeshire Local Development Framework
  - Core Strategy Development Plan Document (January 2007)
  - Development Control Policies Development Plan Document (July 2007)
  - Northstowe Area Action Plan (July 2007)*
  - Cambridge East Area Action Plan (February 2008)*
  - Cambridge Southern Fringe Area Action Plan (February 2008)*
  - North-West Cambridge Area Action Plan (October 2009)*
  - Site Specific Policies Development Plan Document (January 2010)

**not relevant to this study.*

2.2.2 Cambridge City Council

The current adopted statutory Development Plan for the administrative area of Cambridge City Council is currently comprised of the following documents:

- Cambridgeshire & Peterborough Minerals and Waste Plan
  - Core Strategy Development Plan Document (July 2011)
  - Site Specific Proposals Development Plan Document (February 2012)
- Cambridge City Council Local Development Framework
  - Cambridge Local Plan (2006)
  - Cambridge East Area Action Plan (February 2008)*
  - North-West Cambridge Area Action Plan (October 2009)*

**not relevant to this study.*

2.2.3 Emerging Planning Policy

2.2.3.1 South Cambridgeshire Local Plan –Submission Version (March 2014)

South Cambridgeshire District Council is currently in the process of preparing a new Local Plan 2011 – 2031. The Local Plan provides a framework of policies and land allocations that will guide the future development of South Cambridgeshire up to 2031. The Local Plan and its supporting documents were submitted for independent examination to the Secretary of State for Communities and Local Government Examination on 28th March 2014.

Emerging Policy SS/5 allocates land north of Waterbeach for the creation of new town on the site of the former Waterbeach Barracks. Policy SS/5 confirms that the new town will require a significant transport infrastructure to ensure it represents a sustainable form of development and Part x to ff of the policy identifies measures including the delivery of a new Park and Ride site on the A10 to intercept traffic from the north of Waterbeach, served by a new segregated Busway link to Cambridge.

Cambridge City Council is currently in the process of preparing a new Cambridge Local Plan. It will set out the planning framework to guide the future development of Cambridge to 2031. It will be one of the council's development plan documents which comprise the city council's Local Development Framework. The local Plan and its supporting documents were submitted for independent examination to the Secretary of State for Communities and Local Government for Examination on 28th March 2014.

2.3 Cambridgeshire County Council: Relevant Transport Strategies

2.3.1 Cambridgeshire Local Transport Plan 3 (2011 – 2031)

The Cambridgeshire Local Transport Plan (LTP) sets out the future transport strategy for the county up until 2031. The LTP3 is split into three sections which cover Policy and Strategy, Long Term Transport Strategy and Delivery of the Transport Plan. The LTP has been produced in partnership with the district councils of East Cambridgeshire, South Cambridgeshire, Fenland, Huntingdonshire and Cambridge City Council.

The LTP recognises the importance in providing sustainable travel links to all new developments, including the new town north of Waterbeach.

2.3.2 Transport Strategy for Cambridge and South Cambridgeshire (March 2014)

The Transport Strategy for Cambridge and South Cambridgeshire was adopted in March 2014 and ensures that local councils plan together for sustainable growth and continued economic prosperity in the area. The transport strategy provides a plan to accommodate rising populations and increases in demand on the travel network by delivering sustainable travel solutions.

The Transport Strategy sets out a definite list of measures which will need to be satisfied in order for the proposed Waterbeach New town to be developed:

- Additional capacity on the A10 between the northernmost access to the new town and the Milton Interchange of the A10 with the A14.
- Additional capacity at the A14 / A10 Milton Interchange
- Waterbeach Barracks to north Cambridge Busway
- Waterbeach Park & Ride
- Waterbeach new station
- Direct, segregated high quality pedestrian and cycle links.

Policy TSCSC 20 (Planning Obligations for Waterbeach Barracks) outlines that developers will be expected to make provision for mitigation of the site specific and network impacts of their proposals. The policy outlines a series of interventions that are expected to be required intended to help mitigate and support the impact of the development at Waterbeach Barracks, which includes the provision of a busway to north Cambridge.

3 Previous Studies

3.1 Introduction

A number of previous transport studies have been undertaken to assess various proposed transport schemes and options which are relevant to the A10 Corridor Study. These Include:

- Cambridge LTP3 Strategic Environmental Assessment (2014)
- A10 Corridor Transport Study (On-going)
- Bus Strategy-Bus Route Option Study (Capita Symonds, 2009)
- A10 Transport Corridor Constraints Study (LDA Design Consulting, 2012)
- Technical Report 2 – Waterbeach Busway Options Study (WSP, 2015)
- Waterbeach New Railway Option Study
- The Cambridge Access Study

An overview of these studies, their assumptions and their recommendations is presented below.

3.2 Cambridge LTP3 Strategic Environmental Assessment

Atkins Ltd. was commissioned to complete a Strategic Environmental Assessment (SEA) of the Cambridgeshire LTP3 in 2014. The SEA is required under the European Directive 2001/42/EC, to demonstrate that environmental considerations have been incorporated into the development of the LTP.

As discussed previously, the Council's LTP contains details of the future transport plans and schemes which will be delivered to contribute towards the future growth of Cambridgeshire as a place to live and work.

The SEA reviews the various transport schemes contained within the LTP which are considered environmentally sensitive. The SEA has been reviewed to determine if any of the proposed A10 Corridor Transport Schemes have been categorised as being environmentally sensitive within the SEA.

A series of concerns are highlighted within the SEA regarding the proposed schemes in the A10 corridor, the majority of which are related to the high level and indicative nature of the interventions. That is the reason why the SEA concludes that it is likely that almost all of the transport interventions would require further detailed environmental assessment, at the appropriate stage(s) of development.

For instance, the Waterbeach Park and Ride Site (Scheme 44) is highlighted within the SEA as being environmentally sensitive. The proposed site is located in proximity to Denny Abbey and concern has been expressed that the development of the Park and Ride here could have an adverse impact on the listed historic buildings at Denny Abbey. Therefore, in order for the Waterbeach Park and Ride to be taken forward, a full environmental statement will be required.

Similarly, the proposed guided busway scheme between Milton P&R and Cambridge and its potential continuation to Waterbeach new town are considered by The Wildlife Trust as having significant adverse

effects on the environment, including upon diversity and nature conservation. While the Council acknowledged these potential effects, it is the Council's view that the schemes identified in the LTP3 represent the best balance between delivering housing and economic growth and providing appropriate environmental protection and that those schemes will undergo further detailed option analysis.

The results of the environmental assessment will inform the final planning decision at the site. However, the SEA notes that a range of mitigation measures should be included within the environmental assessment so that the development can proceed with no impact to the local environment.

3.3 A10(N) Corridor Transport Study (Baseline Report)

In 2015, Mott MacDonald was been commissioned by Cambridgeshire County Council (CCC) to deliver the Ely to Cambridge Corridor (A10(N)) Transport Study. The A10 Transport Study is currently on-going.

When complete, the A10 Transport Corridor Study will identify the transport measures required to enable the sustainable delivery of the major development sites along the A10. In addition, the study will indicate how these measures may be funded.

The final study outputs of the A10 Corridor Study will be:

- An Options Study and Outline Business Case for the overall package of interventions on the Ely to Cambridge corridor, including development of principles/mechanisms for securing appropriate developer contributions.
- A Transport Study, supported by modelling, that identifies the infrastructure package and phasing of that package to provide for the transport demand of the development of a new town north of Waterbeach.
- A Transport Study, supported by modelling, which provides evidence for the level of development which could be supported in the CNFE and CSP areas and their phasing, in transport terms.

The final report is due to be published in summer 2016.

3.4 Initial Bus Route Option Study – Capita Symonds

In 2009, Capita Symonds was commissioned by RLW Estates, as one of the promoters of the new town north of Waterbeach, to prepare a bus strategy to support the planning application for the Waterbeach New Town development (Denny Street Francis).

The aim of the study was to assess a number of bus route options so that a high class public transport link could be developed in order to mitigate against the traffic impact of the new development on the A10 and the A14. In addition, the bus strategy was to improve connectivity between the development site and Cambridge City Centre.

The study was based on the assumption that the guided busway (which was under construction at the time of the Capita Symonds Report) could potentially be extended to serve the development at Waterbeach. The report considered a number of online and offline bus routes to serve the development.

The study took into consideration various physical and environmental factors along each route which enabled a preferred bus option to be determined.

The preferred option for the bus route was for the construction of a guided busway route with sections of the route both online and offline. The initial assessment showed that the unconstrained journey times the between Waterbeach and CSP along the preferred route would be between 7 and 10 minutes and it would take 23 minutes to reach Cambridge City Centre during the AM peak.

The results of the Capita Symonds assessment showed that a guided bus route had the potential to effectively serve the new development at Waterbeach and reduce the impact of congestion on the A10 Corridor.

3.5 A10 Transport Corridor Constraints Study – LDA Design Consulting

In 2012, LDA Design Consulting was commissioned by RLW Estates to investigate the key potential landscape, heritage and ecology constraints that may influence the design of new transport routes between the proposed Waterbeach New Town (Denny Street Francis) and the A14 Cambridge Bypass.

The study, which builds on the previous bus strategy work undertaken by Capita Symonds in 2009, only took into consideration two proposals, the realignment of the A10 and the creation of a guided busway between the mentioned development and the A14. As a consequent, the extent of the area assessed was limited to a hundred meters each side of the A10.

Although the report identifies a series of potential landscape, heritage and ecology constraints within the area assessed, it concludes that there are no “stoppers” to the realignment of the A10 and the creation of a guided busway. The results from the LDA Design Consulting study are intended to be used to help identify preferred routes, taking into account the constraints identified.

3.6 Waterbeach Busway Options Study – WSP Study

In 2014, WSP and Clewlow Consulting were commissioned by RLW Estates to further assess the preferred busway option contained within 2009 Capita Symonds Bus Route Option Study.

The results of the WSP/Clewlow Consulting assessment concluded that the options assessed within the Capita Symonds report was valid and was therefore, still the preferred option.

The Capita Symonds preferred busway option remained the highest scoring in the WSP/Clewlow study. However, WSP/Clewlow Consulting study assessed a larger study area than what was contained with the

previous study. The WSP/Clewlow Consulting study included modelling committed improvements to the A10 itself which would improve journey times.

Furthermore, the WSP/Clewlow Consulting study examined constraints to the guided busway such as land ownership. The overall results showed that the busway scheme was considered to be deliverable.

The WSP/Clewlow Consulting final preferred option for the busway differed slightly from the Capita Symonds option. WSP/Clewlow Consulting altered the offline route alignment slightly so that where possible, the route was provided within Council land.

The results of the Capita Symonds and WSP/Clewlow Consulting studies show that a busway is a feasible transport option for the A10 Corridor.

3.7 Waterbeach New Railway Option Study – WSP Study

In 2015, WSP and Clewlow Consulting were commissioned by RLW Estates to explore the options for the relocation of the Waterbeach railway station to serve the proposed Waterbeach New Town development.

The report reviewed a wide evidence base including regulatory considerations and the business case for a preferred option. In particular, the report:

- Reviewed the options for train services calling at Waterbeach, including an initial assessment of the operational feasibility of each potential service (timetabling issues).
- Reviewed the potential for providing a Park and Ride, taking into account plans for Chesterton station.
- Provided a basic demand forecasts for the station with various service levels.
- Developed a basic business case for the station including station car parking.

The results of the study found the development of a new rail station at Waterbeach would encourage a significant increase in the number of people using the station. This was a results of the new rail station being located closer to the proposed development site at Waterbeach Barracks that the existing station.

The study acknowledged that some users would be disadvantaged due to the current station closing and the new station being located further away from them. However, improved parking / sustainable travel facilities at the station would help mitigate against these negative impacts.

The study also found that the new station would encourage a modal shift from car to rail and thus helping to reduce traffic congestion along the A10 Corridor and particularly through Waterbeach Village.

3.8 Cambridge Access Study

Mott MacDonald was commissioned by Cambridgeshire County Council (CCC) to deliver the Cambridge Access Strategy study, as one of the schemes identified in Tranche 1 of the City Deal. The Cambridge Access Strategy Audit Report was delivered to CCC in July 2015.

The Council's envisage that Cambridge City and South Cambridgeshire will experience significant population and employment growth between now and 2031. To sustainably and effectively accommodate the anticipated growth, the Council's Local Transport Plan sets out a number of transport schemes to meet the predicated increase in travel demand.

The Cambridge Access Study Audit Report was undertaken to identify and prioritise the remaining transport schemes for delivery. The study recommended the schemes which would most significantly improve movement and access within the city. Whilst still at the option development stage, none of the options present at present would preclude the delivery of enhanced transport capacity on the A10(N) corridor.

The results of the Cambridge Access Study are being considered within the A10 Corridor Transport Study and will they help to inform the emerging list of transport options for the corridor.

3.9 Key Observations

From a review of the previous transport studies undertaken along the A10 Corridor, the following observations have been made:

- The A10 (N) Corridor is one of the key proposed areas for future population and economic growth in the Greater Cambridge area.
- The Cambridgeshire LTP3 and the TSCSC has identified a number of transport schemes for the A10 Corridor in order to meet the future anticipated demand. They are also included in the Local Plan policy allocating the new town.
- The SEA prepared to support the LTP3 identified a number of impacts that would require assessment and mitigation through detailed scheme development.
- Previous studies have determined that the provision of a guided bus route between Waterbeach New Town site and Cambridge is highly feasible. The 2009 Capita Symonds Report indicated a preferred route option for the busway and in 2014, an additional assessment of the preferred option by WSP concluded that this route was highly viable.
- A constraints analysis undertaken by LDA Design Consulting in 2012 concluded that there are not "stoppers" for the creation of a guided busway following the preferred route option identified in the Capita Symonds study. The same applies for a potential realignment of the A10 between Waterbeach and the A14.
- A recent study undertaken by WSP to assess the feasibility of a new rail station at Waterbeach found that a new Waterbeach Railway Station would encourage a modal shift from car to rail. This was on

account of the new station providing enhanced facilities and being located closer to the new development site at Waterbeach barracks.

- Recent work undertaken by Mott MacDonald for the Cambridge Access Strategy Audit Report has shown that the predicted increases in population in Cambridge and South Cambridge can be accommodated thought the continued provision of sustainable transport network and through CCC continued restrictions on private cars in the city centre.
- Finally, the current A10 Corridor Transport Study (due for delivery in Summer 2016), will build on emerging transport options for the A10 Corridor so that the proposed developments can be delivered with limited impact to the existing traffic conditions.

4 Methodology

4.1 Purpose of the Study

South Cambridgeshire District Council and Cambridge City Council are currently in the process of preparing new Local Plans 2011 – 2031. The Local Plans provide a framework of policies and land allocations that will guide the future development. The Local Plans and their supporting documents were submitted for independent examination to the Secretary of State for Communities and Local Government Examination on 28th March 2014.

The Inspector examining the Local Plans issued a letter on 20th May 2015 and outlined preliminary conclusions following the joint hearing sessions on issues relating to overall housing need, the development strategy, Green Belt, transport and housing delivery. The Inspector identified a number of issues the need to be addressed and considered further in the examination process, in order to ensure that the Local Plan is found to be 'sound' and suitable for progression to adoption.

One of the issues identified by the Inspector relates to the infrastructure requirements and sustainable transport options. The Inspector observes that in some cases the ways in which infrastructure requirements are to be met are '*still at a very early stage of consideration, with little work yet to be done on the feasibility or options*.' This includes looking at likely difficulties of land assembly and other constraints that could have significant implications for cost, timing and delivery of an infrastructure project. The lack of evidence in this regard is a matter to be addressed for certain projects to demonstrate deliverability and inclusion of policies and proposals in the emerging Local Plan.

The Submitted South Cambridgeshire Local Plan identified significant growth at a New Town north of Waterbeach, and at Cambridge Northern Fringe East. Emerging Policy SS/5 allocates land north of Waterbeach for the creation of new town on the site of the former Waterbeach Barracks and adjoining land. Policy SS/5 confirms that the new town will require a significant amount of infrastructure to ensure it represents a sustainable form of development and Part x to ff of the policy identifies measures including a new Park and Ride site on the A10 to intercept traffic from the north of Waterbeach, served by a new segregated Busway link to Cambridge. The Waterbeach Barracks to north Cambridge Busway is identified in the adopted Transport Strategy for Cambridge and South Cambridgeshire (March 2014) along with other measures on the A10 Corridor, a separate study of which is being conducted by Mott MacDonald.

The purpose of this study is to provide an assessment and understanding of the existing environmental, physical and planning constraints that could impact the delivery of the identified transport infrastructure (i.e. Waterbeach Barracks to north Cambridge Busway) and in turn which is necessary to support the sustainable new settlement north of Waterbeach at the site of the former barracks. It provides an independent analysis of the constraints to demonstrate the suitability and deliverability of the identified transport intervention to support the Waterbeach New Town, in order to provide evidence regarding the deliverability of transport interventions.

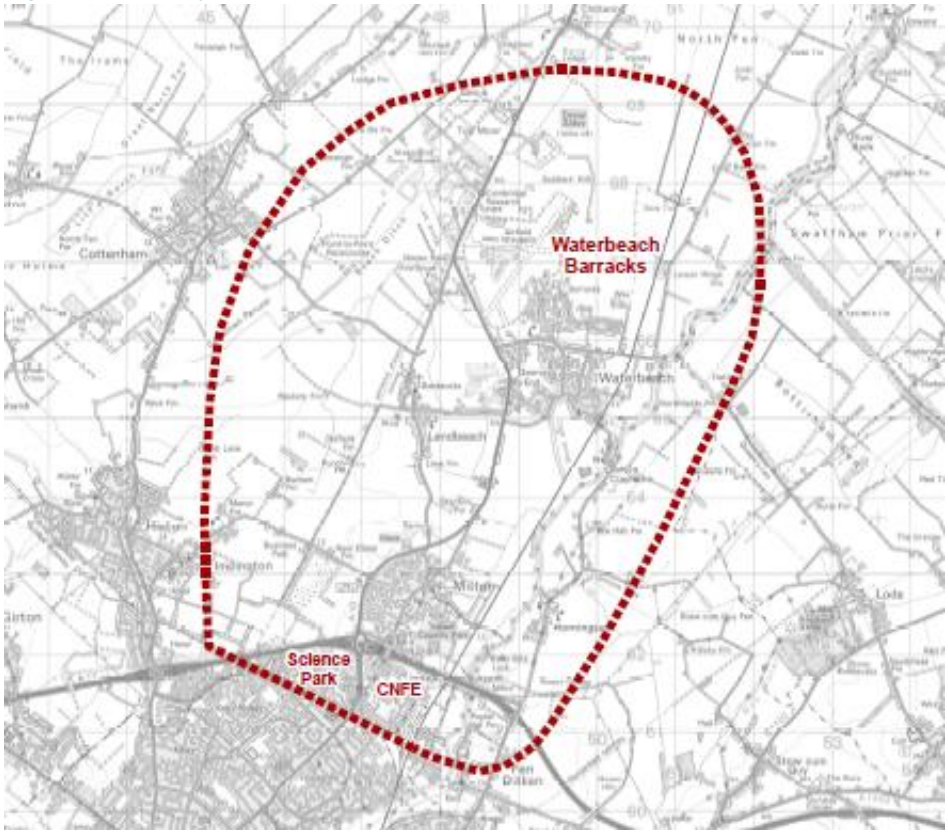
4.2 Defining the Study Area

In establishing the methodology of the A10 (N) Corridor Constraints Study (Waterbeach Barracks to north Cambridge Busway) it was first necessary to define the Study Area within which the assessment would take place. As detailed in Section 4.1 the purpose of the study is to understand the existing environmental, physical and planning constraints that could impact the delivery of range of transport measures within the Study Area.

The Study Area for the assessment covers an area between the north of Cambridge and the Waterbeach Barracks. The Study Area covers a total area of 4,720 hectares which is deemed of a sufficient overall size, and relatable to the transport infrastructure requirements in terms proximity to Waterbeach Barracks and the north of Cambridge, to undertake a high level constraints analysis. This would then provide a suitable basis to determine a number of route options for the transport infrastructure as part of the next stage of assessment and future route selection process.

The extent of the Study Area for the Constraints Study is presented at **Appendix A** and shown below in Figure 4.1.

