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1.	Introduction	
1.1.	Legal Background	
1.1.1.		This document is Volume 1 of the Environmental Statement (ES) for the A11 Attleborough Bypass Improvement. The ES is issued in accordance with Section 105A of the Highways Act (1980) as amended by the Highways (Assessment of Environmental Effects) Regulations 1994. This legislation represents the transposition into English law of the EC Directive 85/337 on the assessment of the effects of certain public and private projects on the environment.
1.1.2.		This ES has been produced to identify, describe and assess all of the direct and indirect environmental effects of the proposals to ensure that they have been fully understood and taken into account before any decision to proceed with the Scheme.
1.1.3.		Specifically the main aims of the ES are:
		<ul style="list-style-type: none"> • to provide a clear description of the Scheme; • to assess the significant environmental effects of the Scheme having taken into consideration measures that are proposed to mitigate any adverse impacts; • to allow the public and consultees a reasonable opportunity to express an opinion before the Secretary of State decides whether to proceed with the Scheme; and • to provide an outline of the main alternatives considered by the Secretary of State, indicating the main reasons for his choice.
1.1.4.		This ES was prepared using the guidance published by the Government in the "Design Manual for Roads and Bridges (DMRB) Volume 11", "Guidance for the Methodology on Multi-Modal Studies" (COMMS) and "Applying the Multi-Modal New Approach to Appraisal to Highway Schemes" (the Bridging Document). Supplementary guidance in each relevant discipline has also been consulted where appropriate.
1.1.5.		The following draft orders apply to the Scheme and the accompanying ES:
		<ul style="list-style-type: none"> • The A11 Trunk Road (Attleborough Bypass Improvement and Slip Roads) Order 20 <p>This Order, under Sections 10 and 41 of the Highways Act 1980 (the Act) defines the location and extent of the lengths of new trunk road and associated slip roads. Where appropriate, modifications to the existing trunk road may be made under the general power of improvement as permitted by the Act.</p> <ul style="list-style-type: none"> • The A11 Trunk Road (Attleborough Bypass Improvement) Side Roads Order 20 <p>This Order, under Sections 12, 14 and 125 of the Act defines the location and extent of side roads improvement, stopping up of highways, construction of new highways, stopping up of private means of access to premises and provision of new private means of access to premises.</p> <p>The elements of the Scheme covered by this Order are:</p> <p>Fen Street Junction and associated side roads and private means of access;</p>

Private means of access at Hillsend;

West Carr Junction and associated site roads, private means of access and non-motorised users route;

Queens Road Junction and associated side roads; and

Private means of access to Attleborough Hall.

- The A11 Trunk Road (Attleborough Bypass Improvement) Compulsory Purchase Order (No) 20

This Order under Sections 239, 240 and 246 of the Act and as extended and supplemented by Section 250 of that Act, and under Section 2 of the Acquisition of Land Act 1981 enables the purchase compulsorily of title to land and rights over land as required for the construction and improvement of the main line and side roads for the Scheme.

1.1.6. The anticipated date for publishing the Made Orders is May 2005.

1.2. Scheme Description

1.2.1. This ES relates to the design and construction of the A11 Attleborough Bypass Improvement Scheme in Norfolk, a section of dual carriageway which will connect the Roudham Heath to Attleborough dual carriageway with existing dual carriageway east of Attleborough in Norfolk, together with all necessary ancillary works. The location of the Scheme is shown on Figure 1.1.

1.2.2. The improvement scheme will largely comprise on-line widening of the existing A11.

1.3. Scheme Development

1.3.1. The single carriageway A11 Attleborough Bypass was opened to traffic in May 1985. The bypass improvement was then first included in the Roads Improvement Program in 1989. In July 1990, Norfolk County Council was commissioned by the Department of Transport to explore dualling options for the 5.5 km bypass. Following a review in 1995, the Scheme was placed on the longer-term programme and Norfolk County Council's commission was suspended. However, in December 1999, the Government announced that the dualling scheme would be taken forward.

1.3.2. In March 2000, following the publication of the proposed changes to the Regional Planning Guidance for East Anglia and the South East, it was announced that the A11 Attleborough Bypass would be included in the Targeted Programme of Improvements (TPI). Following this announcement, Mott MacDonald was commissioned as Stage 1 Consultant to examine the work carried out by Norfolk County Council and to recommend improvement options for Public Consultation, held in 2001. As part of their commission, Mott MacDonald produced a Stage 1 Cost Estimate. Following public consultation and completion of engineering, traffic, environmental and economic assessment, a Preferred Option Announcement was made in November 2001.

1.3.3. In late 2001, Hyder Consulting Ltd was commissioned to further develop the Scheme and produce Contract documents for tender in late 2002. The Highways Agency (HA) awarded the A11 Attleborough Bypass Improvement Scheme as an Early Contractor Involvement Contract to May Gurney/Faber Maunsell in late February 2003.

- 1.3.4. The Scheme comprises the dualling of an existing single carriageway bypass, with the provision of new and improved junctions at existing junction locations. The local network consists of the Attleborough Bypass section of the A11 Trunk Road, the former A11 through Attleborough, and the local roads linking the town and outlying areas with the Trunk Road.
- 1.3.5. This Scheme, together with one other improvement scheme, will complete the dualling of the A11 between the M11 and Norwich Southern Bypass (A47). The other scheme is the A11 Fiveways to Thetford Improvement (programmed for completion in 2007). The Schemes will complete part of the core National Route linking London, Cambridge and the northern part of East Anglia.

Scheme Objectives

- 1.3.6. The Secretary of State's specific objectives for this Scheme are:

Economy

- To reduce congestion by removing the bottleneck of the single carriageway section, and provide optimum economic benefits

Integration

- To assist in the creation of a transport system which encourages access by the most appropriate form of transport and is integrated with land use planning

Environment

- To deliver an environmentally acceptable scheme that protects and enhances the built and natural environment
- To mitigate impacts on all important sites

Safety

- To improve safety for all road users

Accessibility

- To improve access to local facilities and the wider transport network for all road users
- To produce a comprehensive strategy for local equestrian, pedestrian and cycle traffic including, and where appropriate, adequate means of crossing the proposed route based upon existing movement patterns

1.4. Anticipated Programme

- 1.4.1. The anticipated programme for the development of this Scheme at the time of writing is as follows:

May Gurney appointed as ECI Contractor Feb 03

Environmental Statement Published Jun 04

Draft Orders Published	Jun 04
Public Inquiry	Nov 04
Inspectors Report	Jun 05
Secretary of State's Decision	Aug 05
Commence Construction	Oct 05
Road Opening	Oct 07
Completion of Environmental works	Apr 08
Completion of Aftercare	Apr 13

1.5. Environment Team

- 1.5.1. This ES has been produced on behalf of May Gurney by the team of specialist environmental consultants identified below:

Cresswell Associates (Disruption due to Construction; Ecology and Nature Conservation; Land Use; Geology and Soils)

The Landscape Partnership (Landscape and Visual Effects; Vehicle Travellers; Policies and Plans)

Norfolk Archaeological unit (Cultural Heritage)

Faber Maunsell (Air Quality; Traffic Noise and Vibration; Pedestrians, Cyclists, Equestrians and Community Effects; Vehicle Travellers; Water Quality and Drainage; Geology and Soils)

1.6. Structure of the Environmental Statement

- 1.6.1. In accordance with the Design Manual for Roads and Bridges (DMRB), this ES is divided into three parts: Volume 1; a Non-Technical Summary; and Volume 2.
- 1.6.2. Volume 1 (this Volume) provides a concise but comprehensive assessment drawing together all the relevant information about the Scheme. It is supplemented by an Annex containing supporting figures.
- 1.6.3. Volume 2 comprises the supporting detail where appropriate for the chapters of Volume 1 including baseline survey reports, calculations and models.
- 1.6.4. The non-technical summary (NTS) summarises the main sections of Volume 1 of the ES in non-technical language to make it accessible to the non-specialist. The NTS is bound into the back of this volume but is also available as a separate leaflet.