Figure 4.1: Study Area



Source: Mott MacDonald

4.3 Baseline Data Collection

Following the definition of the Study Area the next stage has been to identify a comprehensive set of environmental, physical and planning datasets that could act as constraints to the identified transport infrastructure necessary to support the sustainable new settlement north of Waterbeach at the site of the former barracks.

The study uses a range of publicity available datasets, primarily from Local and National Government Agencies and licensed under the Open Government License. Existing data provided for Cambridgeshire County Council and South Cambridge District Council is also used for the analysis.

The comprehensive set of datasets and their scope to be used to assess the possible constraints for the study area are detailed below:

- **Land Use - Committed Developments:** an assessment covering specific issues in relation to site specific site allocations, and committed major developments through a planning policy review and planning history search. The information is contained on Map 3 presented at Appendix B.
- **Land Use - Green Belt:** a review of the extent of the Green Belt within the Study Area and an assessment of potential harm on the constraint from any forthcoming transport infrastructure as part of the A10 Corridor. The information is contained on Map 4 presented at Appendix B.
- **Land Take - Agricultural Land:** analysis of the Agricultural Land Classification to determine the quality of agricultural land within the study area, particularly with reference to Grades 1, 2 and 3 which represents best and most versatile agricultural land. The information is contained on the Agricultural Land Classification Plan (Map 5) presented at Appendix B.
- **Land Ownership and Assembly:** review of available information in relation to public sector assets in order to assess the impact on any development on land assembly. The information is contained on Map 6 presented at Appendix B. A full review of land ownership has not been considered as part of this constraints study.
- **Heritage:** the identification of heritage assets in the Study Area, including Listed Buildings, Scheduled Ancient Monuments, Conservation Areas and areas of archaeological interest. The information is contained on the Heritage Assets Plan (Map 7) presented at Appendix B.
- **Environment / Ecology:** an assessment of any environmental or ecological designations and possible direct and indirect impacts of a scheme on sensitive ecological resources. The information contained on the environment / ecology is shown on Maps 8 and 9 presented at Appendix B.
- **Physical Considerations:** a review of the physical considerations of the study area covering issues such as potential contamination and land stability undertaken as part of a desk based assessment. The information contained on physical considerations is presented on Maps 10 and 11 at Appendix B.
- **Townscape and Landscape:** an initial assessment of the potential townscape and landscape impacts covering relevant landscape designations and character areas. The information contained

on townscape and landscape considerations in the Study Area is shown on Map 12 presented at Appendix B.

- **Amenity:** a review of potential amenity issues with regards to residential properties, community assets and businesses in the area, such as noise and light related impacts. As part of this process sensitive receptors have been identified within the study area and they are shown on the respective plan (Map 13) presented at Appendix B.
- **Public Rights of Way:** mapping of public footpaths and bridleways has been undertaken to demonstrate any potential resultant impacts. The information is contained of Map 14 presented at Appendix B.
- **Flood Map for Planning:** a review of the available information to determine any flood risk and drainage impacts within the area that will have a bearing on delivery. The information is shown on Map 15 presented at Appendix B.
- **Other Planning Policy Considerations:** the identification of any other policies or documents (where not covered elsewhere in other constraints) that will have a bearing on any option within the Study Area. It will include planning policy implications in relation to other areas of constraint, including loss of local green space and open space (Map 16).
- **Other Technical Considerations:** the identification of any other technical considerations not covered elsewhere within the document.

4.4 Identifying Corridor Options

In order to comprehensively assess the nature and extent of constraints within the defined Study Area, three broad corridors from the north of Cambridge to Waterbeach have been identified. The corridors cover the west, central and east of the Study Area, in to provide a comprehensive coverage of the constraints within the identified area. The definition of these indicative corridors, the combination of which covers all the potential A10 transport infrastructure options, split up the Study Area into three defined zones where the constraints can be more easily assessed. However, any mitigation identified as a result of this assessment will not be restricted to those corridors but to a broader area. Therefore, these corridors are identified only for the purpose of constraints mapping and they do not prejudge optioneering that will be undertaken as part of the main A10 corridor study. Also they do not indicate any specific route alignments within the indicative corridors, and should not be interpreted as such.

The corridors used for assessment as part of the A10 (N) Corridor Constraints Study, which extends 400m and 800m respectively to represent different levels of influence, are identified as follows and shown on the Corridors Plans presented at **Appendix C**:

- **West Corridor:** covering a broad land corridor in the west of the defined Study Area, to the east of Impington and Histon, and to the west of Landbeach. The corridor extends 400m and 800m respectively to represent different areas of influence.

- **Central Corridor:** covering the existing A10 corridor from the north of Cambridge to the entrance of Denny Abbey. The corridor for assessment as part of the constraints study extends approximately 200m and 400m either side of the existing A10.
- **East Corridor:** covering a broad land corridor in the east of the defined Study Area, to the east of Milton and the existing A10.The east corridor, like the rest of corridors, is between 400m and 800m wide and runs nearly parallel to the railway line covering land either side of the railway line.

4.5 Assessment Criteria

The assessment for each corridor option against the baseline identified in Section 4.3 has been recorded in three different proformas, one for each corridor option, and they are presented at **Appendix D, E and F** respectively. The first aspect of the assessment identified the extent of the constraint on the corridor option which then informs the overall level impact. The extent of the constraint was determined using the following criteria:

- **Widespread Extent:** The constraint affects more than 50% of the defined area of the respective corridor option and adjacent areas that may also be affected.
- **Discreet Extent:** The constraint is present at specific locations within the corridor option and adjacent areas that also be affected.

Once the extent of the constraint is identified the next stage of the assessment is to identify the specific issues associated with the physical, environmental or planning constraint and then determined the level of impact using the following criteria:

- **Major Impact:** The identified constraint, if unavoidable, has a potential major cost involved and / or a major impact on deliverability and programme.
- **Medium Impact:** The identified constraint, if unavoidable, has a potential medium cost involved and / or a medium impact on deliverability and programme.
- **Low Impact:** The identified constraint, if unavoidable, has a potential low cost involved and / or a low impact on deliverability and programme.
- **Negligible / Neutral Impact:** The constraint has a potential negligible or neutral cost involved and / or impact on deliverability and programme.

Where possible for each identified constraint types of mitigation measures that are available to address such impacts are described and considered.

5 Findings of the Assessment

5.1 West Corridor

The West Corridor area covers a broad land corridor in the west of the defined Study Area, to the east of Impington and Histon, and to the west of Landbeach. The corridor extends from 400m to 800m to ensure a broad assessment of constraints. The detailed proforma assessing the magnitude of constraints within the West Corridor Area and the potential for mitigation of impacts is contained at Appendix D.

5.1.1 West Corridor - Planning Constraints

There are no major **committed developments** within the broad West Corridor area, other than those associated within the Science Park, Waterbeach Barracks and Cambridge Research Park. A transport intervention in the west corridor would support the overall sustainability of these key development opportunities. Further consideration of emerging development proposals within the defined Study Area is recommended to identify any future possible constraints in terms of committed developments.

The majority of the West Corridor falls within the defined **Green Belt**. National and local planning policies attach a great importance to the Green Belt and seek to restrict inappropriate development. Paragraph 90 of the National Planning Policy Framework outlines certain forms of development that are not inappropriate development in the Green Belt. This includes local transport infrastructure provided the requirement for a Green Belt location can be demonstrated, it preserves the openness of the Green Belt and does not conflict with the purposes of including land in the Green Belt. Therefore, whilst in principle transport infrastructure in the location is not inappropriate development in the Green Belt, sensitive engineering design as part of any optioneering exercise would be recommended to achieve the lowest levels of harm to the Green Belt.

A significant amount of land within the West Corridor is classified as **'best and most versatile agricultural land'** consisting of a mixture of Grade 2 and 3 land of the Agricultural Land Classification. The National Planning Policy Framework confirms that those local planning authorities should take into account the economic and other benefits of the best and most versatile land. Where significant development of agricultural land is deemed necessary, local planning authorities should seek to use areas of poorer quality land in preference to that of a higher quality.

The loss of any 'best and most versatile agricultural land' as part of delivering necessary transport infrastructure will need to be appropriately justified and weighed against the merits of the scheme. A wider analysis of agricultural land in the administrative area should form an integral part of understanding the impact any loss of 'best and most versatile agricultural land' required in connection with the transport infrastructure. As a general principle the highest grades of agricultural land should be avoided in preference to those of a lower quality.

A detailed review of **land ownership** has not been undertaken as part of this constraints study. Information has, however; been obtained in relation to public sector assets which confirms that there are portions of County Council Farms Estate land within the West Corridor area which may be available for a transport

intervention. However, as is common with transport infrastructure projects it is likely that some portions of land in private ownership will be required as part of any development which would require a degree of land assembly. There are a small number of existing rural buildings / properties within the corridor area. The dispersed nature of the buildings / properties means that these could be avoided through detailed design process and careful routing. It is recommended that additional work is undertaken to understand fully assess the extent of land ownership constraints and land assembly to deliver the scheme.

There are a number of potential constraints in relation to **heritage assets** within the area. These include Listed Buildings, Scheduled Monuments and Conservation Areas within or adjacent to the West Corridor area, primarily focused within the settlements of Waterbeach, Milton and Landbeach. A transport intervention on an alignment that passes close to heritage assets could have an impact upon the significance of the heritage assets including within their setting. Detailed design and routing within the broad corridor should avoid physical damage to a heritage asset in the area, and potential impacts are most likely to relate to setting effects on an asset. Mitigation measures such as careful routing, landscaping and design would need to be applied to address this.

It is recommended that further assessment of the significance of heritage assets is undertaken as part of the next stage of assessment to fully understand the constraint within the Study Area and potential impacts. Sensitive engineering design as part of any optioneering exercise would be required from the outset to reduce potential direct impacts and harm with regards to setting of any heritage assets.

No known areas of archaeological interest were identified within the area mindful of the historic nature of surrounding settlements further investigation will be required in this regard as part of the next stage of the assessment. It is noted that the course of the historic Roman Road runs adjacent to the West Corridor area to the west of Landbeach.

5.1.2 West Corridor - Physical and Environmental Constraints

In terms of **environmental and ecological constraints**,a portion of the southern section of the corridor falls within the Site of Special Scientific Interest impact zone for Histon Road, a site of geological importance located in the northern part of the urban area Cambridge (south of recent development at Orchard Park), and the corridor also passes within 1km of Worts Meadow Local Nature Reserve, a site of local importance in Landbeach. There are also several areas of deciduous woodland, priority habitat in the corridor. Consultation with Natural England and a Phase 1 Ecological survey should be undertaken as part of options appraisal in order to identify impacts on the environment and ecology, and appropriate mitigation measures.

Physical considerations principally relate to the southern end of the corridor passing within 1km of the former Milton Lane Landfill Site and at the northern end the former use of Waterbeach as a former airfield. Historical industrial land may also exist in the West Corridor area which could pose a constraint on the route options selection. It is recommended that a desk top study including historical mapping is undertaken to identify historical industry that may pose a constraint for the proposed route options. Preference would be given for avoidance of any land identified as being significantly contaminated due to historical industry. At this stage it is probable that the identified landfill site would be avoided through route selection.

Parts of the West Corridor area (in the north and in the south) are underlain by Superficial Deposits of River Terrace sands and gravels. In other areas (predominantly the central section) the Superficial Deposits are absent. The bedrock geology comprises the Gault Formation, a mudstone with a weathered profile. The variable ground conditions may require a variable approach to the engineering formation of the proposed transport intervention but based upon available evidence there are no significant geological issues which would prevent the scheme being delivered or have a major impact on route option selection. A ground investigation along the route of the preferred option will be required to identify engineering formation conditions as part of detailed design.

There are no **landscape** designations in form of Areas of Outstanding Natural Beauty, Special Area of Conservation or Ancient Woodlands within a 2/3 mile radius of the study area. Due to this separation it considered that there will be no impacts on these designations. Notwithstanding the above the majority of the West Corridor area is located outside of the settlement area and is within the rural area. Any transport infrastructure would need to be sympathetic to the rural area and sensitively designed from the outset in view of this constraint. Hard and soft landscaping proposals will form an integral part of proposals in order to reduce levels of impact on the constraint.

There are a number of **sensitive residential receptors** located within or adjacent to the West Corridor area and there could be amenity issues in the form of noise, air quality and lighting impacts resulting from the provision of transport infrastructure. In order to reduce such impacts sensitive engineering design as part of any optioneering exercise would be required from the outset in terms of route alignment and scheme design to avoid and reduce any impacts on sensitive residential receptors. Appropriate noise, air quality and light impact assessments will be required to understand levels of impact and required mitigation measures.

There are a number of **public footpaths and bridleways** within the study area and Under Section 257 of the Town and Country Planning Act 1990 a footpath or bridleway can be closed or diverted to enable development to take place. Diversion of footpaths / bridleways should be considered where necessary in connection with the transport intervention.

A portion of the West Corridor area north of Cottenham passes through **Flood Zones 2 and 3** as defined by national planning policy guidance. Through the detailed design stage of an identified transport intervention a Flood Risk Assessment should be undertaken and an appropriate drainage scheme designed to take into account the area and meet the requirements of national guidance.

5.2 Central Corridor

The Central Corridor focusses on the existing A10 corridor from the north of Cambridge to the entrance of Denny Abbey. The corridor extends from 40m to 800m to ensure a full consideration of possible constraints.

The detailed proforma assessing the magnitude of constraints within the Central Corridor Area and the potential for mitigation of impacts is contained at Appendix E.

5.2.1 Central Corridor - Planning Constraints

There are no major **committed developments** within the broad Central Corridor area other than those associated within the Science Park, Waterbeach Barracks and Cambridge Research Park, and a transport intervention in the corridor area would support these areas in terms of overall sustainability. Constant monitoring of applications within the defined Study Area is recommended to identify any possible constraints in this regard.

The majority of the Central Corridor falls within the defined **Green Belt**, however; it is noted that a transport intervention would be focussed on the existing A10 which is already present within the Green Belt. National and local planning policies attach a great importance to the Green Belt and seek to restrict inappropriate development. Paragraph 90 of the National Planning Policy Framework outlines certain forms of development that are not inappropriate development in the Green Belt. This includes local transport infrastructure provided the requirement for a Green Belt location can be demonstrated, it preserves the openness of the Green Belt and does not conflict with the purposes of including land in the Green Belt. Therefore whilst in principle transport infrastructure in the location is not inappropriate development in the Green Belt it will be necessary to demonstrate through sensitive engineering design the lowest levels of harm.

A significant amount of land within the Central Corridor is classified as **'best and most versatile agricultural land'** consisting of a mixture of Grade 2 and 3 land of the Agricultural Land Classification. The National Planning Policy Framework confirms that those local planning authorities should take into account the economic and other benefits of the best and most versatile land. Where significant development of agricultural land is deemed necessary, local planning authorities should seek to use areas of poorer quality land in preference to that of a higher quality.

The loss of any 'best and most versatile agricultural land' as part of delivering necessary transport infrastructure will need to be appropriately justified and weighed against the merits of the scheme. As the transport intervention in the Central Corridor is likely to be focussed on the existing A10 agricultural land impact may not be a severe as a standalone transport intervention. A wider analysis of agricultural land in the administrative area should form an integral part of understanding the impact any loss of 'best and most versatile agricultural land' required in connection with the transport infrastructure. As a general principle the highest grades of agricultural land should be avoided in preference to those of a lower quality.

A full review of **land ownership** has not been undertaken as part of this constraints study. Information has, however; been obtained in relation to public sector assets which confirms that there are portions of Country Urban Estate and County Council Farms Estate land within the Central Corridor area which may be available for a transport intervention. There are a large number of buildings / properties to the east of the existing A10 at Milton and a small number of rural buildings / properties within the corridor area which. It is recommended that additional work is undertaken to understand fully the extent of land ownership constraints and the proximity of properties present within proximity to the existing A10. However, as is common with transport infrastructure projects of this nature it is likely that a degree of land assembly will be required, and is an aspect that will require further consideration at the next stage of the project.

There are a number of potential constraints in relation to **heritage assets** including a number of Listed Buildings, Scheduled Monuments and Conservation Areas within or adjacent to the Central Corridor area. These lie mainly within the villages and away from the current A10, with three listed milestones located on the A10. A transport intervention in the location could have an impact upon the significance of the heritage assets within their setting. However, given the location of the majority of heritage assets within villages, it is expected that detailed design and appropriate routing would avoid physical damage to a heritage asset in the area, and impacts are most likely to relate to setting effects on an asset. Three milestones are located along the existing A10 and it is considered that whilst impacted, there would be options to incorporate these within any future design, removing the need to destruction and reducing setting effects.

It is recommended that further assessment of the significance of heritage assets is undertaken as part of the next stage of assessment to fully understand the constraint within the Study Area and potential impacts. Sensitive engineering design as part of any optioneering exercise would be required from the outset to reduce potential direct impacts and harm with regards to setting of any heritage assets.

No known areas of archaeological interest were identified within the area mindful of the historic nature of surrounding settlements further investigation will be required in this regard as part of the next stage of the assessment.

5.2.2 Central Corridor - Physical and Environmental Constraints

In terms of **environmental and ecological constraints** the Central Corridor area does not fall within a Site of Special Scientific Interest risk zone and is not within 1k of any Local Nature Reserve. There are several discreet areas of deciduous woodland and a small area of traditional orchard designated a priority habitat within it. Consultation with Natural England and a Phase 1 Ecological survey should be undertaken as part of options appraisal in order to identify impacts of potential route options within this corridor on the environment and ecology.

Physical considerations principally relate to the southern end of the corridor passing within 1km of the former Milton Lane Landfill Site and at the northern end the former use of Waterbeach as a former airfield. Historical industrial land may also exist in the Central Corridor area which could pose a constraint on the route options selection. It is recommended that a desk top study including historical mapping is undertaken identify historical industry that may pose a constraint for the proposed route options. Preference would be

given for avoidance of any land identified as being significantly contaminated due to historical industry. At this stage it is probable that the identified landfill site would be avoided through route selection.

The majority of the Central Corridor area - with the exception of the south where Superficial Deposits are absent - is underlain by Superficial Deposits of River Terrace sands and gravels. The bedrock geology comprises the Gault Formation, a mudstone with a weathered profile. The existing A10 may also have earthworks associated with it. The variable ground conditions may require a variable approach to the engineering formation of the proposed transport intervention but based upon available evidence there are no significant geological issues which would prevent the scheme being delivered or have a major impact on route option selection. A ground investigation along the route of the preferred option will be required to identify engineering.

There are no **landscape** designations in form of Areas of Outstanding Natural Beauty, Special Area of Conservation or Ancient Woodlands within a 2/3 mile radius of the study area. It is noted that the existing A10 is already an established feature of the landscape. However, notwithstanding this aspect the corridor is located within the rural area, and any transport infrastructure would need to be sympathetic to this and sensitively designed from the outset in view of this constraint. Hard and soft landscaping proposals will form an integral part of proposals in order to reduce levels of impact on the constraint.

There are a number of **sensitive residential receptors** located within or adjacent to the Central Corridor area, particularly to the east of the existing A10. there could be amenity issues in the form of noise, air quality and lighting impacts resulting from the provision of transport infrastructure. In order to reduce such impacts sensitive engineering design as part of any optioneering exercise would be required from the outset in terms of route alignment and scheme design to avoid and reduce any impacts on sensitive residential receptors. Appropriate noise, air quality and light impact assessments will be required to understand levels of impact and required mitigation measures.

There are a number of **public footpaths and bridleways** within the Central Corridor area and Under Section 257 of the Town and Country Planning Act 1990 a footpath or bridleway can be closed or diverted to enable development to take place. Diversion of footpaths / bridleways should be considered where necessary in connection with the transport intervention.

The Central Corridor area north of Denny End passes through **Flood Zones 2 and 3** as defined by national planning guidance. Through the detailed design stage of an identified transport intervention a Flood Risk Assessment should be undertaken and an appropriate drainage scheme designed to take into account the area and meet the requirements of national guidance.

5.3 East Corridor

The East Corridor area covers a broad land corridor in the east of the defined Study Area, to the east of Milton and the existing A10. The East Corridor area extends from has 400m to 800m wide and runs broadly parallel to the railway line. A review of the of the environmental, physical and planning baseline has been undertaken in view of constraints to identified transport infrastructure necessary to support the sustainable new settlement north of Waterbeach at the site of the former barracks.

The detailed proforma assessing the magnitude of constraints within the East Corridor Area and the potential for mitigation of impacts is contained at Appendix F.

5.3.1 East Corridor - Planning Constraints

There is one major **committed development** in the East Corridor area, which comprises a change of use of land to create a Multi-Sport Park on land between Waterbeach and Milton (Reference: S/0032/06/F). A transport intervention in the East Corridor could potentially impact the delivery of the committed development identified above. However, if sensitively design it could also provide an opportunity to improve access arrangement to the identified development parcels.

The majority of the East Corridor falls within the defined **Green Belt**. National and local planning policies attach a great importance to the Green Belt and seek to restrict inappropriate development. Paragraph 90 of the National Planning Policy Framework outlines certain forms of development that are not inappropriate development in the Green Belt. This includes local transport infrastructure provided the requirement for a Green Belt location can be demonstrated, it preserves the openness of the Green Belt and does not conflict with the purposes of including land in the Green Belt. Therefore whilst in principle transport infrastructure in the location is not inappropriate development in the Green Belt it will be necessary to demonstrate a requirement through sensitive engineering design the lowest levels of harm to the Green Belt.

A significant amount of land within the East Corridor is classified as **'best and most versatile agricultural land'** consisting of a mixture of Grade 2 and 3 land of the Agricultural Land Classification. The National Planning Policy Framework confirms that those local planning authorities should take into account the economic and other benefits of the best and most versatile land. Where significant development of agricultural land is deemed necessary, local planning authorities should seek to use areas of poorer quality land in preference to that of a higher quality.

The loss of any 'best and most versatile agricultural land' as part of delivering necessary transport infrastructure will need to be appropriately justified and weighed against the merits of the scheme. A wider analysis of agricultural land in the administrative area should form an integral part of understanding the impact any loss of 'best and most versatile agricultural land' required in connection with the transport infrastructure. As a general principle the highest grades of agricultural land should be avoided in preference to those of a lower quality.

A full review of **land ownership** has not been undertaken as part of this constraints study. Information has, however; been obtained in relation to public sector assets which confirms that there are portions of County Council Farms Estate land within the East Corridor. However, it is noted that some of this land is already committed to the creation of a Multi-Sport Park on land between Waterbeach and Milton. It is recommended that additional work is undertaken to understand fully the extent of land ownership constraints and the proximity of properties present within proximity to the existing A10. However, as is common with transport infrastructure projects of this nature it is likely that a degree of land assembly will be required and is an aspect that will require further consideration at the next stage of the project.

There are a number of potential constraints in relation to **heritage assets** within the area including a number of Listed Buildings, Scheduled Monuments and Conservation Areas within or adjacent to the East Corridor area. These are primarily focussed within the settlements of Milton, Waterbeach and Horningsea. A transport intervention on an alignment that passes close to heritage assets could have an impact upon the significance of the heritage assets within their setting.

It is recommended that further assessment of the significance of heritage assets is undertaken as part of the next stage of assessment to fully understand the constraint within the Study Area and potential impacts. Sensitive engineering design as part of any optioneering exercise would be required from the outset to identify whether impacts could be satisfactorily mitigated through route alignment and design to satisfactorily reduce potential direct impacts and harm with regards to setting of any heritage assets.

No known areas of archaeological interest were identified within the area mindful of the historic nature of surrounding settlements further investigation will be required in this regard as part of the next stage of the assessment.

Milton Country Park is a **recreational asset** and falls within part of the East Corridor Area. A transport intervention in this area has the potential to have a direct or indirect impacts on land associated with Milton Country Park. A route optioneering study as part of the next stage of assessment should seek to avoid impacting this recreational asset.

5.3.2 East Corridor - Physical and Environmental Constraints

In terms of **environmental and ecological constraints** the central section of the East Corridor (east of the existing railway) borders the Site of Special Scientific Interest impact zone for Stow-cum-Quy Fenn. The East Corridor area also has several areas of deciduous woodland and, coastal and floodplain grazing marsh designated as priority habitats. Consultation with Natural England and a Phase 1 Ecological survey should be undertaken as part of options appraisal in order to identify impacts on the environment and ecology and potential for appropriate mitigation measures.

Physical considerations principally relate to the former use of Waterbeach as a former airfield. Historical industrial land may also exist in the East Corridor area which could pose a constraint on the route options selection. It is recommended that a desk top study including historical mapping is undertaken identify historical industry that may pose a constraint for the proposed route options. Preference would be given for

avoidance of any land identified as being significantly contaminated due to historical industry. At this stage it is probable that the identified landfill site would be avoided through route selection.

The East Corridor area is predominantly underlain by Superficial Deposits of Alluvium (clays, silts and sands) with the possibility of River Terrace sands and gravels being encountered along western boundary of the corridor / beneath the Alluvium. The exception to this is the north section of the Corridor where the Superficial Deposits are indicated to be absent. The bedrock geology comprises the Gault Formation, a mudstone with a weathered profile. There may also be earthworks present associated with the existing railway within the corridor. The variable ground conditions may require a variable approach to the formation of the proposed transport intervention. A ground investigation along the route of the preferred option will be required to identify formation conditions as part of detailed design. Based upon available evidence there are no significant geological issues which would prevent the scheme being delivered.

There are no **landscape** designations in form of Areas of Outstanding Natural Beauty, Special Area of Conservation or Ancient Woodlands within a 2/3 mile radius of the study area. Due to this separation it considered that there will be no impacts on these designations. Notwithstanding the above the majority of the East Corridor area is located outside of the settlement area and is within the rural area. Any transport infrastructure would need to be sympathetic to the rural area and sensitively designed from the outset in view of this constraint. Hard and soft landscaping proposals will form an integral part of proposals in order to reduce levels of impact on the constraint.

There are a number of **sensitive residential receptors** located within or adjacent to the East Corridor area and there could be amenity issues in the form of noise, air quality and lighting impacts resulting from the provision of transport infrastructure. In order to reduce such impacts sensitive engineering design as part of any optioneering exercise would be required from the outset in terms of route alignment and scheme design to avoid and reduce any impacts on sensitive residential receptors. Appropriate noise, air quality and light impact assessments will be required to understand levels of impact and required mitigation measures.

There are a number of **public footpaths and bridleways** within the study area and Under Section 257 of the Town and Country Planning Act 1990 a footpath or bridleway can be closed or diverted to enable development to take place. Diversion of footpaths / bridleways should be considered where necessary in connection with the transport intervention.

The majority of the eastern boundary of the East Corridor Area, following the River Cam, is located within Flood Zone 3 and benefiting from flood defences, as defined by national planning policy guidance. The nature of the flood zone could pose a constraint to a transport intervention in this location that would need to be addressed. Through the detailed design stage of an identified transport intervention a Flood Risk Assessment should be undertaken and an appropriate drainage scheme designed taken into account the area.

5.4 Corridor Summary

The assessment has demonstrated that whilst there are certain limited constraints within the **West Corridor area**, this is a broad corridor and most constraints are discreet, as shown on the baseline maps in Appendix B and the 'heat map' in Appendix G. Through a combination of further investigations, informing a sensitive design optioneering assessment, and careful identification of potential route alignments, a transport intervention in this location will be capable of being satisfactorily accommodated by taking into account environmental, physical and heritage constraints and mitigating any impacts on sensitive or protected assets through an appropriate scheme design.

Whilst it is acknowledged that the existing A10 **Central Corridor** includes an established piece of transport infrastructure in the location, a transport intervention would still need to be appropriated justified in view of the Green Belt and loss of agricultural land. However, through a combination of further investigations, informing a sensitive design optioneering assessment, and careful identification of potential route alignments, a transport intervention in this location will also be capable of being satisfactorily accommodated by taking into account environmental, physical and heritage constraints and mitigating any impacts on sensitive or protected assets through an appropriate scheme design.

In comparison with the West and Central Corridor area, the **East Corridor area** contains a greater extent of constraints that could impact on the potential to deliver an appropriate transport intervention in the location. This is principally related to the potential for impacting the delivery of the committed development of the Multi-Sport Park on land between Waterbeach and Milton, being within an area of greater flood risk, a greater concentration of heritage assets within the vicinity and the potential impact on a recreational asset in the form of Milton Country Park. The assessment has confirmed that whilst there are certain constraints within the defined Study Area, these are predominantly limited to discreet areas as demonstrated within the broad corridors assessed. Those constraints that are widespread throughout the Study Area are those that are generally associated with transport interventions, and could be appropriately mitigated.

The extent of the constraints varies from corridor to corridor but it is considered that route alignment and detailed design (incorporating mitigation measures) would be able to overcome constraints in the western and central corridors, such that options can be identified and potentially delivered. In view of more widespread constraints, whilst not ruling out the possibility of delivering a transport intervention in the eastern corridor, further work is recommended to assess the potential to mitigate impacts through route alignment and design.

However, overall we conclude that a transport intervention can be accommodated to serve the A10 (N) Ely to Cambridge Corridor. Further investigation would assist in respect of some of the constraints before options analysis is completed. However, we do not anticipate that constrains beyond those identified in this Report will emerge so as to jeopardise delivery of an acceptable scheme.

Appendix G provides a summary of constraints in the form of a 'heat map'.

6 Conclusions and Recommendations

Mott MacDonald has been commissioned by Cambridgeshire County Council (CCC) to provide a Corridor Constraint Assessment of the (A10(N)) Ely to Cambridge Corridor. This works builds on previous assessments carried out on the corridor which have informed the Transport Strategy for Cambridge and South Cambridgeshire (TSCSC).

South Cambridgeshire District Council is currently in the process of preparing a new Local Plan. The Local Plan provides a framework of policies and land allocations that will guide the future development of South Cambridgeshire up to 2031.

The emerging Local Plan identified significant growth at a New Town north of Waterbeach, and at Cambridge Northern Fringe East (CNFE) adjacent to the A10 (N) between Cambridge and Ely. Emerging Policy SS/5 allocates land north of Waterbeach for the creation of new town on the site of the former Waterbeach Barracks. The A10 (N) is an important transport corridor and provides one of the main strategic links between Cambridge and its north eastern sub-region.

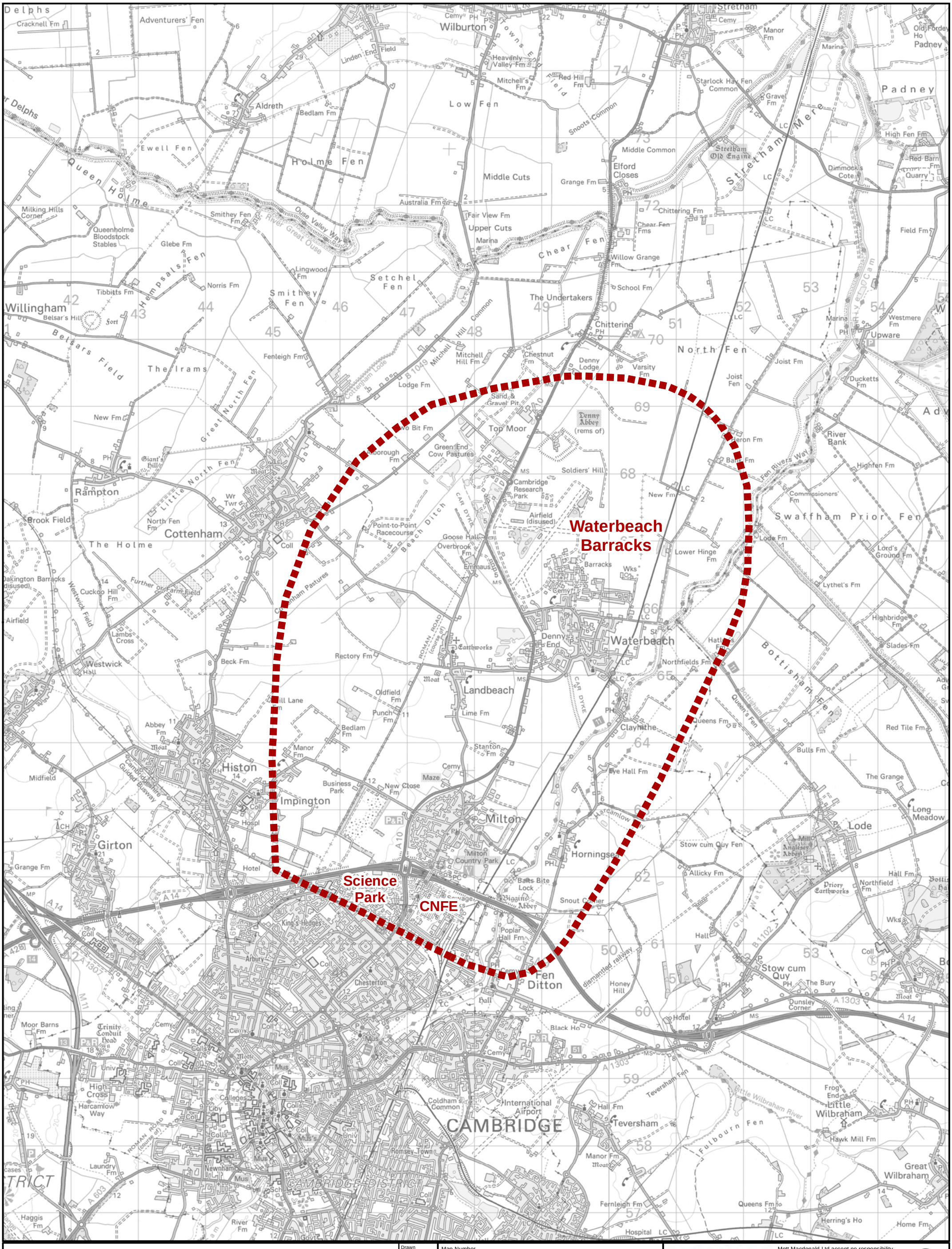
Cambridgeshire County Council and South Cambridge District Council required a robust understanding of existing environmental, physical and planning constraints adjacent to the corridor and whether these could impact the delivery of a range of transport interventions that will support the sustainable delivery of these key housing and employment sites.

In order to comprehensively assess the nature and extent of constraints within the defined Study Area, three broad corridors from the north of Cambridge to Waterbeach have been identified. The corridors cover the west, central and east of the Study Area, each measuring between 400m and 800m in width to provide a comprehensive coverage of the constraints within the identified area. The assessment was not limited to the corridors and any major constraint falling outside the area of influence of the corridors was also taken into consideration.

The assessment has confirmed that whilst there are certain constraints within the Study Area, these are predominantly limited to discreet areas within the broad corridors assessed. The extent of the constraints varies from corridor to corridor but it is considered that route alignment and detailed design (incorporating mitigation measures) will be able to overcome constraints in the western and central corridors, such that options can be identified and potentially delivered. Further investigation would, however; be needed for the eastern corridor in view of more widespread constraints that could impact on the potential to mitigate impacts through route alignment and design. The report demonstrates that a transport intervention can be accommodated to serve the A10 (N) Ely to Cambridge Corridor.

Appendices

Appendix A. Study Area



Legend

Study Area

Drawn	LDG
Checked	CB
Approved	XX
Status	DFT
Rev	P01
Map Number	1
Map Name	STUDY AREA
	A10N TRANSPORT STUDY

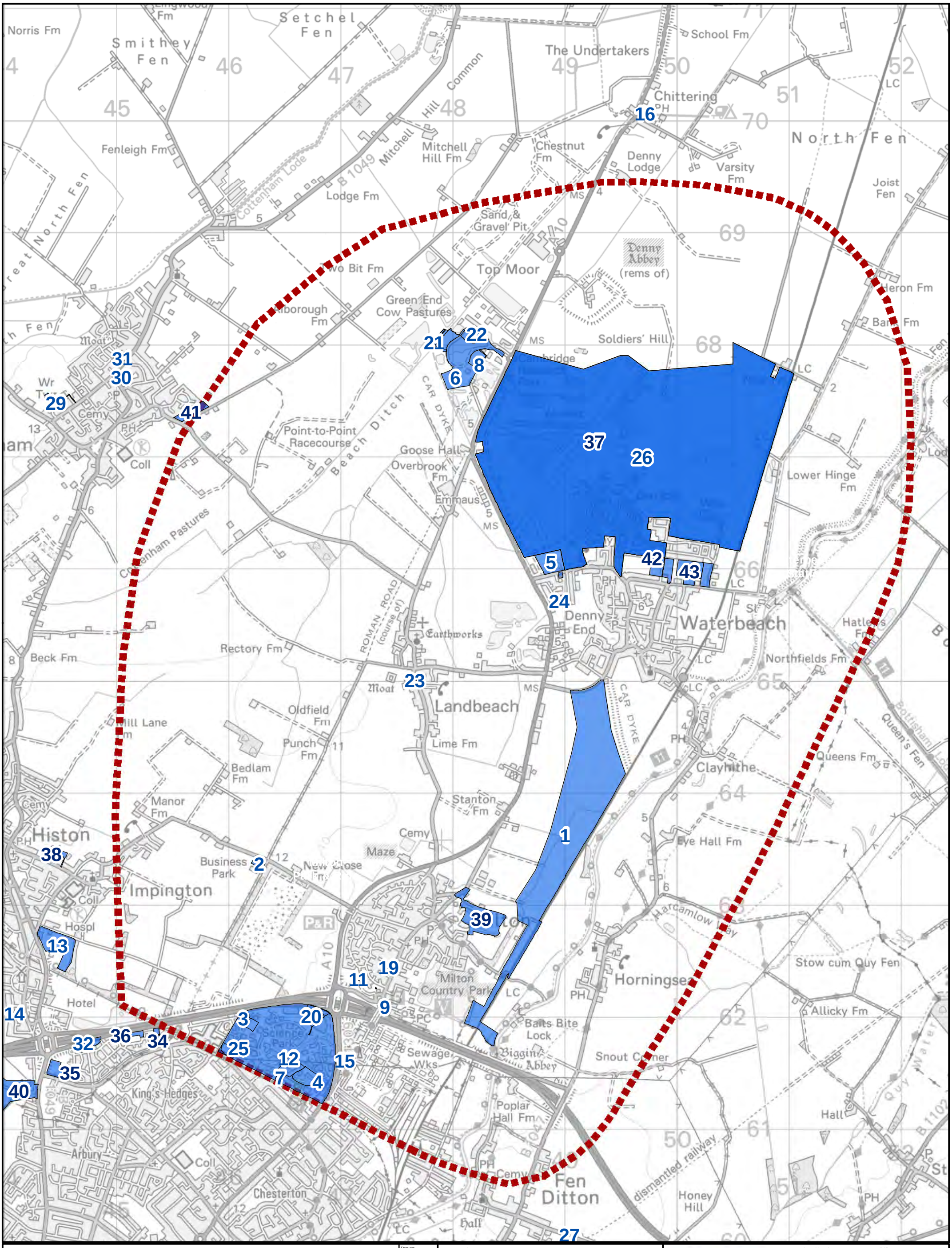
Mott MacDonald

Scale at A3: 1:50,000

0 400 800 1,200 1,600 2,000 Metres

Date: 26/02/16

Appendix B. Baseline Data



Legend

- Study Area
- Committed Developments

Drawn	LDG
Checked	CB
Approved	XX
Status	DFT
Rev	P01

Map Number: 3

Map Name: COMMITTED DEVELOPMENTS (PLANNING APPLICATIONS + POLICY ALLOCATIONS)