1.7. Availability and Comments

- 1.7.1. The ES will be deposited for inspection during opening hours at a number of locations detailed in the NTS. Copies of the ES can also be purchased from the Highways Agency at the address below:

Contact: Graham Wright
 Highways Agency
 Heron House
 49/63 Goldington Road
 Bedford
 MK40 3LJ

Tel. 0845 955 6575

- 1.7.2. The ES is priced as follows:

Volume 1 - £

Volume 1 Annex of Figures - £

Volume 2 - £

Non-technical Summary - Free

Alternatively, a CD of the full ES Volumes 1 and 2 may be ordered at a cost of £.

- 1.7.3. All interested parties are invited to comment on the ES, not later than 29/07/2004, in writing to the Highways Agency at the address above.

2. The Scheme

2.1. Scheme Background

- 2.1.1. The A11 London to Norwich Trunk Road is a strategic route connecting Norwich, east and north Norfolk, and the port of Great Yarmouth, to London and the south-east of England. The road carries a substantial volume of traffic throughout the year (existing Annual Average Daily Traffic (AADT) flows are in the range 20,500 to 24,500), including a high proportion of commercial heavy goods vehicles (around 11-12%). Volumes increase during the summer months, due to traffic heading for the holiday areas of Norfolk.
- 2.1.2. Attleborough is a town located some 22km southwest of Norwich, Norfolk. The existing A11 Attleborough Bypass consists of approximately 5.5 kilometres of single carriageway, passing to the northwest side of the town, and was opened to traffic in 1985. The single carriageway section connects the Besthorpe to Wymondham dual carriageway section of the A11 to the north, with the A11 Roudham Heath to Attleborough section of dual carriageway to the south opened in March 2003. The route corridor of the Scheme is shown in Figure 1.1. The proposed improvement Scheme is shown in Figure 2.1.
- 2.1.3. The form of contract for this Scheme is Early Contractor Involvement (ECI). Under this new format the Contractor who will build the road is appointed after the preferred option for the Scheme is announced. The Contractor's team then develop the Scheme, carry out the Environmental Impact Assessment and produce the Orders under the Highways Act (1980). The Environmental Statement and other documents have been produced by the Contractor, and undertakings made through this process will therefore be implemented by the same Contractor during the design, construction and maintenance phases, allowing the delivery of environmental mitigation to be secured at an early stage.

2.2. Route Description

- 2.2.1. The proposed improvement will involve widening the existing single carriageway bypass, to a dual two-lane all-purpose road, by building a new two-lane carriageway to the northwest of the existing road along its entire length. This aligns readily with the existing Roudham to Attleborough improvement where the new carriageway lies to the northwest of the original. Being an on-line widening, the vertical alignment largely follows that of the existing Attleborough Bypass although the new carriageway is likely to diverge slightly from the existing over certain sections to provide an alignment in accordance with modern design standards and to satisfy environmental and engineering considerations.
- 2.2.2. The Scheme will include three junctions located at Fen Street, West Carr Road and Queens Road. At Fen Street the existing roundabout will be enlarged and modified to include a new connection to Wroo Road and to maintain the connection to London Road. The private access road that currently joins the roundabout will be extended and re-aligned to connect into the modified Wroo Road. A specific pedestrian crossing facility at ground level will be provided about 120 metres from the roundabout on the line of the existing Fen Street side road.
- 2.2.3. At West Carr, the existing T-junctions between West Carr Road (from West Carr and from London Road) and the A11 trunk road will be closed. A new junction will be provided about 250 metres south-west of the existing junction with a new two-way link road connecting the Norwich bound carriageway to West Carr Road. This junction will allow traffic from Thetford to turn left off the A11 into West Carr Road and traffic from West Carr Road to turn left onto the A11. There will not be a connection between the A11

Thetford bound carriageway and West Carr Road on the town side of the A11. There will also be a bridge over the A11 on the line of the existing West Carr Road specifically to cater for pedestrians, cyclists and equestrians (in technical terms known as Non-Motorised Users or NMUs) wishing to cross from one side of the A11 to the other. On the north-west side of the A11 there will be a track for NMUs running alongside the A11 (for most of its length alongside the boundary fence) to link with Crowshall Lane. From Crowshall Lane to Queens Road there will be a similar track just for pedestrians.

- 2.2.4. The Queens Road Junction will cater for all traffic turning movements between the A11 and Queens Road/Ellingham Road. Slip Roads will allow traffic to diverge from and merge with the A11 traffic. The Slip Roads will connect with Queens Road/Ellingham Road at traffic signal controlled junctions. The existing Queens Road/Ellingham Road will continue to pass under the A11 and be widened to provide for safe traffic movements within the junction area. The improvements to Queens Road/Ellingham Road include provision of new and improved footways/cycleways and road crossing facilities for pedestrians and cyclists. The Scheme would further involve the stopping up of all existing direct access onto the A11. Figure 2.1 shows the Scheme design.

2.3. Structures

- 2.3.1. It is proposed to construct an overbridge at West Carr Road, to allow the provision of a separate route for pedestrians, cyclists and equestrians (Non-Motorised Users). The overbridge would be located in shallow cutting along the mainline of the A11 and be an open aspect structure which maximises the view of the surrounding countryside through the openings in the bridge.
- 2.3.2. Some modifications to the existing structure at Queens Road would be required to meet Scheme design and current design standards. The existing structure would carry the Thetford-bound carriageway and a new underbridge would be built alongside the existing bridge to carry the Norwich-bound carriageway over Queens Road. A three span concrete structure of open aspect, with piled foundations to the bankseats and intermediate piers, and having a similar elevation to the existing bridge is proposed.
- 2.3.3. The existing underbridge for the access to Attleborough Hall would be extended. The new structure would be of reinforced concrete construction having similar internal dimensions to the existing one.
- 2.3.4. The proposed replacement Baconsthorpe Culverts, carrying Attleborough Stream at Queens Road, are proposed to consist of rectangular cross-section of internal dimensions and details to be determined in discussions with the Internal Drainage Board, but likely to be similar to the existing culvert that they replace. The lengths and dimensions of the culverts would be sensitive to the ecological value of the Attleborough Stream.
- 2.3.5. A number of other existing structures carrying watercourses would require extending: culverts under the Attleborough Hall access road, and under the A11 between Attleborough Hall access and Besthorpe Junction.

2.4. Earthworks

- 2.4.1. Earthworks operations for much of the proposed route are relatively modest. However, the route is largely within a cutting, or false cutting to the west of Queens Road, and is elevated above the flood plain from west of Queens Road to the eastern end of the Scheme. Whilst the absolute suitability of the soils have yet to be determined, it is hoped to maximise the

potential for re-use of the material excavated from the cutting, in the fill areas to the east. The materials excavated from the site may not be sufficient to provide all the particular engineering fill materials required for the construction, so there would be a need to import fill materials from off-site borrow pits and to dispose of surplus materials either to re-instate the borrow pits or in other similar locations. These pits would be carefully selected and operated so as to minimise any adverse environmental impacts at the pit and along routes from the pit to the site of the Scheme.

- 2.4.2. The route corridor also crosses areas of generally poor ground conditions including areas of peat. The majority of these areas will require fill material to be placed in the embankments and left to settle for six to 12 months before the road is constructed on top. It is envisaged that, wherever possible, the excavated material unsuitable for engineering re-use would be re-used on site for landscaping works or in areas for habitat creation.

2.5. Lighting and Signage

- 2.5.1. It is not proposed to light the dual carriageway as road lighting is unlikely to be justified on safety and operational grounds. The absence of lighting has environmental benefits. However, road lighting will be maintained at Fen Street Junction where the existing roundabout would be modified and incorporated into the Scheme. The proposed roundabout would be 76 meters in diameter compared with 66 metres for the existing roundabout. Consideration would be given to mitigating the impact of this lighting in the wider context of this location, by careful selection of lighting column height and using fully cut-off lanterns. At Queens Road Junction the existing lighting on Queens Road, Ellingham Road and Blackthorn Road would be modified to suit the proposed road layout.