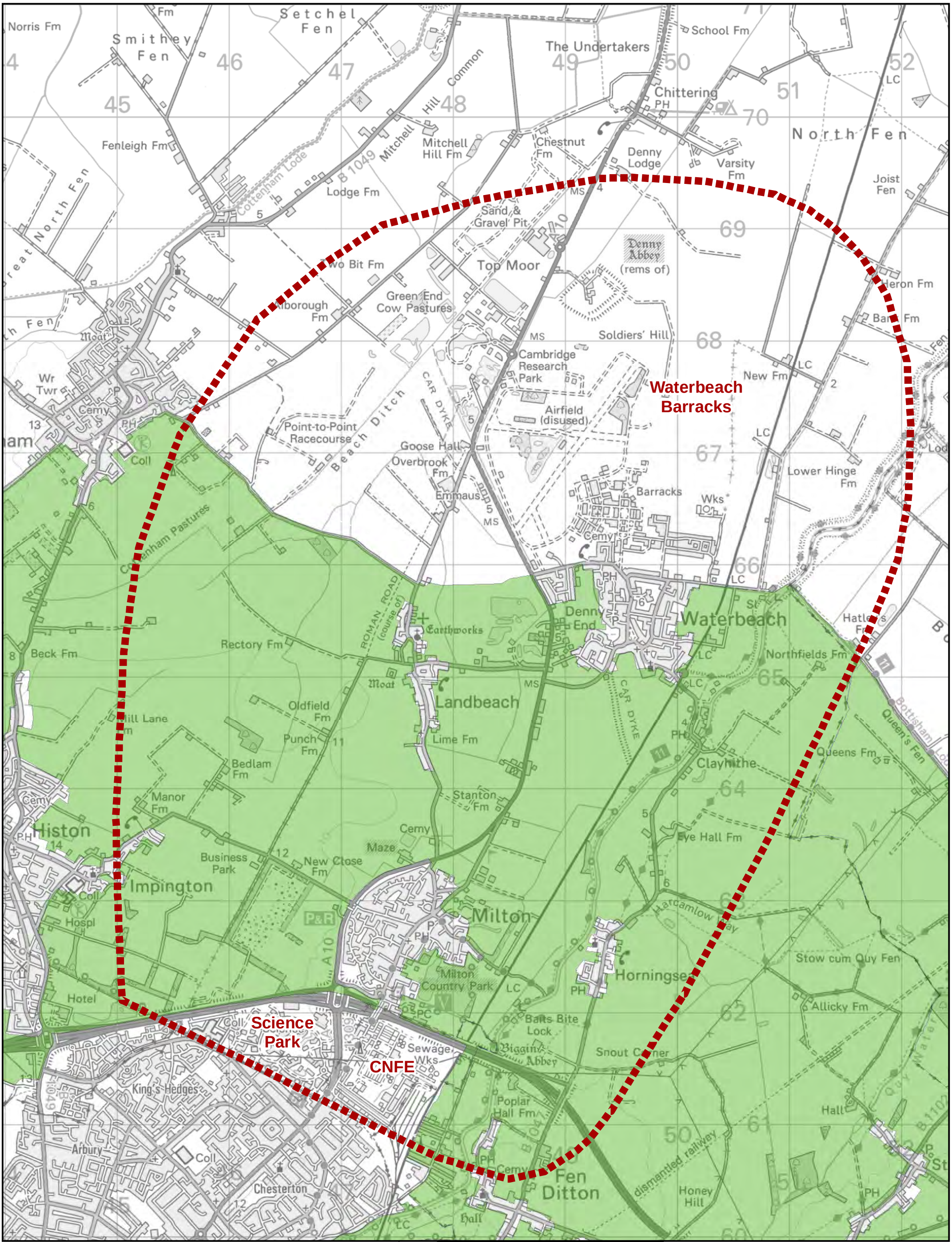
A10N TRANSPORT STUDY

Mott MacDonald

Scale at A3: 1:30,000

0 250 500 750 1,000 1,250 Metres

Date: 24/02/16



Legend

- Study Area
- Green Belt

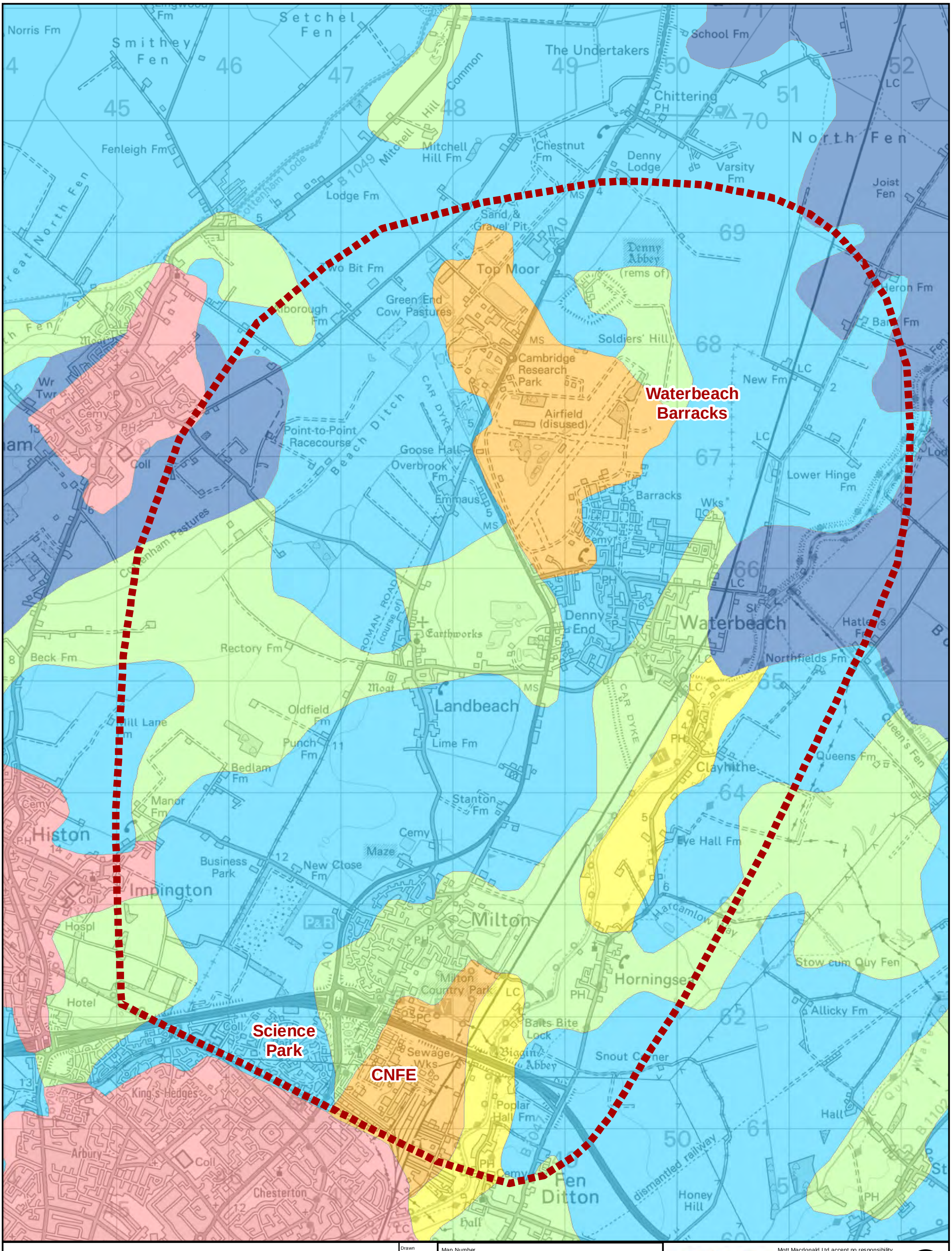
Drawn	LDG
Checked	CB
Approved	XX
Status	DFT
Rev	P01
Map Number	4
Map Name	GREEN BELT
	A10N TRANSPORT STUDY

Mott MacDonald

Scale at A3: 1:30,000

0 250 500 750 1,000 1,250 Metres

Date: 16/02/16



Legend

- Grade 1
- Grade 2
- Grade 3
- Grade 4
- Non-Agricultural
- Urban
- Study Area

Drawn	LDG
Checked	CB
Approved	XX
Status	DFT
Rev	P01
Map Number	5
Map Name	AGRICULTURAL LAND CLASSES
	A10N TRANSPORT STUDY

Mott MacDonald

Scale at A3: 1:30,000

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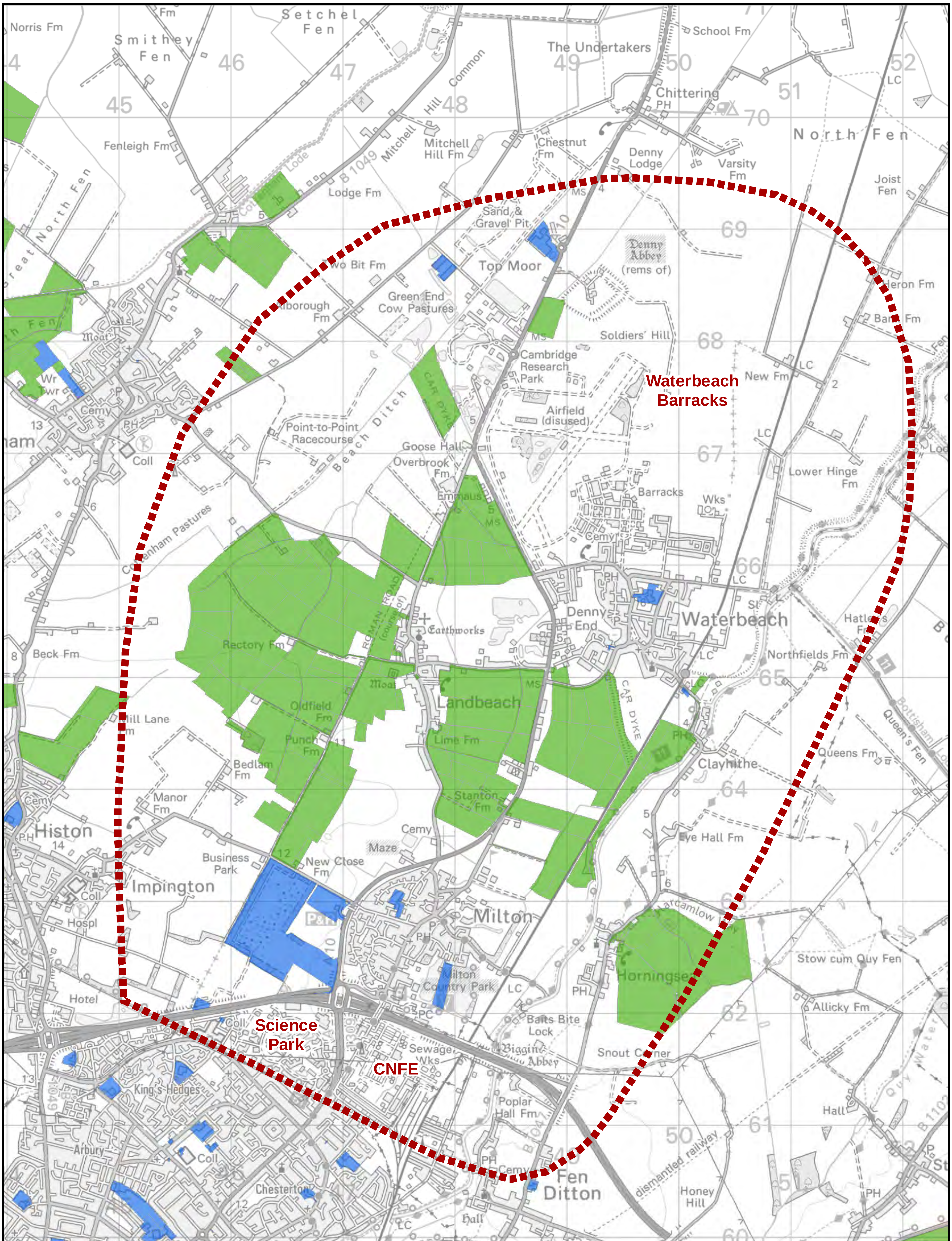
Date: 16/02/16



Legend

Study Area

County Urban Estate

County Council Farms Estate

Drawn LDG	Map Number 6
Checked CB	Map Name
Approved XX	LAND OWNERSHIP AND ASSEMBLY
Status DFT	
Rev P01	A10N TRANSPORT STUDY

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Scale at A3: 1:30,000

0 250 500 750 1,000 1,250
Metres

Date: 05/02/16

Cottenham Moat

Car Dyke

Denny Abbey

Waterbeach Barracks

Landbeach Medieval Village

Waterbeach Abbey

Car Dyke

Horningsea Kilns

Science Park

CNFE

Legend

- Study Area
- Scheduled Monuments
- Conservation Areas

Listed Buildings

- Grade I Listed
- Grade II* Listed
- Grade II Listed

Zones of Influence

- Buffer 250m
- Buffer 500m
- Buffer 750m

Drawn	LDG
Checked	CB
Approved	XX
Status	DFT
Rev	P01

Map Number: 7

Map Name: HERITAGE ASSETS

A10N TRANSPORT STUDY

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Scale at A3: 1:30,000

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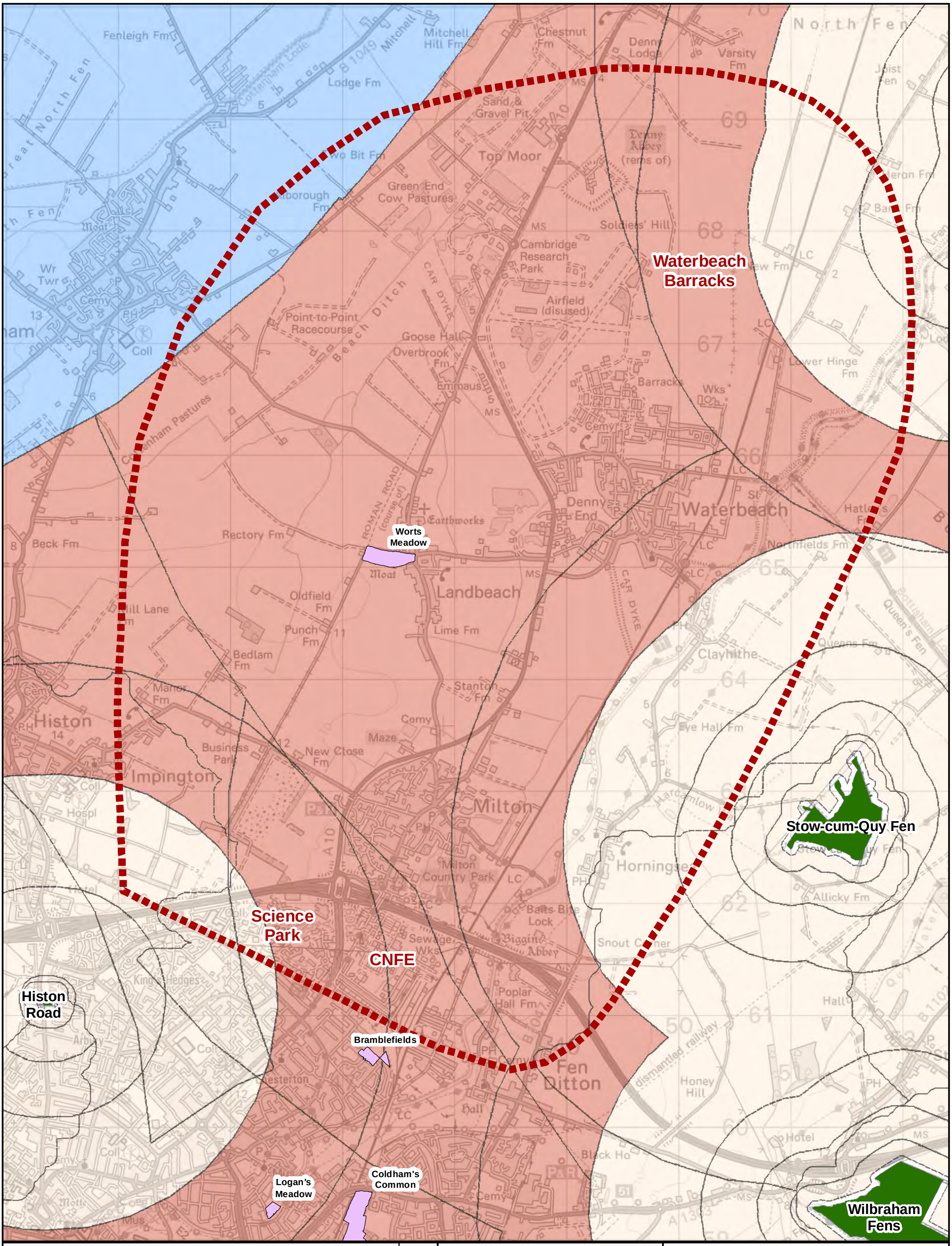
Date: 29/02/16



Sites of Special Scientific Interest (SSSI)

Local Nature Reserves (LNR)

SSSI Impact Risk Zones-To assess planning applications

Pipelines, pylons and overhead cables. Any transport proposal including road, rail and by water. Airports, helipads and other aviation proposals.

Pylons and overhead cables. Airports, helipads and other aviation proposals.

Airports, helipads and other aviation proposals.

Drawn	LDG
Checked	CB
Approved	XX
Status	DFT
Rev	P01

Map Number: 8

Map Name: SITES OF SPECIAL SCIENTIFIC INTEREST AND LOCAL NATURE RESERVES

A10N TRANSPORT STUDY

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Scale at A3: 1:30,000

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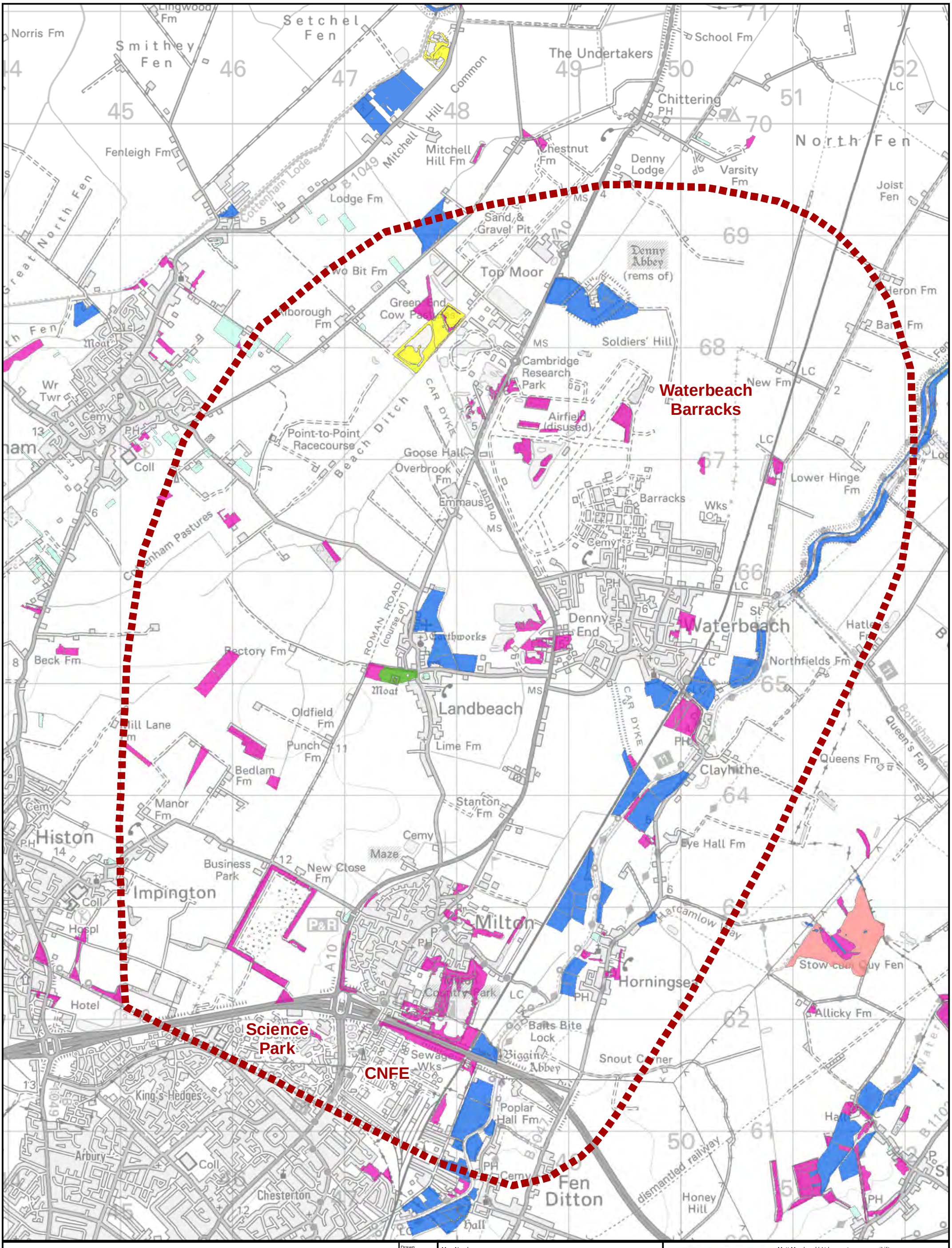
Date: 17/02/16