- 2.5.2. Road signage for the mainline would consist of the normal range of standard signs (such as speed limit, clearway, roundabout ahead, keep left) and non-standard signs (such as direction signs at the approach to junctions and route confirmatory signs between junctions) that are specific to the Scheme. Non-standard signs would be sized and positioned appropriately to provide safe direction and route confirmation in association with the various slip roads. Side roads would also have signs designed for the revised junction layouts.

2.6. Route Options

- 2.6.1. At present, the major part of the London to Norwich route comprises high quality motorway or dual carriageway. With the recent completion of the Roudham Heath to Attleborough scheme, the Attleborough Bypass and the Fiveways to Thetford sections of the A11 remain the only single carriageway sections of this important route.
- 2.6.2. Based on the Preferred Route Announcement, the Scheme would comprise widening the existing single carriageway, to dual two lane standards, between the existing roundabout junction at London Road and the existing dualled section of the A11 near Bcsthorpe Junction, with the widening being to the north-west of the existing carriageway. All movements junctions would be provided at Fen Street Junction, and Queens Road Junction. West Carr Junction would provide for movements to and from the Norwich bound carriageway of the A11 only, but a bridge over the A11 linking West Carr Road each side of the trunk road would be provided for pedestrians, cyclists and equestrians. All at-grade crossings and private accesses on to the A11 within the Scheme extents would be removed.
- 2.6.3. The proposed Fen Street Junction would provide the opportunity to minimise the area of land-take and also limit the adverse environmental effects, particularly in respect of the

- River Thet. The layout proposed was arrived at after consideration of land-take, landscape, ecological, visual and operational effects. The proposed layout has been modified from that shown at Preferred Route stage in order to reduce the adverse effect on the properties and land in Fen Street area southeast of the A11. Options similar to the Preferred Route Announcement layout using a Compact Grade Separated design (with the side road and turning traffic passing over the A11 on a bridge) were considered. These options were shown to the public at a Public Forum exhibition and the views of the local people attending were taken into account together with the operational and economic (value for money) aspects of the options and a thorough review of the overall Scheme strategy in choosing the selected option for Fen Street Junction.
- 2.6.4. The proposed West Carr Road Junction would provide the opportunity to minimise the area of land-take and also limit the adverse environmental effects, particularly in terms of landscape. The proposed layout has been modified from that shown at Preferred Route stage in order to reduce the adverse effect on the properties and land between the A11 and London Road east of West Carr Road.
- 2.6.5. Options similar to the Preferred Route Announcement layout using all movements grade separated design (with the side road and turning traffic passing over the A11 on a bridge), with roundabouts each side of the A11 connecting to the slip roads was considered and dismissed due to technical difficulties in complying with design standards relating to the distance between this junction and Queens Road junction. An option with only Thetford facing slip roads and a new two-way link road parallel to, and on the northwest side of the A11, between the West Carr Roundabout (on the north-west side of the A11) and Ellingham Road at the new Queens Road Junction was also considered. It included new links to the existing West Carr Road (northwest of the A11) and to the existing London Road. These options all had significant landscape impacts.
- 2.6.6. The options were shown to the public at a Public Forum exhibition and the views of the local people attending were taken into account together with the operational, environmental and economic (value for money) aspects of the options and a thorough review of the overall Scheme strategy in choosing the selected option for West Carr Junction. Other options considered during the strategic review were (i) no junction, (ii) a roundabout junction and (iii) a road bridge taking West Carr Road over the A11 with no connections to the A11.
- 2.6.7. The proposed Queens Road Junction would be a grade separated junction with Queens Road/Ellingham Road taken under the A11. The junction would provide for all movements to and from the A11 via slip roads and incorporate connections to Queens Road, Ellingham Road, Deopham Road and Blackthorn Road. At the junctions of the slip roads and Ellingham Road/Queen's Road would be traffic signal controlled.
- 2.6.8. The Public Consultation layout incorporating roundabouts at the junctions of the slip roads and Ellingham Road/Queen's Road was considered but dismissed on the grounds of requiring too much land take and having significant environmental impact on the adjacent properties, the landscape and the ecology of Attleborough Stream. This led to the option incorporating traffic signal junctions instead of roundabouts. Further options comprised the two-way link road between the West Carr Junction and Ellingham Road as described in para 2.6.5. These options were shown to the public at a Public Forum exhibition and the views of the local people attending were taken into account together with the operational and economic (value for money) aspects of the options and a thorough review of the overall Scheme strategy in choosing the selected option for Queen's Road Junction.

“Do-Minimum” Option

2.6.9. In order to assess the effects of the Scheme, the proposals have been tested against a “do-minimum” option, which would involve no physical network changes likely to result in a material change in local traffic patterns. The “do-minimum” does not include any committed network changes because none were identified within the area of the scheme within the timescale being modelled. The schemes considered were the proposals by Norfolk CC to provide slip roads at Besthorpe, make Surrogate Street two-way and implement HGV bans within the town centre. When these were looked into, it was confirmed that these schemes were behind the A11 Attleborough Bypass Improvement in the programme, i.e. they should be regarded as speculative, not committed. Therefore no committed network changes have been built into the ‘Do Minimum’ modelling, with the exception of routine maintenance including overlay, surface dressing and resurfacing.

2.7. Environmental Design Objectives

2.7.1. The Highways Agency’s Environment Strategic Plan lists the Agency’s specific environmental key objective as *“to minimise the impact of the trunk road network on both the natural and built environment”*. This Scheme would support the above objective through the following scheme-specific environmental design objectives:

- there would be no net loss of nature conservation value associated with the Scheme’s construction or operational phases;
- there would be no negative impact on Swangey Fen SSSI/the Norfolk Valley Fens cSAC;
- opportunities for beneficial environmental impacts, such as habitat creation, would be taken where appropriate;
- opportunities for re-use of material in preference to disposal to land-fill would be taken wherever possible;
- adverse impacts on the environment would be avoided through careful Scheme design;
- appropriate measures would be put in place to mitigate any unavoidable adverse impacts on the environment;
- disruption to users of the existing A11 and the surrounding road network would be minimised; closure of the A11 would be avoided wherever possible;
- disruption to landowners, local businesses and other members of the local community would be minimised.

2.7.2. A series of Key Performance Indicators (KPIs) have been developed for the Scheme. These have been based on the results of the environmental surveys, and include indicators for both the design and construction phases. The KPIs for this Scheme would be:

- No material to be removed to landfill;
- To avoid or minimise nuisance complaints received during construction (twenty complaints as a minimum performance standard);

- No net loss of valuable habitat for each habitat type, species or species group affected by the works; and an overall net increase in wetland habitat in general, and valuable water vole habitat in particular;
- The proportion of fill material from recycled or secondary sources to be at least 40%;
- The final area of vegetation lost during the construction of the scheme will be considerably less than the area that is to be planted, resulting in an overall net gain;
- The Biological Water Quality of the River Thet and Attleborough Stream to improve immediately downstream of the works, following construction of the new drainage scheme.

2.8. Environmental Impact Assessment Methodology

2.8.1. The Environmental Assessment has been undertaken in accordance with DMRB Volume 11, Guidance on the Methodology for Multi-Modal Studies (GOMMMS) and the Bridging Document (which links DMRB and GOMMMS), supplemented by current best practice. For each environmental topic there is a dedicated chapter in the ES. Each chapter includes a description of the assessment methods (including the scope, study area and consultations), existing conditions, the environmental effects both during construction and operation of the works, and the mitigation strategy proposed.

2.8.2. Environmental surveys and consultation commenced in early 2003, following the methods outlined in the Environmental Statement Scoping Report (published in June 2003), which were amended to account for comments received from statutory consultees. Environmental surveys continued throughout 2003 until April 2004, to ensure that the environmental assessment was based on up-to-date surveys carried out during the correct season (where necessary). Scheme design was an iterative process incorporating the results of the environmental assessment, public consultations (through public exhibitions and consultations) with amendments made to avoid or minimise environmental impacts wherever possible. Proposed mitigation is shown on the Environmental Masterplan (Figure 2.2).

2.8.3. The results of the assessments are summarised in the Environmental Impact Tables (EITs) presented in Chapter 15. The EIT is a tabular presentation of the data summarising the main likely direct and indirect effects of the Scheme, taking account of agreed mitigation. It comprises three tables:

- A summary table of the effects of the published Scheme under four appraisal groups:
 - Local people and their communities,
 - Travellers,
 - The cultural and natural environment,
 - Policies and plans;
- A land use table;
- A mitigation table.

4. Cultural Heritage

4.1. Introduction

Purpose of the Assessment

- 4.1.1. The purpose of this assessment is to evaluate the impacts on the cultural heritage likely to result from the construction phase of the Scheme. It aims to ensure that this phase of the Scheme is carried out in accordance with Highways Agency best practice, national and local policies and planning guidance, and that all potential adverse effects on the cultural heritage are identified and appropriate mitigation responses developed and implemented.
- 4.1.2. The assessment attempts to identify all impacts on the cultural heritage that are likely to be significant. Significance, as it refers to the cultural heritage, is based on the relative importance of the site, feature or building; the effects of Scheme construction requirements on it and the degree to which it would be affected by these requirements.

Summary of Key Issues Along the Scheme

- 4.1.3. A number of prehistoric, Roman, Saxon, Medieval, Post-Medieval archaeological remains, historic landscapes and historic buildings are situated within or in close proximity to the Scheme.
- 4.1.4. The northern part of the Scheme crosses the approach avenue to Attleborough Hall. The Hall, moat bridge, the moat retaining walls and associated cottage are listed buildings of national importance. A Late Bronze Age/Early Iron Age archaeological site lies within the survey area to the northeast of Hillsend and the remains of Post-Medieval water meadows are located southwest of Attleborough Hall and south of the Attleborough Stream. The site of Roman and Medieval metalwork finds to the north of the existing A11 at Queens Road is of unknown importance.
- 4.1.5. Given the identified archaeological potential for the area adjacent to the Scheme, there exists a strong possibility that hitherto unknown archaeological sites and deposits will emerge during road construction.

Scope of the Assessment

- 4.1.6. The assessment set out in this chapter provides a characterisation of the nature of the cultural heritage resource within and adjacent to the land-take of the Scheme and evaluates the significance of Scheme impacts on it. It also identifies appropriate mitigation measures for cultural heritage resources directly affected by the Scheme and evaluates the effectiveness of these measures in minimising significant adverse effects.
- 4.1.7. The cultural heritage resource considered in this chapter falls into three broad categories for assessment purposes: archaeological sites, historic landscapes and historic buildings.

4.2. Study Area

- 4.2.1. The study area comprised a corridor 1km wide on each side of the existing A11 alignment extending from approximately 600m south of the existing Fen Street Junction to approximately 1km north of where the road joins the dual carriageway close to the Besthorpe Junction (approximately 6.8km in total). This corridor was divided into inner and outer 500m wide strips, to characterise the range of cultural resources occurring within the

broad environs of the Scheme, and to identify potential avoidance areas for temporary land-take. The built areas of Attleborough were excluded from the study corridor as they would not be directly affected by the Scheme.

4.3. Survey and Assessment Methodology

Desk-Based Study

- 4.3.1. The Norfolk Historic Environment Record (HER) was consulted for information concerning archaeological sites, historic environments and historic buildings (Listed Buildings). Selected aerial photographs of the study area held by the Norfolk Aerial Photograph Library and numerous published and unpublished sources were also reviewed. Cartographic information held by the Norfolk Record Office was not available for examination. Maps held by the Norfolk Historic Environment Record, the Archaeology and Environment Division Library and other sources, however, were consulted. The desk-based study was supplemented by a walk-over survey of the route, to identify any landscape features of archaeological significance not previously recorded.

Field Evaluation

- 4.3.2. The desk-based study was supplemented by a field evaluation of selected locations intersected by the proposed roadline. Ten trenches were excavated across the sites of two possible post-medieval water meadows (HER 20028 and 4380) and a cropmark of possible roadway of Roman or medieval date (HER 33952) to assess sub-surface survival (see Volume 2, Part 2 of this ES for further details). Fifty-seven test pits were excavated between the proposed Fen Street and West Carr Road Junctions (chainage 700m to 2500m), to determine if any unknown archaeological sites were intersected by the roadline. The evaluation of a rectangular cropmark partially destroyed by the construction of the original bypass (HER 12793) was not considered necessary as aerial photographs showed the surviving features of this site to be located east of the road, and outside of proposed land-take areas (see Volume 2, Part 2 of this ES for further details). Trenches and test pits were initially excavated by machine to the surface of undisturbed sub-soil, and any exposed archaeological features sample excavated and recorded using a proforma recording system.

Assessment

- 4.3.3. Assessment methods comprised an evaluation of the construction requirements associated with the Scheme to identify potential impacts and their possible effects on the cultural heritage resource, and an evaluation of the importance of cultural resources and the significance of identified impacts and effects on them. Resources were graded as of national, regional/county, unknown and low importance, on the basis of formal status, period, type, rarity, fragility, condition and the potential survival of buried deposits. The significance of effects was determined by integrating resource importance with the severity of predicted impacts, and categorising them as major (effects which breach national statutory designations), moderate (effects which conflict with national designations and local authority policies) or minor (effects which may be identified by local authorities that do not breach national or local policies). Details of the assessment methods used are set out within Volume 2, Part 2 of this ES.

4.4. Existing Conditions

- 4.4.1. The study corridor contains a rich and diverse cultural heritage that includes prehistoric, Roman, Saxon, Medieval and Post-Medieval archaeological remains, historic landscapes

and a number of historic buildings. A total of 97 cultural resources was identified by the desk-based study as occurring within 1km of the Scheme on both sides of the existing A11 carriageway. Fifty-two of these are situated within the inner 500m areas of the corridor and 41 within the outer 500m areas of the corridor. The four historic landscapes identified by the study extend across inner and outer corridor areas on either side of the current road. The technical report presented in the accompanying volume sets out the details of the various resources identified, and their relative importance for the study area as a whole.

- 4.4.2. The historic core of Attleborough is a designated Conservation Area. This area is outside that designated for the Scheme and will not be affected by construction activities.
- 4.4.3. The field evaluation found buried deposits at one of the known post-medieval water meadows (HER 20028) and buried deposits of a previously unknown Late Bronze Age/Early Iron Age settlement (HER 39690) approximately 200m northeast of Hillsend, within the land-take area. No buried deposits were found within the area of the Scheme for the other post-medieval water meadow (HER 4380) or the Roman/Medieval roadway (HER 33952) identified from aerial photographs (see Volume 2, Part 2 of this ES for further details). Buried deposits for these sites are likely to survive elsewhere outside of the Scheme corridor.
- 4.4.4. Five cultural resources of national or regional/county importance have been identified by the desk-top study and field evaluation as lying within or immediately adjacent to the Scheme corridor. In addition to these, a site of unknown importance is situated adjacent to and possibly extending into the flood compensation area east of Deopham Road. These are listed below, and are shown on Figure 4.1 (see Volume 2, Part 2 of this ES for further details).

Site 1. Attleborough Hall (HER 7009)

- 4.4.5. This site comprises a medieval moat and 17th Century house, with associated fishponds and 19th Century farm buildings. The site is also the centre of a historic landscape, composed of an approach avenue, a cottage, remnants of parkland, and a cropmark of a roadway (HER 3392) running northeast to a complex of moats and earthworks (HER 1056). The Hall, moat bridge and moat retaining walls are Grade 2* listed buildings, with the associated cottage listed Grade 2. It is classified as a site of 'national' importance.