Legend

- Coastal and Floodplain Grazing Marsh
- Deciduous Woodland
- Good Quality Semi-Improved Grassland
- Lowland Calcereous Grassland
- Lowland Fens
- Traditional Orchard
- Study Area

Drawn	LDG
Checked	CB
Approved	XX
Status	DFT
Rev	P01
Map Number	9
Map Name	PRIORITY HABITATS
	A10N TRANSPORT STUDY

Mott MacDonald

Scale at A3: 1:30,000

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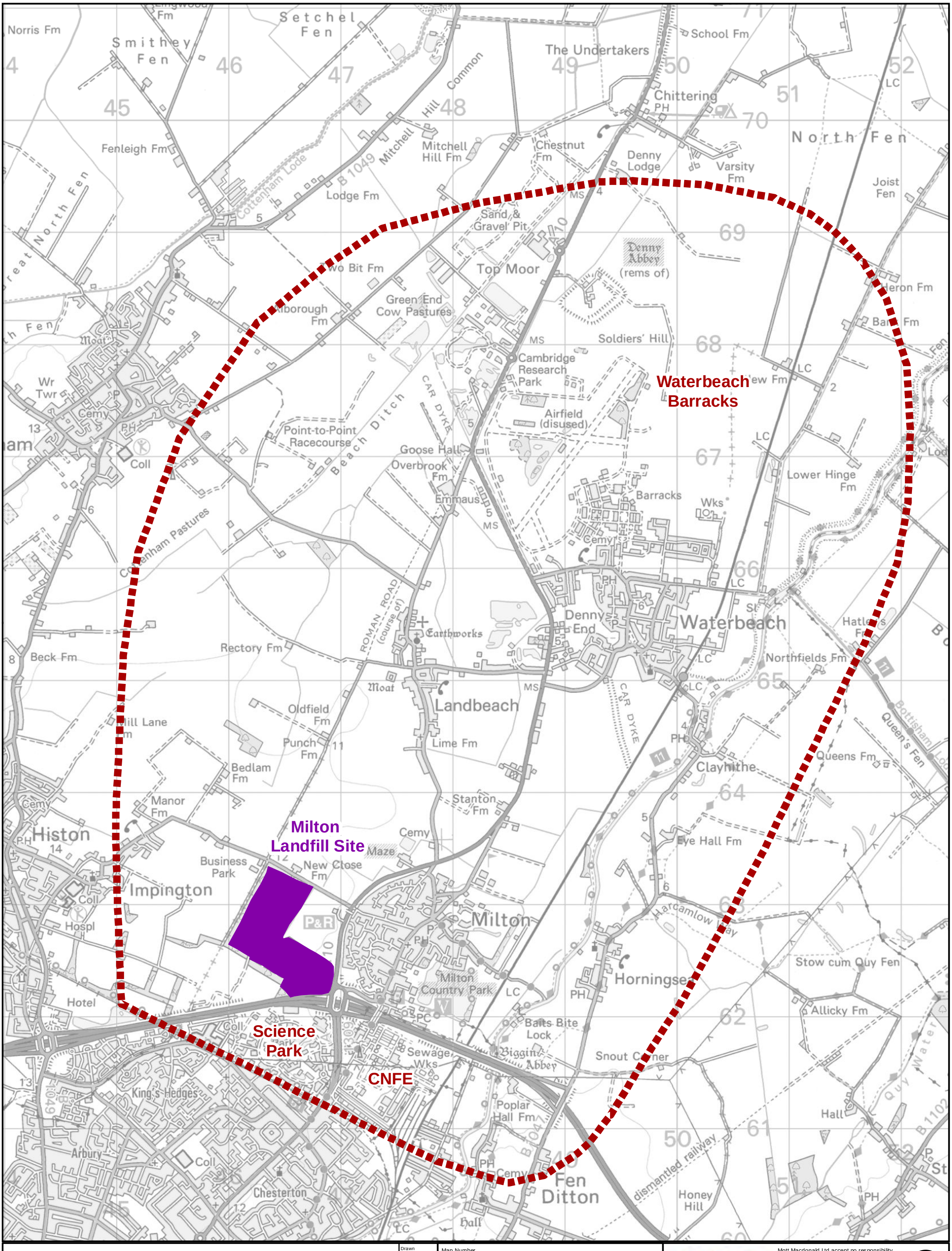
Date: 16/02/16



Legend

- Study Area
- Landfill Sites

Drawn	LDG
Checked	CB
Approved	XX
Status	DFT
Rev	P01
Map Number	10
Map Name	LANDFILL SITES
	A10N TRANSPORT STUDY

Mott MacDonald

Scale at A3: 1:30,000

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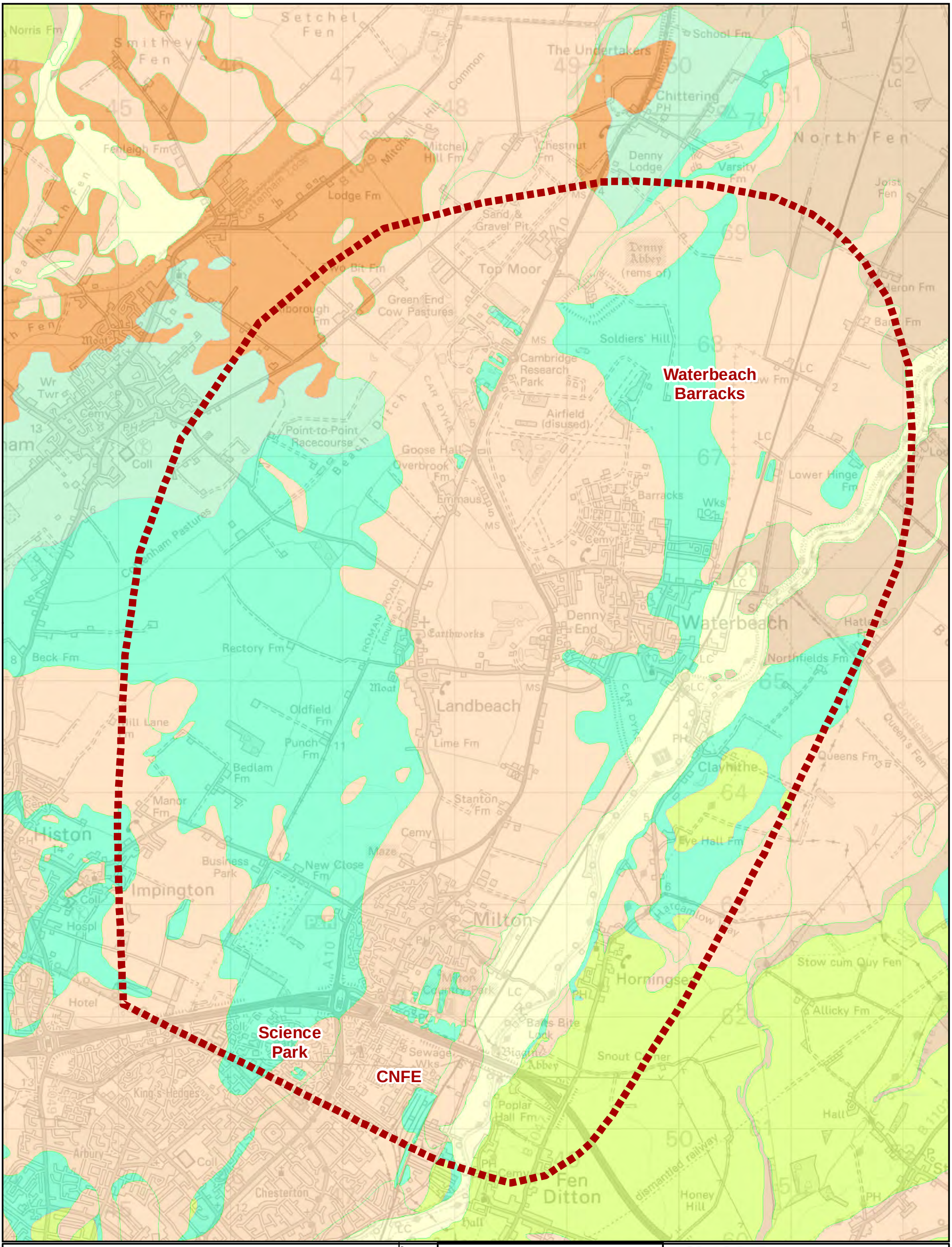
Date: 16/02/16



Legend

Bedrock

- Gault formation-Mudstone
- West Melbury Marly Chalk Formation - Chalk
- Woburn Sands Formation - Sandstone
- Kimmeridge Clay Formation - Mudstone.

Superficial Deposits

- River terrace deposits 2 - Sand and gravel
- Alluvium - Clay, Silt, Sand and gravel

Drawn	LDG
Checked	CB
Approved	XX
Status	DFT
Rev	P01

Map Number: 11

Map Name: 1:50k SCALE SUPERFICIAL AND BEDROCK GEOLOGY

A10N TRANSPORT STUDY

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Scale at A3: 1:30,000

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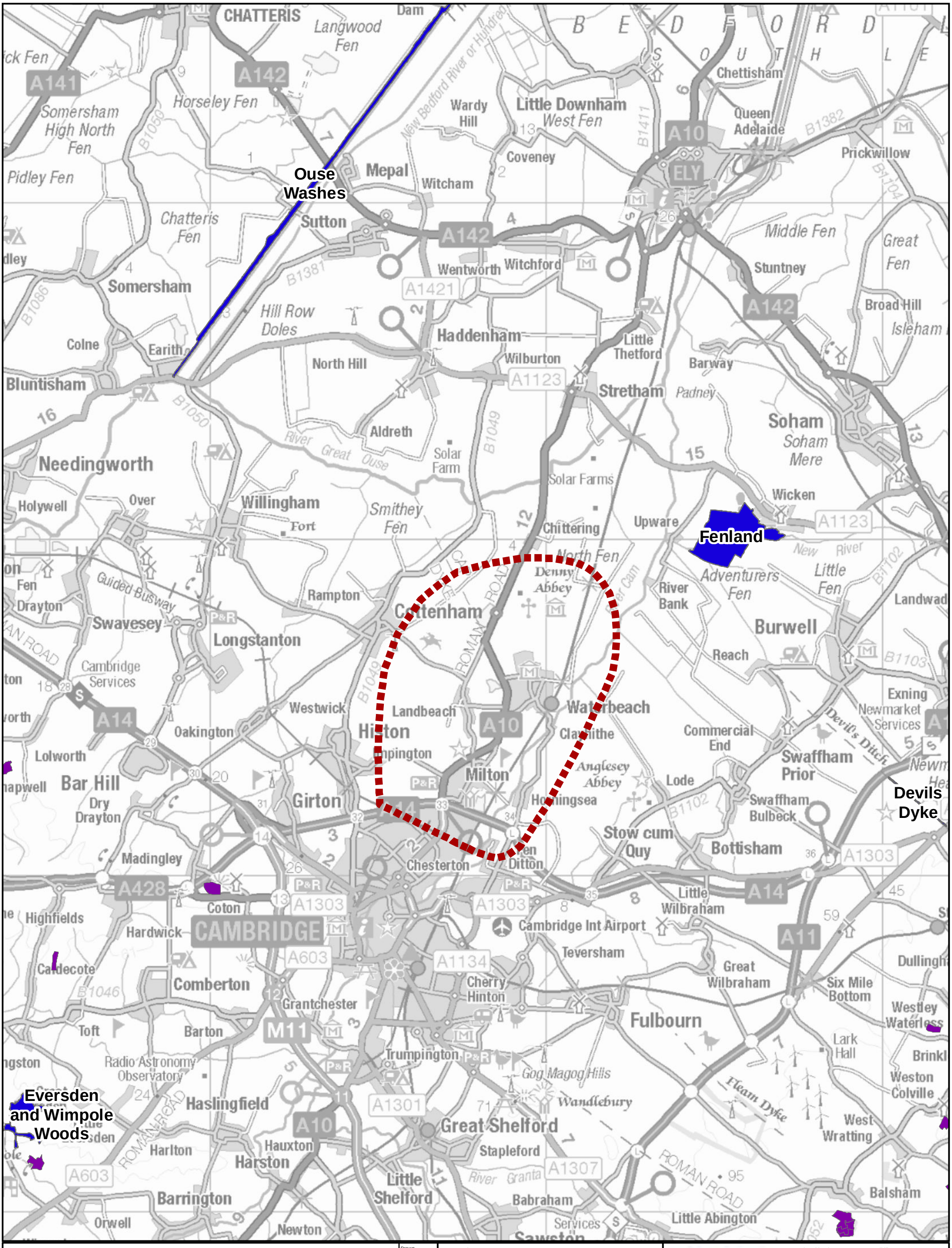
Date: 29/02/16



Legend

- AONB © Natural England
- Special Areas of Conservation © Natural England
- Ancient Woodland
- Study Area

Drawn	LDG
Checked	CB
Approved	XX
Status	DFT
Rev	P01
Map Number	12
Map Name	LANDSCAPE
	A10N TRANSPORT STUDY

Mott MacDonald

Scale at A3: 1:100,000

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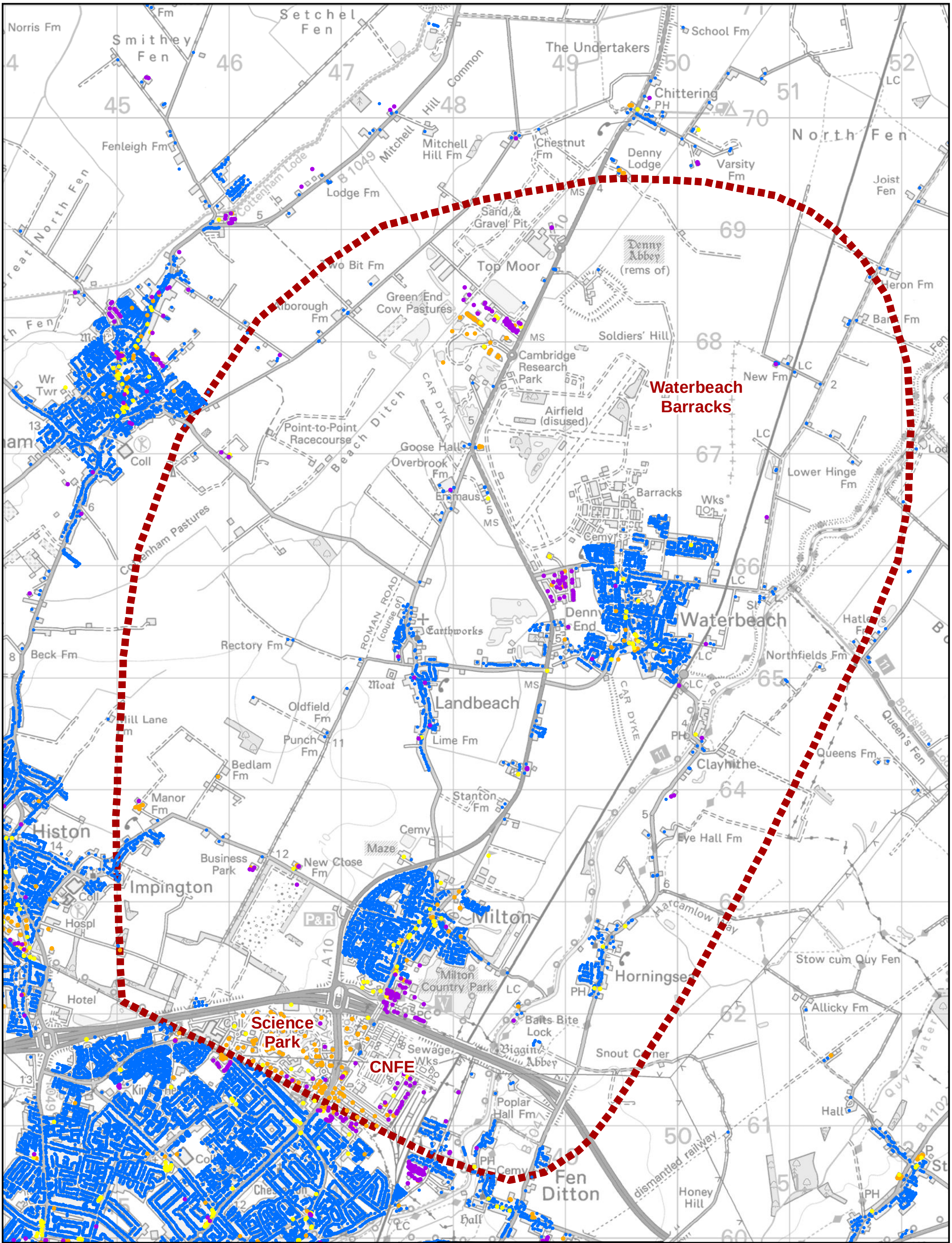
Date: 04/03/16



Legend

- Study Area
- Residential Locations from Addressbase
- Industrial Locations from Addressbase
- Office Locations from Addressbase
- Retail Locations from Addressbase

Drawn	LDG
Checked	CB
Approved	XX
Status	DFT
Rev	P01
Map Number	13
Map Name	SENSITIVE RECEPTORS
	A10N TRANSPORT STUDY

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Scale at A3: 1:30,000

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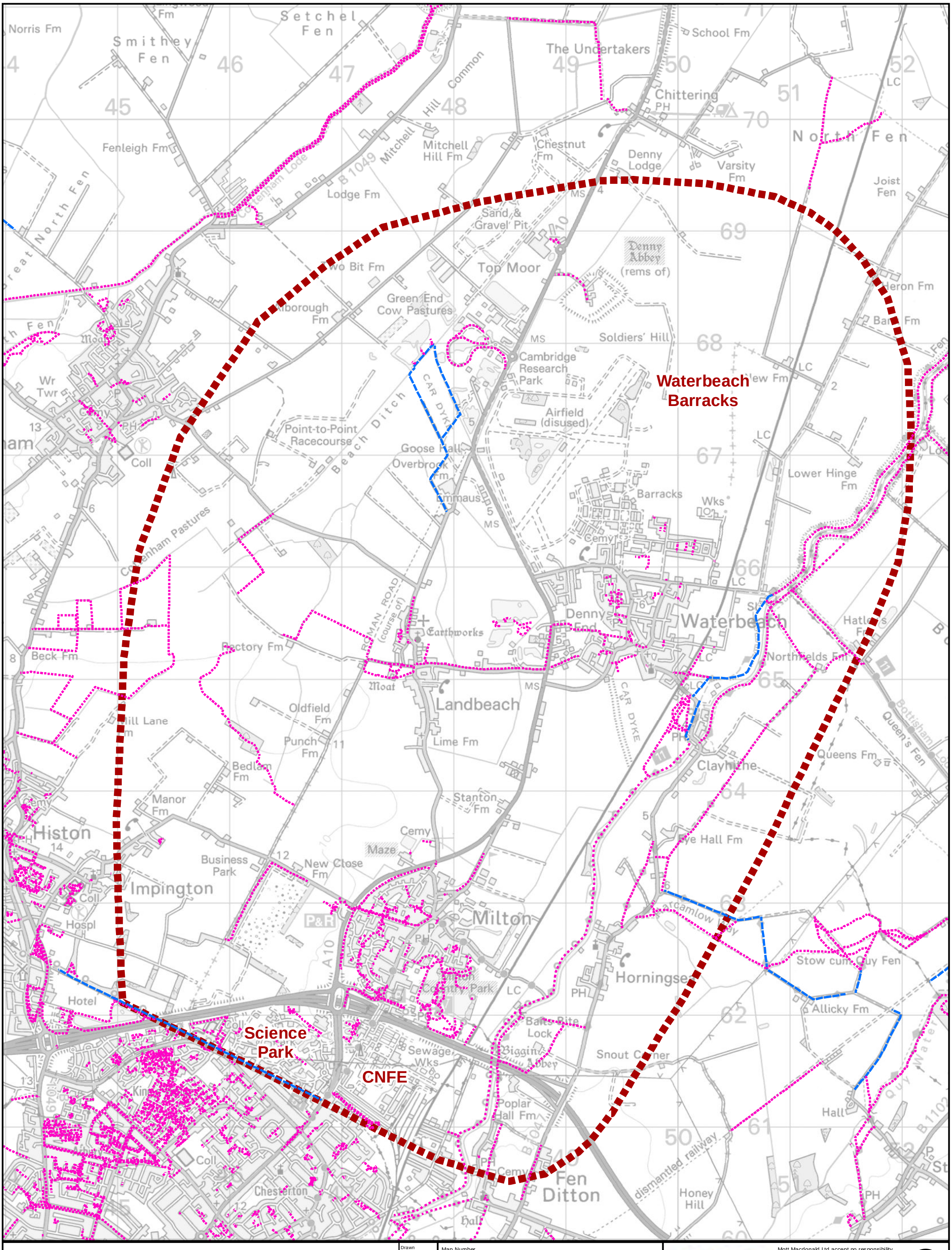
Metres

Date: 16/02/16



Legend

- Study Area
- Footpath
- Bridleway

Drawn	LDG
Checked	CB
Approved	XX
Status	DFT
Rev	P01
Map Number	14
Map Name	PUBLIC RIGHTS OF WAY
	A10N TRANSPORT STUDY

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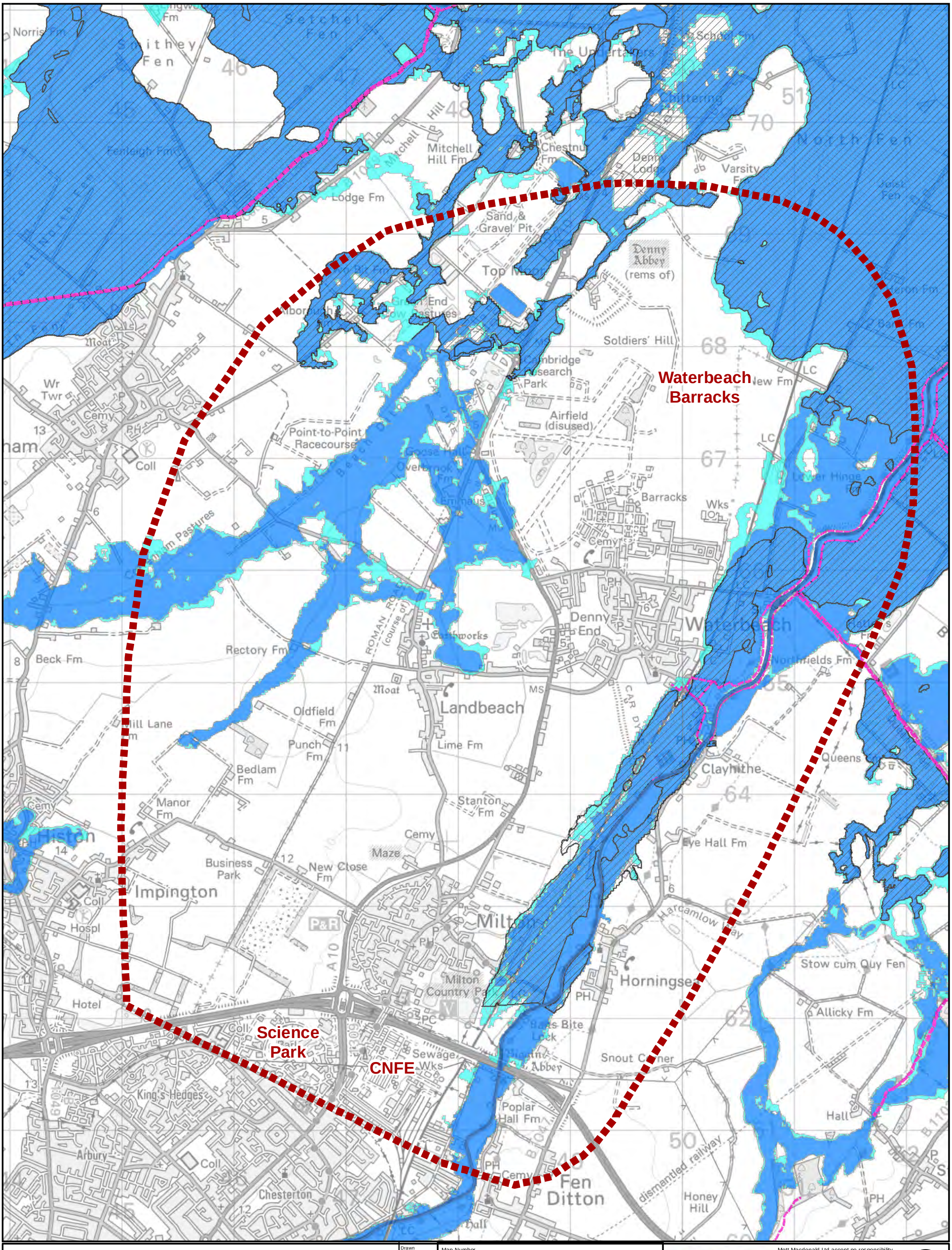
Metres

Date: 29/02/16



Legend

- Extreme Flooding from Rivers or Sea withouth Defences (Zone 2)
- Flooding from Rivers or Sea withouth Defences (Zone 3)
- Area Benefiting from Flood Defence
- Flood Defence
- River Cam

Drawn	LDG
Checked	CB
Approved	XX
Status	DFT
Rev	P01

Map Number: 15

Map Name: FLOOD MAP FOR PLANNING (RIVERS AND SEA)

A10N TRANSPORT STUDY

Mott MacDonald

Scale at A3: 1:30,000

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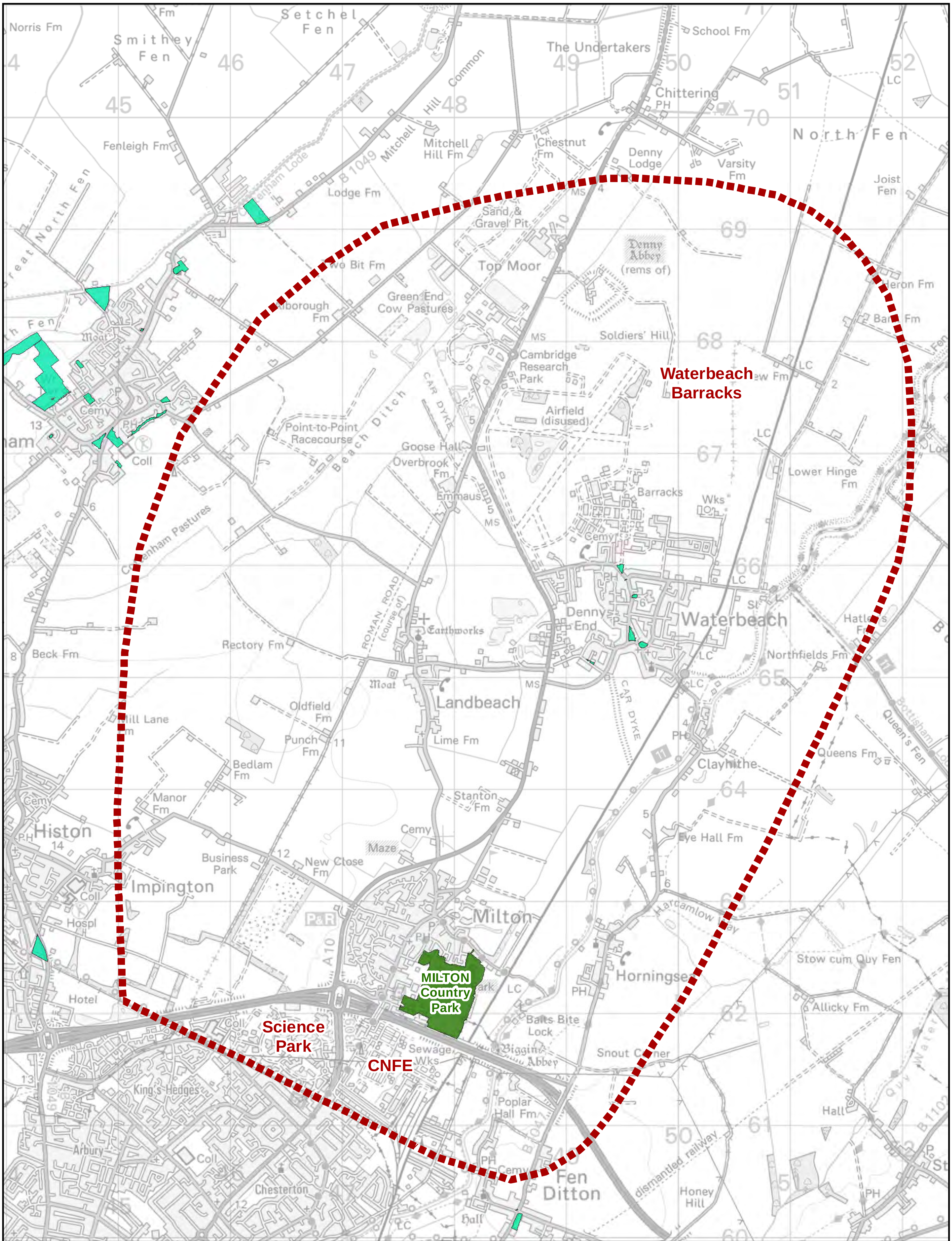
Date: 29/02/16



Legend

- Study Area
- Country Parks
- Local Green Spaces

Drawn	LDG
Checked	CB
Approved	XX
Status	DFT
Rev	P01

Map Number: 16

Map Name: RECREATIONAL ASSETS

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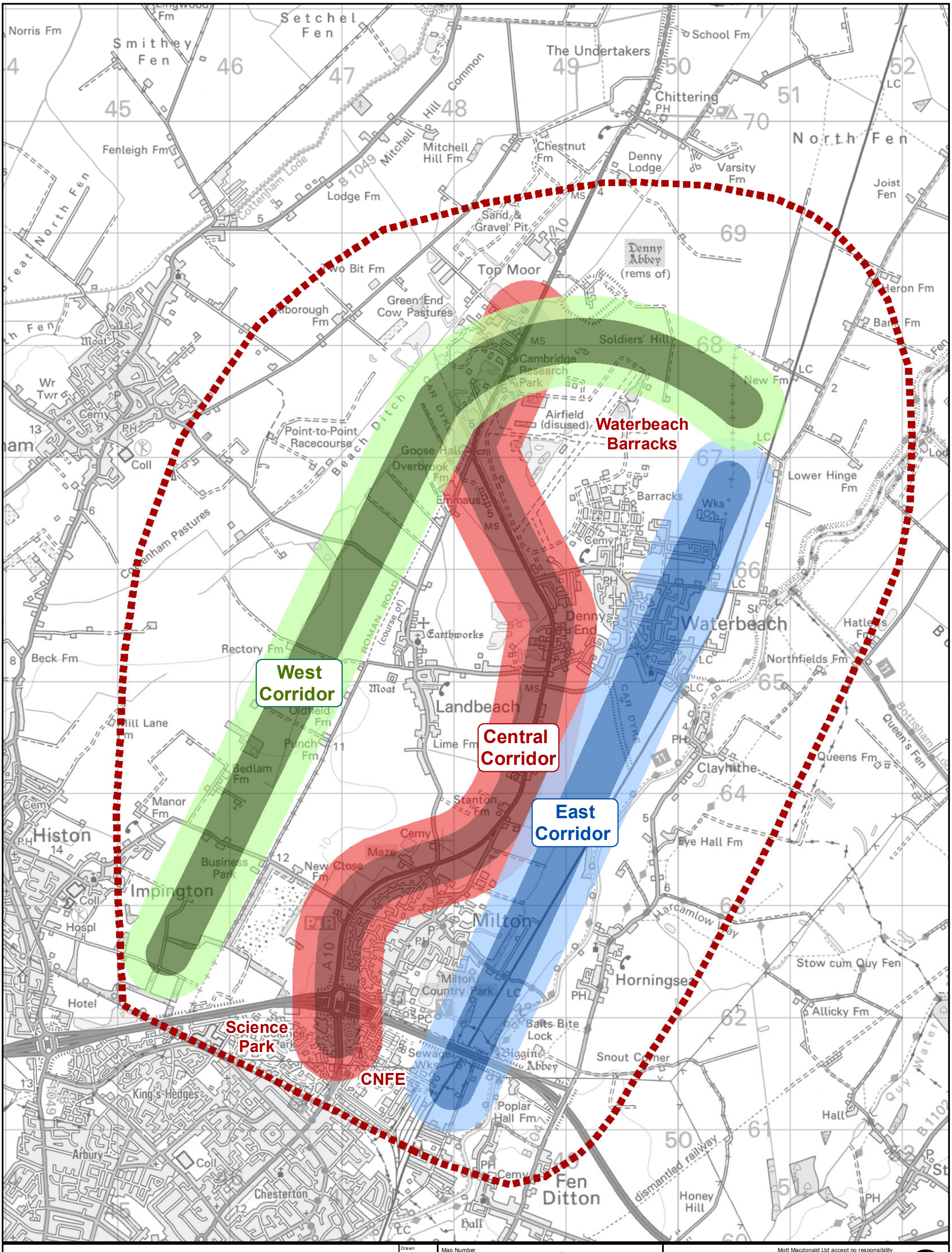
Scale at A3: 1:30,000

0 250 500 750 1,000 1,250 Metres

Date: 17/02/16

Appendix C. Corridor Options



Legend

- Study Area
- West Corridor
- East Corridor
- Central Corridor

* Corridors are indicative only. They are identified only for the purpose of constraints mapping and they do not indicate specific route alignments, and should not be interpreted as such.

Drawn	LDG
Checked	CB
Approved	XX
Status	DFT
Rev	P01
Map Number	2
Map Name	CORRIDORS
	A10N TRANSPORT STUDY

Mott MacDonald

Scale at A3: 1:30,000

0 200 400 600 800 Metres

Date: 01/03/16

Appendix D. West Corridor Proforma

Appendix D

A10 Corridor Options Assessment – West Corridor

Glossary of Terms

Extents

Widespread Extent: The constraint affects more than 50% of the defined area of the respective corridor option and adjacent areas that may also be affected.

Discreet Extent: The constraint is present at specific locations within the corridor option and adjacent areas that also be affected.

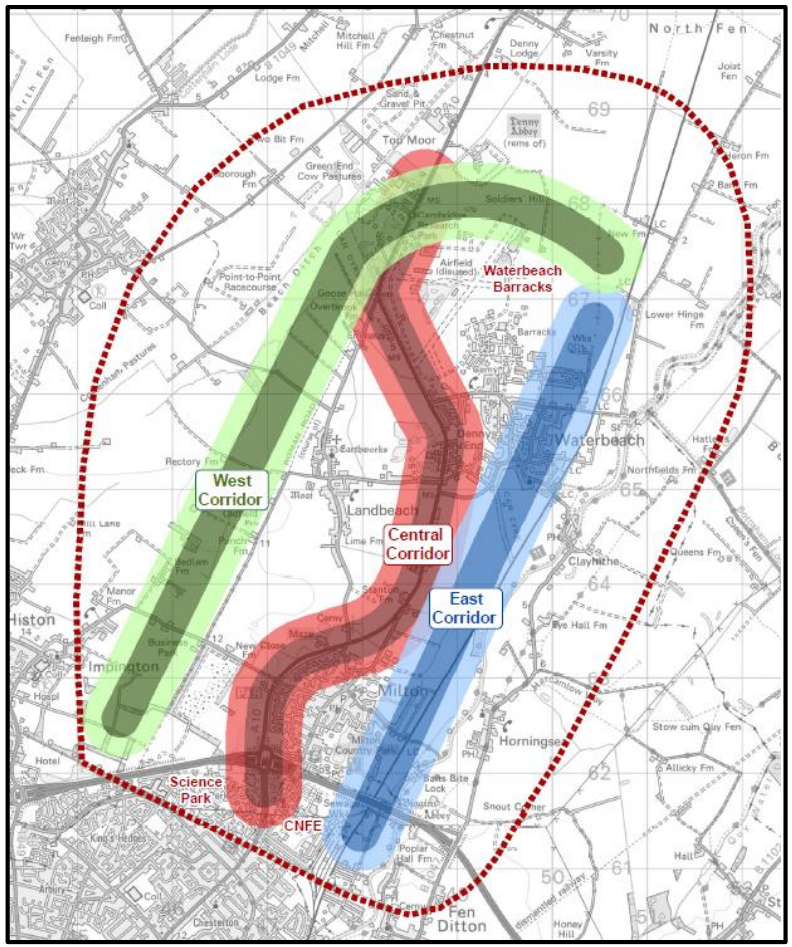
Impact

Major Impact: The identified constraint, if unavoidable, has a potential major cost involved and / or a major impact on deliverability and programme.

Medium Impact: The identified constraint, if unavoidable, has a potential medium cost involved and / or a medium impact on deliverability and programme.

Low Impact: The identified constraint, if unavoidable, has a potential low cost involved and / or a low impact on deliverability and programme.

Negligible / Neutral Impact: The constraint has a potential negligible or neutral cost involved and / or impact on deliverability and programme.



Constraint	Extents	Commentary	Potential Impact Range from Transport Interventions	Possible Mitigation / Recommended Further Work
Land Use: Committed Developments	Discreet	Extant planning permissions and planning policy allocations represent committed developments. Using GIS data provided by South Cambridgeshire Council and Cambridgeshire County Council, this information has been mapped on Map 3 presented at **Appendix B**. Whilst the information provided covers all applications and allocations for land, this Constraints Study has focussed on major developments within and adjacent to the corridor areas as opposed to works that are only minor in nature (i.e. changes of use). There are no major committed developments within the broad West Corridor area other than those associated with the Science Park, Waterbeach Barracks and Cambridge Research Park, which any transport infrastructure interventions in the corridor area will support in terms of overall sustainability.	Negligible / Neutral Impacts	Constant monitoring of applications within the defined Study Area.

Land Use: Green Belt	Widespread	The majority of the West Corridor area, with the exception of land to the north of the Cottenham Road, falls within the Green Belt as shown on Map 4 presented at **Appendix B**. Relevant national and local planning policies attaches a great importance to Green Belts and seeks to restrict inappropriate development. Paragraph 90 of the National Planning Policy Framework ('NPPF' or 'the Framework' hereafter) outlines certain forms of development that are not inappropriate development in the Green Belt. This includes local transport infrastructure provided the requirement for a Green Belt location can be demonstrated, it preserves the openness of the Green Belt and does not conflict with the purposes of including land in the Green Belt. Whilst in principle not inappropriate development in the Green Belt it will therefore be necessary to demonstrate a requirement for local transport infrastructure being located within this constraint. Any transport infrastructure will need to preserve the openness of the Green Belt and not conflict with the purposes of including land within it (Paragraph 90 of the National Planning Policy Framework). Sensitive engineering design as part of any optioneering exercise would be required from the outset to demonstrate lowest levels of harm to the Green Belt. This includes ensuring that any associated buildings and structures are of a suitable size relatable to the operational requirements.	Low Impacts	Sensitive engineering design as part of any optioneering exercise would be required from the outset to demonstrate lowest levels of harm to the Green Belt.

Land Take: Agricultural Land	Widespread	The NPPF confirms that 'best and most versatile agricultural' land encompasses land in grades 1, 2 and 3a of the Agricultural Land Classification. The majority of the West Corridor area falls within open agricultural land, comprising a mixture of grade 2 and 3 of the Agricultural Land Classification as shown on Map 5 presented at **Appendix B**. Planning policy contained in the NPPF confirms that local planning authorities should take into account the economic and other benefits of the best and most versatile land. Where significant development of agricultural land is deemed necessary, local planning authorities should seek to use areas of poorer quality land in preference to that of a higher quality. The loss of any 'best and most versatile agricultural land' as part of delivering necessary transport infrastructure will need to be appropriately justified and weighed against the merits of the scheme. A wider analysis of agricultural land in the administrative area would be form an integral part of understanding the impact any loss of 'best and most versatile agricultural land' required in connection with the transport infrastructure. Where possible the highest grades of agricultural land should be avoided in preference to those of a lower quality to reduce associated levels of impact.	Medium to Low Impacts	Avoiding where possible the highest grades of agricultural land. This would form integral part of a route options assessment.