Site 2. Late Bronze Age/Early Iron Age settlement (HER 39690)

- 4.4.6. This site was discovered by the field evaluation within the proposed land-take area. Archaeological features exposed in one test pit comprised a rubbish pit and ditch containing well-preserved artefactual and faunal material. The archaeological features indicate the survival of buried archaeological deposits within this area of the Scheme. It is classified as a site of 'regional/county' importance.

Site 3. Site of Neolithic/Bronze Age date (HERs 23291, 23292)

- 4.4.7. This site is composed of worked flint and a burnt flint mound on the northwest side of the shallow valley through which the Attleborough Stream flows and lies immediately outside the Scheme land-take area. The site survives as an artefact scatter and is likely to contain some buried archaeological deposits. It is classified as a site of 'regional/county' importance.

Handwritten notes in the left margin:
Further evaluation?
geophysics
moat
before
100m x 200m
1/2m/2m

Site 4. Site of post-medieval water meadows (HER 20028).

- 4.4.8. The area of the site within the proposed land-take for the Scheme was investigated by field evaluation. Archaeological features exposed in three trenches comprised ditches, gullies and possible pits or natural features containing predominately post-medieval artefactual materials. It is classified as a site of 'regional/county' importance.

Site 5. Besthorpe Common historic landscape

- 4.4.9. The site comprises an arrangement of enclosure fields composed of small closes of rough pasture and marsh carr. This landscape is associated with a scheduled ancient monument (SAM 340) composed of a complex of moats and earthworks (HER 1056) situated 400m south of the Scheme area. It is classified as a site of 'regional/county' importance.

Site 6. Site of Roman and Medieval findspots (HER 31415)

- 4.4.10. This site comprises the findspot location of a Roman coin and Medieval metalwork on the edge of the built area of Baconsthorpe east of Deopham Road. It is classified as a site of 'unknown' importance.

4.5. Description of Impacts and Effects of Mitigated Scheme

Impacts

- 4.5.1. The majority of the sites (Sites 1, 2 and 4) have already been affected to some degree by the construction of the original bypass and would be subject to further impacts during the construction phase of the Scheme.

Attleborough Hall (Site 1)

- 4.5.2. The site is located adjacent to an area of fill for the Scheme. The Scheme would have no direct impact on the Hall or its associated archaeological deposits and buildings. However, the setting of the site would be further disrupted by the additional loss of parts of the approach avenue through the increase in land-take area. Any deposits associated with the approach avenue to the Hall within the land-take area would be buried by earthworks and subjected to a small amount of permanent compaction. The compaction effects identified for the site are considered to be of minor significance as they do not breach local policies. However, the further disruption of the site's landscape and visual setting is of 'moderate' significance as it conflicts with local authority policies (Norfolk Structure Plan Policy ENV13:i.; Breckland Local Plan Policy Env.1).

Late Bronze Age/Early Iron Age settlement (Site 2)

- 4.5.3. The most severe impact of the Scheme's construction phase would be on the surviving deposits of this site. The site is located within the proposed cut for the road extending from Fen Street Junction to West Carr Road (chainage 700m to 2700m). Excavations undertaken as part of the construction of the road would destroy all archaeological deposits surviving for this site within the land-take area. These effects are of 'moderate' significance as they conflict with local authority policies (Norfolk Structure Plan Policy ENV13:iii.; Breckland Local Plan Policy Env.16).

Post-Medieval water meadows (Site 4)

- 4.5.4. This site is partially located within an area of fill for the Scheme. A further part of the site has been identified as a location for a balancing pond. The part of the site within the area of fill would be buried by earthworks and subjected to a small amount of permanent compaction. Those parts of the site lying south of Attleborough Stream outside the area of earthworks would be severely impacted by the excavation of a (approximately) 1,040m² area for the balancing pond (No. 3). The excavation would destroy all archaeological deposits within the proposed balancing pond area and severely compromise the integrity of this site. The effects identified for the site are of 'moderate' significance as they conflict with local authority policies (Norfolk Structure Plan Policy ENV13:iii.; Breckland Local Plan Policy Env.16).

Site of Roman and Medieval findspots (Site 6)

- 4.5.5. The site is situated adjacent to the flood compensation area east of Deopham Road and is of 'unknown' importance. Buried archaeological deposits not evident as cropmarks may survive and extend into the flood compensation area, and have the potential to be severely affected by construction excavations. Further information is required to assess the importance of this site and the likely impacts and effects of construction activities.

Neolithic/Bronze Age Site (Site 3)

- 4.5.6. The Scheme would not have an impact on this site as it lies outside the land-take area.

Besthorpe Common (Site 5)

- 4.5.7. The Scheme would also have no impact on this site as no additional landscape features would be lost as a result of construction activities.

Unknown Sites

- 4.5.8. Elsewhere, the impact of the Scheme on known archaeological resources is of 'minor' significance as these have been identified as of low importance. However, given the identified archaeological potential of the area adjacent to the Scheme, there exists a strong likelihood that further archaeological sites and deposits would emerge during road construction. The proposed balancing ponds at Fen Street, north of Crowshall Lane and northeast of Attleborough Hall, the areas of Attleborough Stream realignment, and the diversion linking Wroo Road with the Fen Street Junction roundabout are highlighted as areas of particular potential for the occurrence of unknown archaeological resources.

Mitigation Measures

- 4.5.9. In line with the general principles enshrined in PPGN.16 Archaeology and Planning (1990) mitigation measures for the cultural heritage resources affected by the Scheme comprise either in-situ preservation or preservation by record in advance of their destruction. Preservation in-situ would be possible for sites or parts of sites located within fill areas of the Scheme or adjacent to, but outside of, land-take areas. Preservation by record would be required for those sites or parts of sites directly affected by groundworking operations. Mitigation measures for individual sites directly affected by the Scheme have been drawn up in consultation with Norfolk Landscape Archaeology and are listed below.

Proposed

Attleborough Hall is not directly affected

Attleborough Hall (Site 1) — Indirect effect

- 4.5.10. Some landscaping and visual screening would be required to off-set the impact on the Hall's setting (see Section 7.5.28 for details). Avenue segments within the land-take area for the road would be preserved *in-situ* by their burial under earthworks.

Late Bronze Age/Early Iron Age settlement (Site 2)

- 4.5.11. Archaeological excavation of an area 100m by 30m centred on the location of the features identified by the field evaluation would be required to record surviving deposits prior to their destruction by highway construction.

Post-Medieval water meadows (Site 4)

- 4.5.12. An archaeological watching brief would be required during the excavation of the proposed balancing pond, to undertake the salvage recording of any exposed features and deposits. The part of the site within the land-take area for the road would be preserved *in-situ* by its burial under earthworks.

Unknown Sites

- 4.5.13. In addition to the proposed mitigation measures for identified sites, an archaeological watching brief would be required during groundworks associated with the areas identified in 4.5.7 above to allow for the identification and salvage recording of hitherto unknown archaeological remains.

Roman and Medieval findspots (Site 6)

- 4.5.14. A field evaluation of this site is required to assess its importance and the likely impacts of the construction of the flood compensation area on any surviving buried archaeological deposits which may extend into the area.

Residual Impacts

Do we use this?

- 4.5.15. Residual impacts are minor for the majority of the sites affected by the Scheme, and confined to some deposit compaction for those sites, or parts of sites, preserved *in-situ* under earthworks within fill areas of the Scheme. No residual impacts will occur for those sites or parts of sites archaeologically excavated prior to or during construction. Residual impacts for individual sites directly affected by the Scheme are summarised below.

Attleborough Hall (Site 1)

- 4.5.16. Residual effects comprise some compaction for deposits associated with the approach avenue buried *in-situ* under earthwork and the deterioration of the Hall's visual setting. Deposit compaction is considered to be of 'minor' significance. Further deterioration of the site's visual setting is of 'moderate' significance. Mitigation, principally the provision of landscaping and visual screening would offset some of the impacts but require a period of 10 to 20 years before being fully effective (see Section 7.5.28 for details).