Land Ownership and Assembly	Widespread	A full review of land ownership has not been undertaken as part of the constraints study. Available information in relation to public sector assets however has been obtained and reviewed, as shown on Map 6 presented at **Appendix B**. There are portions of County Council Farms Estate land within the West Corridor area. Depending on the nature of the transport intervention, and whilst there is certain amounts of public land available for the transport infrastructure, it is likely that some portions of private land will be required which would require a degree of land assembly. This is a common aspect with transport infrastructure projects. There appears to also be a small number of existing rural buildings / properties within the corridor area.. It is recommended that additional work is undertaken to understand the land ownership constraints associated within the Study Area.	Major to Low Impacts	A detailed review of land ownership within the Study Area.
Heritage	Discreet	Listed Buildings (Grade I, Grade II and Grade II), Scheduled Monuments and Conservation areas are mapped on the Heritage Assets plan (Map 7) presented at **Appendix B**. **Listed Buildings:** There are a number of Listed Buildings within the broadly defined West Corridor areas, including: • Barn at West of Rectory Farmhouse (Grade II) west of Landbeach • In the Denny Abbey area: Gates Piers (Grade II) • Denny Abbey (Grade I) • Denny Abbey Refectory (Grade I) • Barn to north of Denny (Grade II)	Major to Negligible / Neutral Impacts	Sensitive engineering design as part of any optioneering exercise would be required from the outset to reduce or avoid any potential direct impacts and harm with regards to setting of heritage assets.

		There are also a number of assets located within 1km of the corridor, with large concentrations within the village of Landbeach, two Grade I Listed Buildings at Histon and high concentrations at Cottenham (outside of the Study Area). A Transport Intervention in this location (either within or outside the corridor) could have an impact upon the significance of the heritage assets including within their setting. Impacts on Listed Buildings will require further consideration as part of the next stage of assessment. **Scheduled Monuments:** Denny Abbey Scheduled Monument is located within the broadly defined West Corridor area. Landbeach Medieval Village is also located within 500m of the corridor. Further consideration will need to be given to potential impacts on the setting of Scheduled Ancient Monuments. **Archaeology:** There are no known areas of archaeological interest within the corridor area. However, mindful of the historic nature of surrounding settlements further investigation will be required in this regard as part of the next stage of the assessment. It is noted that the course of the historic Roman Road runs adjacent to the West Corridor area to the west of Landbeach. **Conservation Areas:** There are no Conservation Areas within the broad West Corridor area. However, the Conservation Areas at Landbeach and Impington are within 750 m of the corridor. Consideration will need to be given to potential impacts on the setting of nearby Conservation Areas.		

		Registered Parks and Gardens: There are no Registered Parks and Gardens within the Study Area.		
Environment / Ecology	Discreet	Environmental and ecological constraints are shown on the Sites of Special Scientific Interest (SSSI) and Local Nature Reserves (LNR) plan (Map 8) and the Priority Habitats plan (Map 9) both presented at **Appendix B**. A portion of the southern section of the route falls within the SSSI impact zone for Histon Road, an area of geological importance south of Orchard Park in Cambridge. The corridor also passes within 1km of Worts Meadow LNR, an area of local importance in Landbeach. The West Corridor area also includes several areas of deciduous woodland priority habitat.	Medium Impacts	Natural England will require consultation during the planning process relating to development within the SSSI impact zone and impact upon priority habitats. As part of this process mitigation would be identified. Given the extent of the issues identified, it is unlikely to significantly impact on delivery of transport schemes. A Phase 1 Ecology survey should be undertaken to identify the presence of protected species should be undertaken as part of route option appraisals.
Physical Considerations	Widespread	Physical considerations are shown on the Landfill Sites plan (Map 10) and 1:50k Scale Superficial and Bedrock Geology plan (Map 11) presented at **Appendix B**. The southern end of the West Corridor area passes within 1km of the former Milton Lane Landfill Site which accepted Special Waste and was operated by East Waste Ltd under Waste Management Licence number 70140, integrated pollution prevention control number XP3635NA and environmental permit reference no. EAEPR\EA/EPR/ZP3690NV/V002. Waterbeach is a former Airfield. The Ministry of Defence Land Estates Land Quality Assessment (LQA) should be viewed to	Major to Low Impacts	A desk top study including historical mapping to collate existing information from available public sources and the Ministry of Defence should be undertaken to identify historical industry that may pose a constraint for the proposed route options. Based upon available evidence there are no significant geological issues which would

		identify the presence of any radioactive waste, underground structures etc. as part of the next stage of assessment. Historical industrial land may also exist in the West Corridor area which could pose a constraint on the route option selection. Parts of the West Corridor area (in the north and in the south) are underlain by Superficial Deposits of River Terrace sands and gravels. In other areas (predominantly the central section) the Superficial Deposits are absent. The bedrock geology comprises the Gault Formation, a mudstone with a weathered profile. The variable ground conditions may require a variable approach to the formation of the proposed transport intervention which would be identified during ground investigations.		prevent a scheme being delivered. A ground investigation along the route of the preferred option to identify formation conditions.
Landscape	Widespread	There are no Areas of Outstanding Natural Beauty, Special Area of Conservation Conservation or Ancient Woodlands within a 2/3 mile radius of the study area as shown on Map 12 presented at **Appendix B**. Due to this separation it considered that there will be no impacts on these designations. Notwithstanding the above the majority of the West Corridor area is located outside of the settlement area and is within the rural area. Any transport infrastructure would need to be sympathetic to the rural area and sensitively designed from the outset in view of this constraints. Hard and soft landscaping proposals will form an integral part of proposals in order to reduce levels of impact on the constraint.	Medium to Low Impacts	Sensitive engineering design as part of any optioneering exercise would be required from the outset to reduce the impact on the landscape. Hard and soft landscaping proposals will be integral to reducing levels of impact on the constraint.

Amenity	Discreet	Sensitive residential receptors are plotted on Map 13 presented at **Appendix B**. The plan shows that there are a number of residencies located within or adjacent to the West Corridor area and there could be amenity issues in the form of noise, air quality and lighting impacts resulting from the provision of transport infrastructure. In order to reduce such impacts sensitive engineering design as part of any optioneering exercise would be required from the outset to avoid and reduce any impacts on sensitive residential receptors. Appropriate noise, air quality and light impact assessments will be required to understand levels of impact and required mitigation measures.	Major to Medium Impacts	Sensitive engineering design as part of any optioneering exercise would be required from the outset to reduce amenity impacts.
Public Rights of Way	Discreet	Public Rights of Way are shown on Map 14 presented at **Appendix B**. The West Corridor area impacts upon approximately 4no. public footpaths and 1no. Bridleway. Under Section 257 of the Town and Country Planning Act 1990 a footpath or bridleway can be closed or diverted to enable development to take place. This may be required in order to deliver the required transport intervention.	Low Impacts	Diversion of footpaths / bridleways should be considered where necessary in connection with the transport intervention.
Flood Map for Planning	Discreet	The Flood Map for Planning (Rivers and Sea) is shown on Map 15 presented at **Appendix B**. The West Corridor area north of Cottenham passes through Flood Zones 2 and 3 as defined by national planning policy guidance. Soakaway drainage is unlikely to be possible in the central section of the West Corridor area where it is directly underlain by the Gault Formation.	Medium Impacts	A Flood Risk Assessment for the preferred option should be undertaken once the nature of the intervention is defined. A Sustainable Drainage scheme would be required to mitigate impacts on flood risk. A ground investigation should be undertaken along the preferred route option including

				soakaway testing.
Recreational Assets	Discreet	Country Parks and Local Green Spaces are mapped on the Recreational Assets plan (Map 16) presented at **Appendix B**. The plan shows that there are no recreational assets within or adjacent to the West Corridor area. There would therefore be no detrimental impact resulting from the provision of identified transport infrastructure.	Negligible / Neutral Impacts	None identified at this stage of assessment.

Appendix E. Central Corridor Proforma

Appendix E

A10 Corridor Options Assessment – Central Corridor

Glossary of Terms

Extents

Widespread Extent: The constraint affects more than 50% of the defined area of the respective corridor option and adjacent areas that may also be affected.

Discreet Extent: The constraint is present at specific locations within the corridor option and adjacent areas that also be affected.

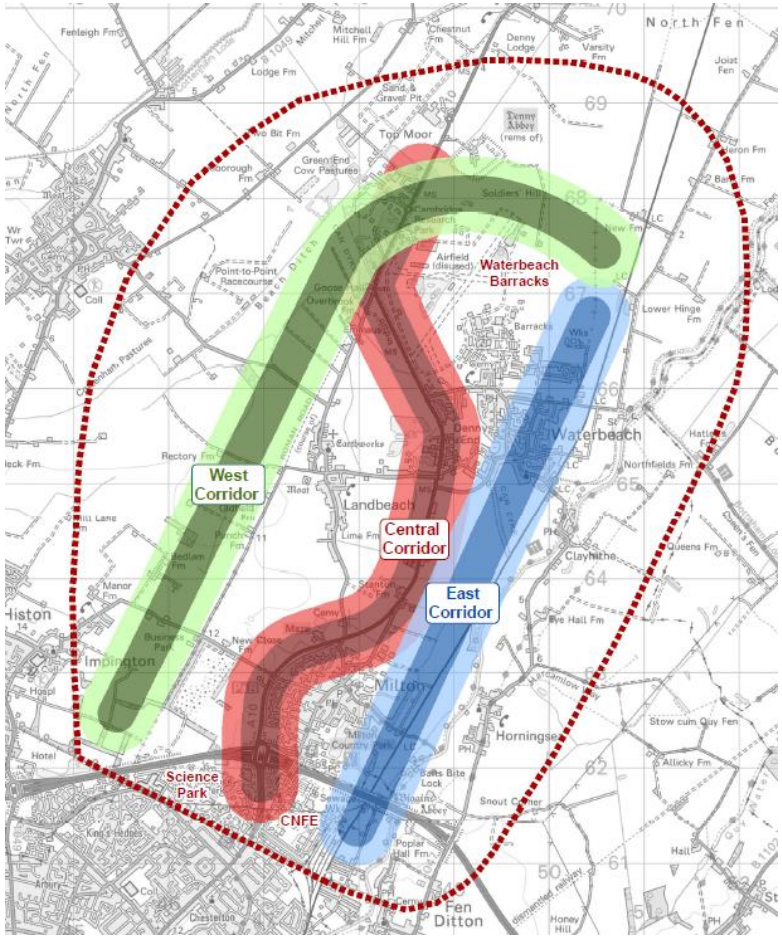
Impact

Major Impact: The identified constraint, if unavoidable, has a potential major cost involved and / or a major impact on deliverability and programme.

Medium Impact: The identified constraint, if unavoidable, has a potential medium cost involved and / or a medium impact on deliverability and programme.

Low Impact: The identified constraint, if unavoidable, has a potential low cost involved and / or a low impact on deliverability and programme.

Negligible / Neutral Impact: The constraint has a potential negligible or neutral cost involved and / or impact on deliverability and programme.



Constraint	Extents	Commentary	Potential Impact Range from Transport Interventions	Possible Mitigation / Recommended Further Work
Land Use: Committed Developments	Discreet	Extant planning permissions and planning policy allocations represent committed developments. Using GIS data provided by South Cambridgeshire Council and Cambridgeshire County Council, this information has been mapped on Map 3 presented at **Appendix B**. Whilst the information provided covers all applications and allocations for land, this Constraints Study has focussed on major developments within and adjacent to the corridor areas as opposed to works that are only minor in nature (i.e. changes of use). There are no major committed developments within the broad Central Corridor area other than those associated with the Science Park, Waterbeach Barracks and Cambridge Research Park, which any transport infrastructure interventions in the corridor area will support in terms of overall sustainability.	Negligible / Neutral Impacts	Constant monitoring of applications within the defined Study Area.
Land Use: Green Belt	Widespread	The majority of the Central Corridor falls within the Green Belt as shown on Map 4 presented at **Appendix B**. However, any transport intervention would be focussed on the existing A10 which is also located within the Green Belt. Relevant national and local planning policies attaches a great importance to Green Belts and seeks to restrict inappropriate development. Paragraph 90 of the National Planning Policy Framework ('NPPF' or 'the Framework' hereafter) outlines certain forms of development that are not inappropriate development in the Green Belt. This includes local transport infrastructure provided the requirement for a Green Belt location can be demonstrated, it preserves the openness of the	Low Impacts	Sensitive engineering design as part of any optioneering exercise would be required from the outset to demonstrate lowest levels of harm to the Green Belt.

		Green Belt and does not conflict with the purposes of including land in the Green Belt. Whilst in principle not inappropriate development in the Green Belt it will therefore be necessary to demonstrate a requirement for local transport infrastructure being located within this constraint. Any transport infrastructure will need to preserve the openness of the Green Belt and not conflict with the purposes of including land within it (Paragraph 90 of the National Planning Policy Framework). Sensitive engineering design as part of any optioneering exercise would be required from the outset to demonstrate lowest levels of harm to the Green Belt. This includes ensuring that any associated buildings and structures are of a suitable size relatable to the operational requirements.		
Land Take: Agricultural Land	Widespread	The NPPF confirms that 'best and most versatile agricultural' land encompasses land in grades 1, 2 and 3a of the Agricultural Land Classification. The majority of the Central Corridor area falls within open agricultural land, comprising a mixture of grade 2 and 3 of the Agricultural Land Classification as shown on Map 5 presented at **Appendix B**. Planning policy contained in the NPPF confirms that local planning authorities should take into account the economic and other benefits of the best and most versatile land. Where significant development of agricultural land is deemed necessary, local planning authorities should seek to use areas of poorer quality land in preference to that of a higher quality. The loss of any 'best and most versatile agricultural land' as part of delivering necessary transport infrastructure will need to be appropriately justified and weighed against the merits of the scheme. A wider analysis of agricultural land in the administrative area would be form an integral part of	Medium to Low Impacts	Avoiding where possible the highest grades of agricultural land. This would form an integral part of a route options assessment.

		understanding the impact any loss of 'best and most versatile agricultural land' required in connection with the transport infrastructure. It is noted that in this corridor transport infrastructure will be focussed on the existing A10 so agricultural land impact may not be as severe as a standalone transport intervention. As a general principle, where possible the highest grades of agricultural land should be avoided in preference to those of a lower quality to reduce associated levels of impact.		
Land Ownership and Assembly	Widespread	A full review of land ownership has not been undertaken as part of the constraints study. Available information in relation to public sector assets however has been obtained and reviewed, as shown on Map 6 presented at **Appendix B**. There are portions of County Urban Estate and County Council Farms Estate land within the Central Corridor area. Depending on the nature of the transport intervention, and whilst there is certain amounts of public land available for the transport infrastructure, it is likely that some portions of private land will be required would require a degree of land assembly. This is a common aspect with transport infrastructure projects. There also appears to be a large number of properties to the east of the existing A10 at Milton and a small number of rural properties within the corridor area that may also be a consideration depending on routing and detailed design. It is recommended that additional work is undertaken to understand the land ownership constraints associated within the Study Area.	Major to Low Impacts	A detailed review of land ownership within the Study Area.
Heritage	Discreet	Listed Buildings (Grade I, Grade II and Grade II*), Scheduled Monuments and Conservation Areas are mapped on the Heritage Assets Plan (Map 7) presented at **Appendix B**.	Medium to Negligible / Neutral Impacts	Sensitive engineering design as part of any optioneering exercise would be required from the outset to reduce or

		Listed Buildings: There are three structures that have Listed Building status in the Central Corridor area: • Milestone south of junction with Waterbeach Road at NGR 487 649 (Grade II) • Milestone half mile south of Green End Junction and Goose Hall at NGR 484 664 (Grade II) • Milestone half mile north of Goose Hall at NGR 485 679 (Grade II) There are a number of assets within 750 m of the corridor, with large concentrations within Milton, Landbeach and Waterbeach. Further consideration will need to be given to potential impacts on the setting of nearby Listed Buildings. A transport intervention in this location could have an impact upon the significance of the heritage assets including within their setting. However, given that the assets directly contained within the corridor are 'milestones' there are options to incorporate these within any future design, removing the need for destruction and reducing setting effects. This should be explored further as part of the next stage of assessment. **Scheduled Monuments:** There are no Scheduled Monuments within the Central Corridor area. However, Car Dyke, Waterbeach Abbey and Landbeach Medieval Village is within 1km. Whilst the delivery of transport infrastructure within the Central Corridor area does not contain any Scheduled Monuments, further consideration will need to be given to potential setting impacts on the setting of such assets. **Archaeology:** There are no known areas of archaeological interest within the Central Corridor area. However, mindful of		avoid potential direct impacts and harm with regards to setting of heritage assets.

		the historic nature of surrounding settlements, further investigation will be required in this regard as part of the next stage of assessment. **Conservation Areas:** There are no Conservation Areas within the Central Corridor Area. However, Milton Conservation Area and Waterbeach Conservation Area are within 500m of the corridor. Landbeach Conservation Area is located within 1km of the corridor. Consideration will need to be given to potential impacts on the setting of nearby Conservation Areas. **Registered Parks and Gardens:** There are no Registered Park and Gardens in the Study Area.		
Environment / Ecology	Discreet	Environmental and ecological constraints area shown on the Sites of Special Scientific Interest (SSSI) and Local Nature Reserves (LNR) plan (Map 8) and the Priority Habitats plan (Map 9) both presented at **Appendix B**. The Central Corridor area does not fall within a SSSI risk zone for surface transport. It is not within 1km of any LNR. The Central Corridor area has several discreet areas of deciduous woodland, and a small area of traditional orchard designated as priority habitat within it.	Medium to Low Impacts	Natural England will require consultation during the planning process relating to development impact upon priority habitats. As part of this process potential mitigation would be identified Given the extent of the issues identified, it is unlikely to significantly impact on delivery of transport schemes. A Phase 1 Ecology survey should be undertaken to identify the presence of protected species as part of the route options assessment.
Physical Considerations	Widespread	Physical considerations are shown on the Landfill Sites plan (Map 10) and 1:50k Scale Superficial and Bedrock Geology Plan (Map 11) presented at **Appendix B**. The southern end of the Central Corridor is adjacent to the	Major to Low Impacts	A desk top study including historical mapping to collate existing information from available public sources and the Ministry of Defence should

		former Milton Lane Landfill Site which accepted Special Waste and was operated by East Waste Ltd under Waste Management Licence number 70140, integrated pollution prevention control number XP3635NA and environmental permit reference no. EAEPR\EA/EPR/ZP3690NV/V002. Waterbeach is a former Airfield. The Ministry of Defence Land Estates Land Quality Assessment (LQA) should be viewed to identify the presence of any radioactive waste, underground structures etc. as part of the next stage of assessment. Historical industrial land may also exist in the Central Corridor area which could pose a constraint on the route option selection. The majority of the Central Corridor area - with the exception of the south where Superficial Deposits are absent - is underlain by Superficial Deposits of River Terrace sands and gravels. The bedrock geology comprises the Gault Formation, a mudstone with a weathered profile. (Map 17) The existing A10 may also have earthworks associated with it. The variable ground conditions may require a variable approach to the formation of the proposed transport intervention which would be identified during ground investigations.		be undertaken to identify historical industry that may pose a constraint for the proposed route options. Based upon available evidence there are no significant geological issues which would prevent the scheme being delivered. A ground investigation along the route of the preferred option to identify formation conditions.
Landscape	Widespread	There are no Areas of Outstanding Natural Beauty, Special Area of Conservation or Ancient Woodlands within a 2/3 mile radius of the study area as shown on Map 12 presented at **Appendix B**. Due to this separation it considered that there will be no impacts on these designations. It is noted that in this corridor transport infrastructure will be focussed on the existing A10 which is already an established feature of the landscape. Notwithstanding this aspect the	Low Impacts	Sensitive engineering design as part of any optioneering exercise would be required from the outset to reduce the impact on the landscape. Hard and soft landscaping proposals will be integral to reducing levels of impact on

		corridor is located within the rural area, and any transport infrastructure would need to be sympathetic to this and sensitively designed from the outset in view of this constraint. Hard and soft landscaping proposals will form an integral part of proposals in order to reduce levels of impact on the constraint.		the constraint.
Amenity	Widespread	Sensitive residential receptors are plotted on Map 13 at **Appendix B**. The plan shows that there a number of residencies located within or adjacent to the Central Corridor area, particularly to the east of the existing A10. There could be amenity issues in the form of noise, air quality and lighting impacts resulting from the provision of transport infrastructure. In order to reduce such impacts sensitive engineering design as part of any optioneering exercise would be required from the outset to avoid and reduce any impacts on sensitive residential receptors. Appropriate noise, air quality and light impact assessments will be required to understand levels of impact and required mitigation measures.	Major to Medium Impacts	Sensitive engineering design as part of any optioneering exercise would be required from the outset to reduce amenity impacts.
Public Rights of Way	Discreet	Public Rights of Way area shown on Map 14 presented at **Appendix B**. The Central Corridor area impacts upon a number of footpaths. Under Section 257 of the Town and Country Planning Act 1990 a footpath or bridleway can be closed or diverted to enable development to take place. This may be required in order to deliver the required transport intervention.	Low Impacts	Diversion of footpaths / bridleways should be considered where necessary in connection with the transport intervention.
Flood Map for Planning	Discreet	The Flood Map for Planning (Rivers and Sea) is shown on Map 15 presented at **Appendix B**. The Central Corridor, north of Denny End, passes through Flood Zones 2 and 3 as defined by national planning policy guidance and at its northern extent is located within an area	Medium Impacts	The Local Planning Authority should consult their Strategic Flood Risk Assessment. A Flood Risk Assessment for the preferred option should be undertaken once the nature of

		that benefits from flood defences. Soakaway drainage is unlikely to be possible in the southern section of the corridor where it is directly underlain by the Gault Formation.		the intervention is defined. A Sustainable Drainage scheme would be required to mitigate impacts on flood risk. A ground investigation should be undertaken along the preferred route option including soakaway testing.
Recreational Assets	Discreet	Country Parks and Local Green Spaces are mapped on the Recreational Assets plan (Map 16) presented at **Appendix B**. The plan shows that there are no recreational assets within or adjacent to the Central Corridor area. There would therefore be no detrimental impact resulting from the provision of identified transport infrastructure.	Negligible / Neutral Impacts	None identified at this stage of assessment.