Late Bronze Age/Early Iron Age settlement (Site 2)

- 4.5.17. No residual effects will occur as the site will be archaeologically excavated prior to the start of construction works.

Post-Medieval water meadows (Site 4)

- 4.5.18. Residual effects are confined to some compaction for those deposits buried in-situ under earthworks and is considered to be of 'minor' significance. No residual effects are anticipated for deposits within the area of the balancing pond (No 3) as salvage recording and excavation will be carried out during construction.

Unknown Sites

- 4.5.19. No residual effects are expected for unknown archaeological deposits or features exposed during construction as salvage recording and excavation will be carried out prior to the completion of works. However, there is the potential for any unknown archaeological remains occurring within fill areas of the Scheme to be subjected to some compaction.

4.6. Conclusions

- 4.6.1. The key effects of the Scheme on the cultural heritage resource are as follows:

- The loss of all archaeological sites and deposits within the areas of construction excavation comprising Fen Street Junction to West Carr Road (chainage 700m to 2700m), proposed balancing ponds, the Attleborough Stream re-alignment, the Wroo Road diversion, and the flood compensation area. This includes the Late Bronze Age/Iron Age site discovered by the field evaluation, areas of the post-medieval water meadows north of Attleborough Stream, and any hitherto unknown archaeological sites and deposits.
- The burial of all archaeological sites and deposits within the fill areas of the Scheme under earthworks. This includes areas of the post-medieval water meadows south of Attleborough Stream and the Attleborough Hall approach avenue.
- The additional impact on the setting of Attleborough Hall by the increase in land-take area.

- 4.6.2. The excavation and salvage recording measures proposed for archaeological sites and deposits would be highly effective in ensuring that an appropriate record is made of them, prior to their destruction by scheme groundworking operations. The burial of archaeological deposits within fill areas of the Scheme elsewhere would ensure that the deposits are preserved in-situ underneath earthworks, without being damaged by the Scheme.

- 4.6.3. The proposed field evaluation for Site 6 would also be highly effective in characterising the importance of the site, and determining the most appropriate means for minimising the potential impacts of the construction of the flood compensation area on any surviving buried archaeological deposits.

- 4.6.4. Identified residual impacts are largely confined to some deposit compaction for those sites, or parts of sites, preserved *in-situ* under earthworks within fill areas of the Scheme and further disruption of the landscape and visual setting of Attleborough Hall. Compaction effects are considered to be of 'minor' significance whereas the residual effects of the Scheme on the setting of Attleborough Hall are of 'moderate' significance as they breach local policies.

5. Disruption due to Construction

5.1. Introduction

Purpose of the Assessment

- 5.1.1. This chapter addresses the temporary impacts of the Scheme during the construction stage of the works. It describes the key construction activities, the disruption that is envisaged due to construction, and provides details of the Construction Environmental Management Plan, referred to here as the Project Management Plan (PMP).

Summary of Key Issues along the Scheme

- 5.1.2. There are a number of key potential environmental impacts which may arise during construction, which have been addressed in detail in other chapters of this ES. These are:
- construction dust (Chapter 3),
 - visual impacts (Chapter 7);
 - potential noise and vibration (Chapter 9)
 - severance effects (Chapter 10).
- 5.1.3. Disturbance to other sensitive receptors, most notably effects of noise and visual disturbance associated with birds, and potential disturbance to sensitive species such as otters and water voles, and the seasonal constraints associated with wildlife, are dealt with in Chapter 6 of this Volume. The most sensitive ecological receptors are the two watercourses which would be affected by the Scheme, the Attleborough Stream and the River Thet; Swangey Fen SSSI, which is located downstream of the Scheme on the River Thet; and the otter and water vole populations associated with these, and other, watercourses. Ecological mitigation during construction therefore includes avoidance of pollution and sedimentation in the watercourses, temporary relocation of water voles ahead of works affecting watercourses where they are present, as well as appropriate seasonal constraints.

Scope of the Assessment

- 5.1.4. The scope of the assessment of disruption due to construction is described in section 5.3.1 below.

5.2. Key Construction Activities

Introduction

- 5.2.1. This section sets out the proposed programme for constructing the Scheme and the key construction activities that are planned. The form of contract procurement for this project, Early Contractor Involvement, means that the construction proposals are more fixed, and it is possible to be more confident about the construction effects than with other forms of procurement. It is intended that any changes to these proposals subsequent to the publication of the ES would not result in any worse environmental effects than those described herein.

Construction Programme

- 5.2.2. Construction works are planned to commence in the late summer/autumn of 2005 and to take place over two years, with the project proposed for completion in mid 2007. The exact timings would depend on the outcome of the statutory process. Work in the first year would concentrate on vegetation clearance, topsoil stripping, watercourse diversions, earthworks, structures and construction of the Norwich-bound carriageway, all side roads and associated drainage. In the second year of construction, traffic on the A11 would be diverted onto the new carriageway, and the Thetford-bound carriageway and associated drainage constructed. The majority of landscape planting would also take place during the second year. Standard working hours would be 7am to 7pm, Monday to Friday, ~~XXXXXX~~
~~XXXXXX~~

Advance Works

- 5.2.3. To avoid delays to the start of construction a number of works are planned as advance works. These works are planned to start in the summer / autumn of 2005 and include:
- creation of receptor sites for translocated habitats and animals (see Chapter 6);
 - relocation of reptiles from road verge habitats affected by the proposals (Autumn 2005 and Spring 2006) (see Chapter 6);
 - pre-construction surveys (including protected species, archaeology, and any additional ground investigation required) to check for any changes since the original surveys were undertaken;
 - establishment of site compounds;
 - diversion of the Attleborough stream (see Chapter 12); and
 - relocation of water voles (Spring 2006) (see Chapter 6).

Site Clearance and Fencing

- 5.2.4. Site clearance works would begin in the autumn of 2005 and would be completed before the onset of the bird breeding season in February 2006 in order to avoid impacts on nesting birds. Site clearance would involve the removal of trees, hedges and woody vegetation under the footprint of the Scheme. All site clearance would take place under ecological supervision.
- 5.2.5. Permanent fencing along the new highway boundary would be erected at this stage where possible. Elsewhere, temporary stock-proofed fencing would be provided by agreement with the relevant neighbouring landowner.

Topsoil Strip

- 5.2.6. Topsoil removal is programmed to occur in Spring 2006 using excavators feeding dump trucks or road-going lorries, to identified stockpile locations. The topsoil strip would take approximately ten weeks. Topsoil would be stockpiled as close as possible to its point of origin or final destination to minimise transport and handling. The topsoil strip would be subject to ecological and/or archaeological supervision and certification. One area of

topsoil containing a valuable seed-bank will be stockpiled and re-spread in suitable locations on the new verges.

Earthworks

- 5.2.7. Although the Scheme has an appropriate balance of cut and fill, much of the road is on glacial tills which would require considerable settlement time before the construction could be completed. In order to avoid this delay, and the associated extension of the temporary disruption due to construction, more suitable fill material would be imported during the early weeks of construction operations. Much of the material excavated would be unsuitable, and cement/lime stabilisation may be required to render the material usable. This technique allows more site-won material to be used, and reduces the need for import by road-going lorry. There would be a small surplus of U1 material, and this would be utilised in landscape areas. Export of material to landfill would be avoided.
- 5.2.8. The Scheme results in a requirement for the import of 196,500 tonnes of material, as identified in Table 5.1 below. This represents a total of 6,000 lorry movements. It is likely that there would be very little excess material requiring removal from the site.

Table 5.1 Estimated quantities of materials to be imported

Resource	Quantity
Granular material for embankments (a combination of Imported Acceptable 1A and Class 6A, 6K and 6N)	80,000 tonnes
Imported Class 6F1 capping	22,000 tonnes
Cement and granular material	54,000 tonnes
Sub-base type 1	17,500 tonnes
Sand	500 tonnes
Filter Type A	15,000 tonnes
Granular Pipe Bedding	8,000 tonnes
Total Quantity (tonnes)	196,500 tonnes

- 5.2.9. Location and height of stockpiles has not been finalised at this stage. These would be located in non-environmentally sensitive areas in agreement with local landowners and the Environmental Clerk of Works. Specifically, stockpiles would not be located adjacent to watercourses or waterbodies, within the floodplain, on areas of cultural heritage significance, or in areas where they would have significant ecological or visual impacts.
- 5.2.10. The main haul route for the Scheme would initially comprise the existing A11. The proposed new carriageway would be used as a haul route as site clearance and construction operations progress, to reduce the disruption on the A11 caused by deliveries.

Piling Operations

- 5.2.11. Piling operations are proposed at all three of the new or modified structures (see 5.2.11 below). These are likely to be CFA piles. In addition, sheet piles would be used to construct the three new culverts on the Attleborough Stream: at Ellingham Road, Deopham Road and the Attleborough Hall driveway.

Structures

- 5.2.12. There are three new or modified structures proposed along the Scheme, each of which would be constructed by piling and using pre-cast beams:
- Non-motorised users overbridge at West Carr Road (new build);
 - Queens Road bridge (modification of the existing structure); and
 - Attleborough Hall underpass (modification of the existing structure).

Road Pavement Construction

- 5.2.13. [REDACTED]

Labour Force

- 5.2.14. The predicted labour force for the works is likely to vary between a minimum of 50 and a maximum of approximately 200, with the peak in numbers being largely during the period June to September inclusive. The work force would be encouraged to rent or lodge in locally available accommodation. Means of travel from the main site compound to distant parts of the site would be provided to prevent the need for individual journeys along the Scheme.

5.3. Disruption Due to Construction

- 5.3.1. This section assesses any additional potential disruption resulting from the construction phase of the Scheme that is not dealt with in the other relevant chapters of this ES. Specifically this includes:
- traffic management of vehicles along the A11 and side roads;
 - construction traffic;
 - import of construction materials.

Assessment Methodology

- 5.3.2. The assessment of the effects of the disruption due to construction follows the methodology set out in DMRB Volume 11. In accordance with this guidance, the study area for the assessment of disruption due to construction extends over a corridor of 100m to either side of the works, including compounds, storage areas and haul routes.
- 5.3.3. There are a number of residential dwellings within 100m of the working areas. These include:
- Breckland Lodge;
 - Newf Cottage;

- Wroo Farm;
 - Meadow Cottage;
 - West Farm;
 - Properties on Alexandra Road, Celandine Road, Carver's Lane, West Carr Road, Queens Road, Ellingham Road, Deopham Road, Blackthorn Road and Norwich Road.
- 5.3.4. An assessment has been made of the potential noise and vibration (Chapter 9), construction dust (Chapter 3), visual impacts (Chapter 7), ecology and nature conservation (Chapter 6) and severance effects (Chapter 10) of the Scheme on these residential receptors under the relevant topic chapters.

Traffic Management

- 5.3.5. Disruption to the travelling public would be minimised by maintaining free-flowing traffic on the A11 on either its existing line, or on the new Norwich-bound carriageway, throughout the construction period. The need for long diversion routes would be avoided through careful phasing of the works to ensure that access to West Carr Road, Fen Street and London Road is maintained through either the West Carr Road or Fen Street Junctions. It is anticipated that the traffic beneath the bridge on Queens Road would be temporarily restricted using traffic lights. The Queens Road Junction would require a temporary closure for placement of the bridge beams, which it is proposed to carry out at night, although this, and all other Traffic Management issues, would be discussed with Attleborough Town Council, Norfolk County Council and the local residents.
- 5.3.6. At Queens Road Junction pedestrians would be able to cross to the existing footpath or, if that was unavailable, to a temporary footpath, whilst the new junction was under construction. At West Carr junction pedestrians and cyclists would be able to cross the existing A11 and the construction works at dedicated crossing points. Effects on bus journeys and bus stops would be minimised during the construction works. Bus journey routes may be affected along London Road during the proposed works, although this would be minimised by carrying out liaison with the bus companies prior to works commencing.

Construction Traffic

- 5.3.7. Construction traffic bringing materials into the site or removing waste from the site would be routed to avoid, as far as possible, residential areas, schools, aged persons homes and other buildings with sensitive users by keeping them on the line of the existing A11.
- 5.3.8. The estimated number of heavy goods vehicles (HGV) that would need to access the site would be approximately 29,000 over the two years of construction, with an average of 87 per day. In addition, private vehicles to get construction workers to the site would amount to approximately 50 per day at peak times. A site travel plan would be included in the PMP to encourage car sharing and sustainable transport around the site.

Conclusion

- 5.3.9. Total daily average number of additional vehicles (137 per day) required to support construction operations is equivalent to approximately 0.6% of the existing annual average daily traffic value (approximately 22,000 per day) on the existing A11. The effect of this increase in traffic would therefore be relatively insignificant. By routing construction

traffic on the trunk road, or a specifically constructed haul route, effects on minor routes would be avoided.

Import of Construction Materials

- 5.3.10. Raw materials required for the construction of the Scheme would be sourced predominantly from the contractor's existing approved suppliers in East Anglia in order to avoid long-distance lorry movements. The contractor's procurement policies take environmental and sustainability issues into account.

5.4. Outline Project Management Plan (PMP)

Introduction

- 5.4.1. The contractor operates an Environmental Management System (EMS) certified to the international standard ISO 14001. This would be adopted on site through the development of a PMP. This is the mechanism by which the contractor manages environmental issues on the site. The PMP would be critical to the successful management of construction environmental issues during the project. The PMP would be subject to external audit by the contractors' certification body. All site works would be undertaken in compliance with the PMP.

Roles and Responsibilities

- 5.4.2. The Project Manager would have overall responsibility for the project, with an Environmental Manager being responsible for the development and implementation of the PMP.

Environmental Manager

- 5.4.3. The Environmental Manager would:
- Develop and review the PMP and specialist procedures;
 - Lead the appointment/management of environmental specialists;
 - Deliver environmental training to the workforce;
 - Monitor compliance of construction activities with the PMP, and with environmental legislation/licences; and
 - Act as the focal point of contact for all environmental issues on site.

Environmental Clerk of Works

- 5.4.4. An Environmental Clerk of Works would be employed on the project and would be responsible for recording the progress of the Environmental Works. The Environmental Clerk of Works would:
- Support the Environmental Mitigation in delivering the environmental components of the works;
 - Monitor or supervise construction activities as required;

- Maintain auditable environmental records; and
- Carry out audits as required by the PMP.

Environmental Specialist

- 5.4.5. The environmental specialists that have contributed to the production of this ES would be retained at construction stage to carry out pre-construction surveys, watching briefs and provide advice on specific issues as they arise throughout the project.

Outline PMP

- 5.4.6. A Project Management Plan (PMP) would be prepared to control and reduce the environmental impact of construction works and promote awareness of the environmental characteristics of this contract.
- 5.4.7. Risk assessments for each work element would include environmental risks. Site personnel would be informed of environmental issues, risks and emergency environmental procedures during site induction.
- 5.4.8. Daily inspections and weekly Safety/Environmental Inspections would be carried out and recorded. A Site Environmental Emergency Notice would be completed and displayed at the site office. The PMP would be made available for use by all staff, the external auditor and the client.
- 5.4.9. The contents of the PMP would be as follows:
1. General
 - 1.1 Introduction
 - 1.2 Construction aims and objectives
 2. Employer's Requirements
 3. Environmental Legislation
 4. Site Environmental Action Plan
 - 4.1 Environmentally Sensitive Receptors
 - 4.2 Water and Land Pollution
 - i) Protection against accidental spillage
 - ii) Protection against accidental pollution
 - iii) Protection against silt
 - iv) Protection against run-off into watercourses
 - 4.3 Air Pollution
 - i) Dust from earthworks
 - ii) From road vehicles
 - iii) Fires
 - 4.4 Species Protection
 - 4.5 Noise and Vibration
 - i) Plant and machinery
 - 4.6 Artificial light spillage
 - 4.7 Archaeology
 - 4.8 Energy and Waste Management
 - i) Waste materials
 - ii) Waste storage
 - iii) Waste disposal and re-use
 - iv) Waste minimisation

- v) Energy conservation
- 5. Environmental Emergencies
- 5.1 Staff and Responsibilities
- 5.2 Licences and Consents
- 6. Audit

7. Landscape Effects

7.1. Introduction

Purpose of the Assessment

- 7.1.1. The landscape and visual assessment initially identified the area likely to be affected by the proposed construction works. It established the extent and significance of the visual change and the ability of the surrounding landscape to incorporate such changes. This information was used to inform the process of best practice in constructing on-line improvements which would have minimal detrimental impact on the surrounding landscape, people living and working in the vicinity, and road users.