Appendix F. East Corridor Proforma

Appendix F

A10 Corridor Options Assessment – East Corridor

Glossary of Terms

Extents

Widespread Extent: The constraint affects more than 50% of the defined area of the respective corridor option and adjacent areas that may also be affected.

Discreet Extent: The constraint is present at specific locations within the corridor option and adjacent areas that also be affected.

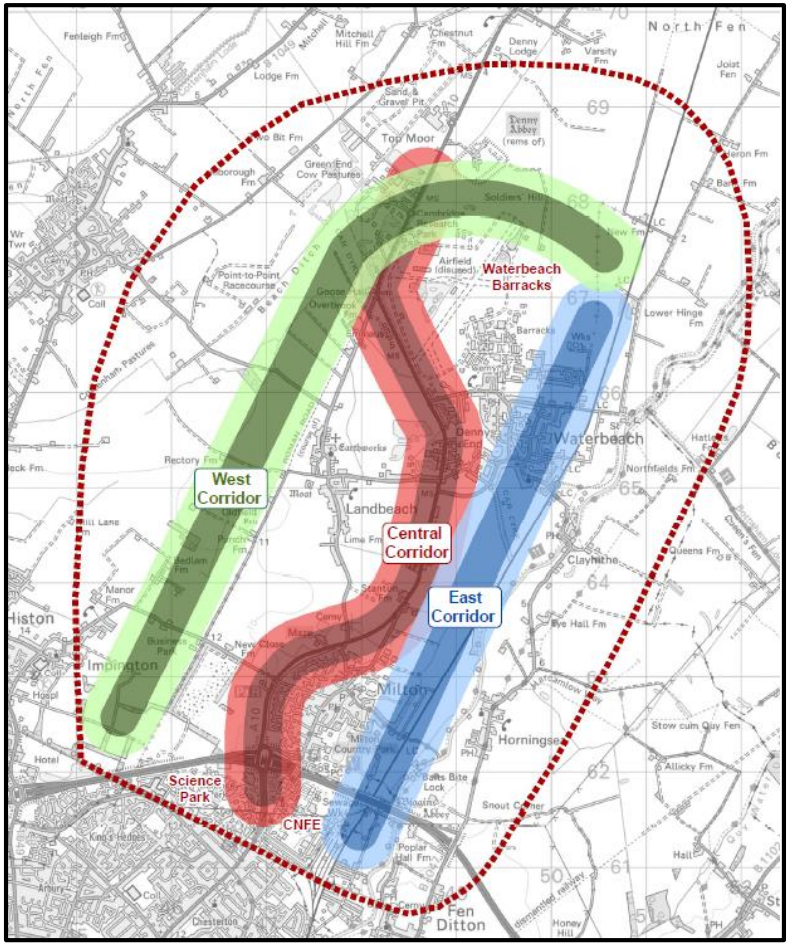
Impact

Major Impact: The identified constraint, if unavoidable, has a potential major cost involved and / or a major impact on deliverability and programme.

Medium Impact: The identified constraint, if unavoidable, has a potential medium cost involved and / or a medium impact on deliverability and programme.

Low Impact: The identified constraint, if unavoidable, has a potential low cost involved and / or a low impact on deliverability and programme.

Negligible / Neutral Impact: The constraint has a potential negligible or neutral cost involved and / or impact on deliverability and programme.



Constraint	Extents	Commentary	Potential Impact Range from Transport Interventions	Possible Mitigation / Recommended Further Work
Land Use: Committed Developments	Discreet	Extant planning permissions and planning policy allocations represent committed developments. Using GIS data provided by South Cambridgeshire Council and Cambridgeshire County Council, this information has been mapped on Map 3 presented at **Appendix B**. Whilst the information provided covers all applications and allocations for land, this Constraints Study has focussed on major developments within and adjacent to the corridor areas as opposed to works that are only minor in nature (i.e. changes of use). There is one major committed developments in the East Corridor area, a change of use of land to create a Multi-Sport Park on land between Waterbeach and Milton (Site Reference: 1). A transport intervention in the East Corridor area could potentially impact the delivery of the committed development identified above. However, if sensitively designed it could also provide an opportunity to improve access arrangements to the identified development parcels.	Major to Low Impacts	Constant monitoring of committed developments within the defined Study Area.

Land Use: Green Belt	Widespread	The majority of the East Corridor area, with the exception of land to the north of the Cottenham Road, falls within the Green Belt as shown on Map 4 presented at **Appendix B**. Relevant national and local planning policies attaches a great importance to Green Belts and seeks to restrict inappropriate development. Paragraph 90 of the National Planning Policy Framework ('NPPF' or 'the Framework' hereafter) outlines certain forms of development that are not inappropriate development in the Green Belt. This includes local transport infrastructure provided the requirement for a Green Belt location can be demonstrated, it preserves the openness of the Green Belt and does not conflict with the purposes of including land in the Green Belt. Whilst in principle not inappropriate development in the Green Belt it will therefore be necessary to demonstrate a requirement for local transport infrastructure being located within this constraint. Any transport infrastructure will need to preserve the openness of the Green Belt and not conflict with the purposes of including land within it (Paragraph 90 of the National Planning Policy Framework). Sensitive engineering design as part of any optioneering exercise would be required from the outset to demonstrate lowest levels of harm to the Green Belt. This includes ensuring that any associated buildings and structures are of a suitable size relatable to the operational requirements.	Low Impacts	Sensitive engineering design as part of any optioneering exercise would be required from the outset to demonstrate lowest levels of harm to the Green Belt.

Land Take: Agricultural Land	Widespread	The NPPF confirms that 'best and most versatile agricultural' land encompasses land in grades 1, 2 and 3a of the Agricultural Land Classification. The majority of the East Corridor area falls within open agricultural land, comprising a mixture of grade 2 and 3 of the Agricultural Land Classification as shown on Map 5 presented at **Appendix B**. Planning policy contained in the NPPF confirms that local planning authorities should take into account the economic and other benefits of the best and most versatile land. Where significant development of agricultural land is deemed necessary, local planning authorities should seek to use areas of poorer quality land in preference to that of a higher quality. The loss of any 'best and most versatile agricultural land' as part of delivering necessary transport infrastructure will need to be appropriately justified and weighed against the merits of the scheme. A wider analysis of agricultural land in the administrative area would be form an integral part of understanding the impact any loss of 'best and most versatile agricultural land' required in connection with the transport infrastructure. Where possible the highest grades of agricultural land should be avoided in preference to those of a lower quality to reduce associated levels of impact.	Medium to Low Impacts	Avoiding where possible the highest grades of agricultural land. This would form integral part of a route options assessment.

Land Ownership and Assembly	Widespread	A full review of land ownership has not been undertaken as part of the constraints study. Available information in relation to public sector assets however has been obtained and reviewed, as shown on Map 6 presented at **Appendix B**. There are portions of County Council Farms Estate land within the East Corridor area. It is noted that some of this land is already committed to the creation of a Multi-Sport Park on land between Waterbeach and Milton (Site Reference: 1). Depending on the nature of the transport intervention, and whilst there is potentially certain amounts of public land available for the transport infrastructure, it is likely that some portions of private land will be required which would require a degree of land assembly. This is a common aspect with transport infrastructure projects. There are existing concentrations of properties at Milton and Waterbeach, and a limited amount of rural properties within the corridor area. It is recommended that additional work is undertaken to understand the land ownership constraints associated within the Study Area.	Major to Low Impacts	A detailed review of land ownership within the Study Area.
Heritage	Widespread	Listed Buildings (Grade I, Grade II and Grade II), Scheduled Monuments and Conservation areas are mapped on the Heritage Assets Plan (Map 7) presented at **Appendix B**. **Listed Buildings:** There are a number of Listed Buildings within the broadly defined East Corridor area, with large number concentrated in Waterbeach (mixture of Grade II and II*) and Wildfowl Cottage (Grade II) to the south of Horningsea. There are also a number of assets located within 500m of the corridor, with large concentrations within the village of Milton,	Major to Low Impacts	Sensitive engineering design as part of any optioneering exercise would be required from the outset to reduce or avoid the potential direct impacts and harm with regards to setting of heritage assets.

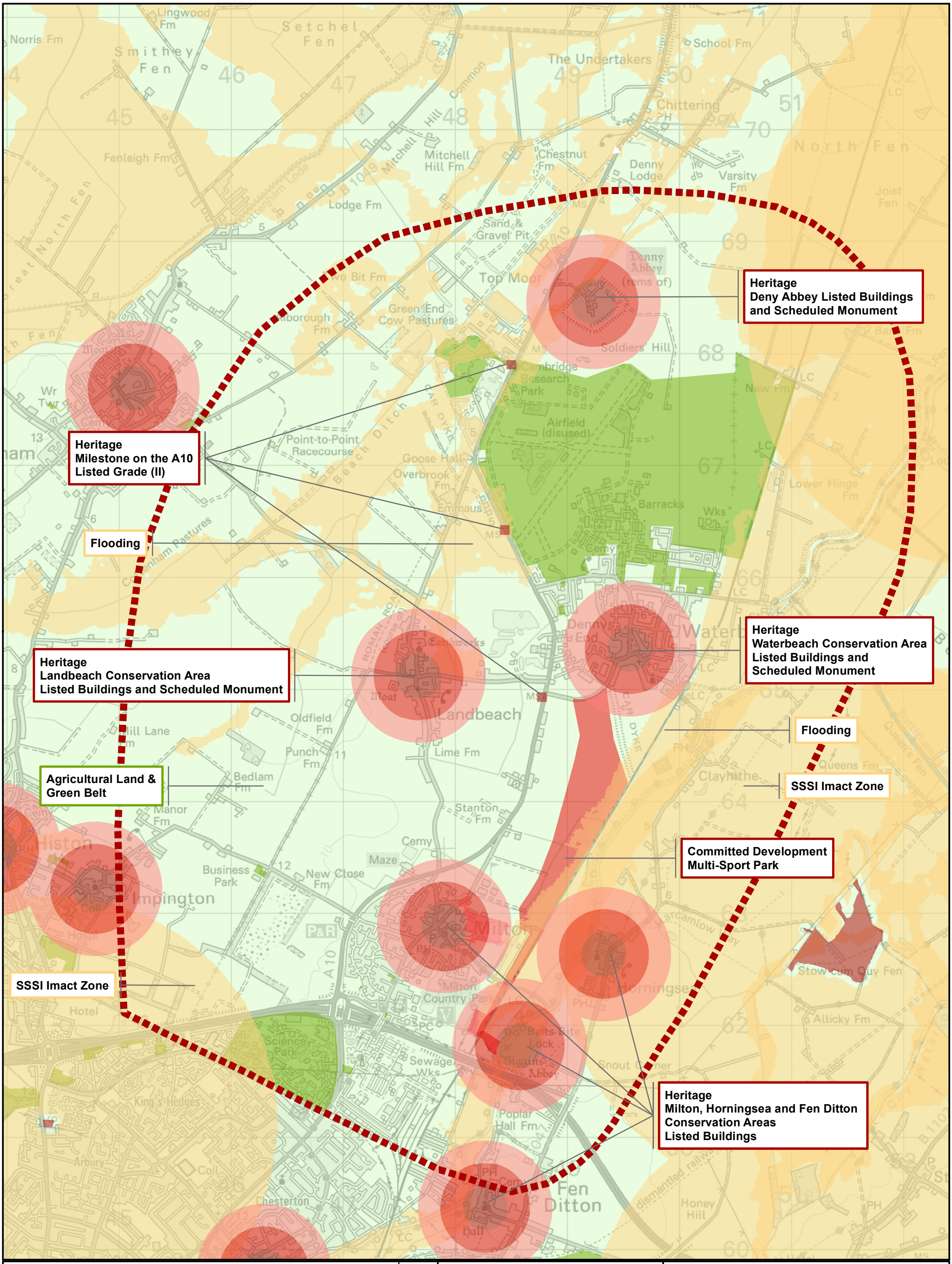
		Horningsea and Waterbeach. This includes the Grade I listed Church of St Peter in Horningsea. A transport intervention in this location (either within or outside the corridor) could have an impact upon the significance of the heritage assets including within their setting. Impacts on Listed Buildings will require further consideration as part of the next stage of assessment. **Scheduled Monuments:** There are two Scheduled Monuments within the broadly defined East Corridor area, namely Car Dyke and Waterbeach Abbey. The Horningsea Kilns Scheduled Monument is also situated within close proximity. A transport intervention in this location (either within or outside the corridor) could have impact upon the significance of the heritage assets through alteration, destruction or development within their setting. Impacts on Scheduled Monuments will require further consideration as part of the next stage of assessment. **Archaeology:** There are no known areas of archaeological interest within the East Corridor area. However, mindful of the historic nature of surrounding settlements further investigation will be required in this regard as part of the next stage of the assessment. **Conservation Areas:** A number of Conservation Areas are located within the East Corridor Area. Consideration will need to be given to potential impacts on the significance of the Conservation Areas and their setting. **Registered Parks and Gardens:** There are no Registered Parks and Gardens within the Study Area.		

Environment / Ecology	Discreet	Environmental and ecological constraints area shown on the Sites of Special Scientific Interest (SSSI) and Local Nature Reserves (LNR) plan (Map 8) and the Priority Habitats plan (Map 9) both presented at **Appendix B**. The central section of the East Corridor area (east of the existing railway) borders the SSSI impact zone for Stow-cum-Quy Fenn that includes any surface transport proposal. The East Corridor area has several areas of deciduous woodland and, coastal and floodplain grazing marsh designated as priority habitats.	Medium Impacts	Natural England will require consultation during the planning process relating to development within the SSSI impact zone and impact upon priority habitats. As part of this process potential mitigation would be identified. A Phase 1 Ecology survey to identify the presence of protected species should be undertaken as part of the route options assessment.
Physical Considerations	Widespread	Physical considerations are shown on the Landfill Sites plan (Map 10) and 1:50k Scale Superficial and Bedrock Geology Plan (Map 11) presented at **Appendix B**. Waterbeach is a former Airfield. The Ministry of Defence Land Estates Land Quality Assessment (LQA) should be viewed to identify the presence of any radioactive waste, underground structures etc. as part of the next stage of assessment. Historical industrial land may also exist in the East Corridor area which could pose a constraint on the route option selection. The East Corridor area is predominantly underlain by Superficial Deposits of Alluvium (clays, silts and sands) with the possibility of River Terrace sands and gravels being encountered along western boundary of the corridor / beneath the Alluvium. The exception to this is the north section of the Corridor where the Superficial Deposits are indicated to be absent. The bedrock geology comprises the Gault Formation, a mudstone with a weathered profile. There may also be	Major to Low Impacts	A desk top study including historical mapping to collate existing information from available public sources and the Ministry of Defence should be undertaken to identify historical industry that may pose a constraint for the proposed route options. Based upon available evidence there are no significant geological issues which would prevent a scheme being delivered. A ground investigation along the route of the preferred option to identify formation conditions.

		earthworks present associated with the existing railway within the corridor. The variable ground conditions may require a variable approach to the formation of the proposed transport intervention which would be identified during ground investigations.		
Landscape	Widespread	There are no Areas of Outstanding Natural Beauty, Special Area of Conservation or Ancient Woodlands within a 2/3 mile radius of the study area as shown on Map 12 presented at **Appendix B**. Due to this separation it considered that there will be no impacts on these designations. Notwithstanding the above a large part of the East Corridor area is located outside of the settlement area and is within the rural area. Any transport infrastructure would need to be sympathetic to the rural area and sensitively designed from the outset in view of these constraints. Hard and soft landscaping proposals will form an integral part of proposals in order to reduce levels of impact on the constraint.	Medium to Low Impacts	Sensitive engineering design as part of any optioneering exercise would be required from the outset to reduce the impact on the landscape. Hard and soft landscaping proposals will be integral to reducing levels of impact on the constraint.
Amenity	Discreet	Sensitive residential receptors are plotted on Map 13 at **Appendix B**. The plan shows that there are a number of residencies located within or adjacent to the East Corridor area and there could be amenity issues in the form of noise, air quality and lighting impacts resulting from the provision of transport infrastructure. In order to reduce such impacts sensitive engineering design as part of any optioneering exercise would be required from the outset to avoid and reduce any impacts on sensitive residential receptors. Appropriate noise, air quality and light impact assessments will be required to understand levels of impact and required mitigation measures.	Major to Medium Impacts	Sensitive engineering design as part of any optioneering exercise would be required from the outset to reduce the amenity impacts.

Public Rights of Way	Discreet	Public Rights of Way area shown on Map 14 presented at **Appendix B**. The East Corridor area affects footpaths within the area of Milton and Waterbeach. Under Section 257 of the Town and Country Planning Act 1990 a footpath or bridleway can be closed or diverted to enable development to take place. This may be required in order to deliver the required transport intervention.	Low Impacts	Diversion of footpaths / bridleways should be considered where necessary in connection with the transport intervention.
Flood Map for Planning	Widespread	The Flood Map for Planning (Rivers and Sea) is shown on Map 15 presented at **Appendix B**. The majority of the eastern boundary of the East Corridor area is located within a Flood Zone 3 area benefitting from flood defences as defined by national planning policy guidance. Soakaway drainage is unlikely to be possible in the northern section of the Corridor where it is directly underlain by the Gault Formation.	Medium Impacts	A Flood Risk Assessment for the preferred option should be undertaken once the nature of the intervention is defined. A ground investigation should be undertaken along the preferred route option including soakaway testing.
Recreational Assets	Discreet	Country Parks and Local Green Spaces are mapped on the Recreational Assets plan (Map 16) presented at **Appendix B**. The plan shows that part of Milton Country Park is located within the East Corridor Area and highlights that a transport intervention could have impacts with regards to loss of land associated with the recreational asset. As part of the next stage of assessment, any route options identified in this location should seek to avoid impacting the recreational asset.	Medium to Neutral / Negligible Impacts	Sensitive engineering design as part of any optioneering exercise would be required from the outset to reduce or avoid the potential harm on the recreational asset.

Appendix G. Corridor Assessment Heat Map



Significance of Constraint + Potential Impact

- High
- Medium
- Low
- Study Area

Drawn	LDG
Checked	CB
Approved	CB
Status	APP'D
Rev	P01

Map Number: 17

Map Name: SUMMARY OF CONSTRAINTS HEAT MAP

A10N TRANSPORT STUDY

Mott MacDonald

Scale at A3: 1:30,000

0 250 500 750 1,000 1,250 Metres

Date: 03/03/16