Summary of Key Issues Along the Scheme

- 7.1.2. The existing A11 Attleborough Bypass passes through a gently undulating landscape that is characterised by small paddocks, water meadows and large arable fields, punctuated by hedges and trees. The landscape immediately adjacent to the route is, and has been, heavily influenced by the Attleborough Stream. The urban edge of Attleborough lies to the south of the existing bypass and there is an open agricultural landscape to the north. The impact of the road on these landscape features is therefore the key issue of concern.

Scope of the Assessment

- 7.1.3. The assessment has identified individual properties and landscape areas that would experience visual change as a result of the construction works and the eventual operation of the scheme.
- 7.1.4. The degree and significance of the visual change associated with the proposed works has been assessed, with an evaluation of whether the changes are likely to be long term or short term, and have adverse or beneficial impacts. The information is presented in a manner that enables those with an interest to readily understand the impact of the road on the landscape.

Stages of the assessment process

- 7.1.5. This comprised the following:
- A preliminary scoping and consultation exercise;
 - A comprehensive desk study of background documents and previous studies;
 - Identification of potential receptors, and definition of their sensitivity through on-site survey work;
 - Identification of potential impacts, and definition of their magnitude through on-site survey work;
 - Site specific detailed studies and the design of mitigation proposals;
 - Overall assessment of the implications of the proposed works on the landscape in order to ascertain the net beneficial or adverse implications of the scheme on the landscape.

7.2. Study Area

7.2.1. The study areas for the different elements of the landscape assessment were defined as follows:

- Topography The area within 100m of the centreline of the dual carriageway, extending up to 1500m at the junctions.
- Vegetation Those areas of removal or severe management; in general, within 200m of the centreline of the dual carriageway, extending up to 1500m at the junctions.
- Character The area contained within the visual envelope (see Section 7.2.2 below).
- Visual Effects The area contained within the visual envelope (see Section 7.2.2 below).

7.2.2. The visual envelope is defined by the outer limit of viewpoints, i.e. individual buildings and points on roads, footpaths etc. likely to experience visual change as a result of the proposed Bypass improvement. These lie between 3580m (at the widest) and 35m (at the narrowest) from the centreline of the proposed dual carriageway. The visual envelope is illustrated on Figure 7.4.

7.3. Survey and Assessment Methodology

7.3.1. In general the framework and guidelines for this section are provided by the Design Manual for Roads and Bridges (DMRB) and Guidelines for Visual Assessment provided by the Landscape Institute.

7.3.2. The list of consultees includes:

- Norfolk County Council (Landscape character, impact and mitigation);
- Breckland District Council (Landscape character, impact and mitigation);
- Countryside Agency (Landscape character (national policies));
- Environment Agency (River corridor initiatives and water management plan);
- English Heritage (Historic landscape).

Topography

7.3.3. Survey information was obtained from the following sources:

- OS Explorer Map No.237 and Pathfinder No.923;
- Topographic survey of site carried out by *Longdin & Browning, 2002*;
- Visual survey/familiarisation of site and comprehensive recording via photography.

7.3.4. The topography was assessed via a desktop study of the OS map contours. This was verified on-site and through the use of collated site survey information.

7.3.5. The assessment of how construction would affect the local topography within the Study Area was informed by information provided by the contractor on the anticipated location and process of works.

Vegetation

7.3.6. The visual value of the vegetation within the Study Area was assessed using a combination of desktop study to record designations (Ancient Woodland, TPOs, etc.) and field survey techniques.

7.3.7. The survey was undertaken by a Chartered Landscape Architect and was based upon external visual assessment only, and the structural stability of the trees was not assessed. Where appropriate it was noted which trees should be subject to a qualified arboriculturist's assessment prior to the commencement of the works. The methodology for the tree survey was based on *BS 5837:1991, Trees in relation to construction*, and in particular, Section 5: *Pre-planning site assessment*. It included all trees with a stem diameter over 75mm, measured at 1.5m above ground level, while other smaller vegetation was recorded by area. Where appropriate blocks of trees were considered as groups.

7.3.8. For each tree and group of vegetation included within the survey, a note/assessment was made of:

- the species;
- its age and approximate spread;
- its condition, i.e. the degree to which it appears healthy and vigorous;
- any visually obvious structural defects and the life expectancy;
- its visual contribution and appropriateness within the landscape, e.g. its value as a feature or as a screen;
- any planning designation covering the tree, e.g. a TPO.

7.3.9. The tree survey is included in Volume 2, Part 4 of this ES, and is to be read in conjunction with Figure 7.2 (a-h) in the Annex of Figures to this Volume.

7.3.10. On the basis of the survey, each tree or group of vegetation was graded into one of the following four categories:

- vegetation whose retention is most desirable: **high category** (green);
- vegetation whose retention is desirable: **moderate category** (blue);
- vegetation which could be retained: **low category** (brown);
- vegetation for removal: **fell category** (red).

- 7.3.11. An assessment was then made of the likely implications of the proposed scheme on the graded vegetation. Consideration was given to the following:
- visual contribution;
 - appropriateness of species;
 - condition (based on visual observation);
 - likely stability (particularly those trees adjacent to areas of storm damage or that might become exposed due to removal of surrounding trees);
 - aims and objectives of amenity designations.

- 7.3.12. The results of the vegetation assessment are summarised in Section 7.4 Figures 7.3 (a-h) show vegetation likely to be removed or compromised by the Scheme.

Landscape Character

- 7.3.13. The methodology follows the principles and process set out in the current (2002) *Guidance* published by Countryside Agency and Scottish Natural Heritage. The assessment was carried out by a Chartered Landscape Architect using a combination of desk-top study and field survey.
- 7.3.14. The object in relation to the proposed A11 improvements was to use the landscape character assessment methodology to identify and understand the different areas of landscape/townscape which would be affected by the scheme, and to assess their ability to accommodate the proposed changes. This was achieved by undertaking a detailed analysis of the areas of land subject to visual change because of the proposals. Their condition and quality was also assessed and related to the robustness of each character area, i.e. ability to accommodate the proposed changes.
- 7.3.15. The 'Landscape Character Assessment Report' is included in full in Volume 2, Part 4 of this ES.

Identification of Visual Envelope (Figure 7.4)

- 7.3.16. An initial assessment of areas bordering the existing road was undertaken in July 2003 to identify the extent of visibility to or from the road corridor. This zone contains the areas which could experience varying degrees of visual change and thus where it is necessary to assess their character and ability to withstand or accommodate such changes.
- 7.3.17. The visual envelope defines the study area for the landscape character assessment.

Desk Study

- 7.3.18. The study area was divided into a number of Landscape Description Units or LDUs. This involved the consideration of the following levels of detail:
- Level 1: Sub-division at a national/regional scale in accordance with the Joint Character Map of England [*Countryside Character, Volume 6: East of England* published by the Countryside Agency] combining both landscape character regions and natural areas.

- Level 2: Physiography and Soil - geology, topography and soils were both mapped as layers on a GIS system to enable correlation.
- Level 3: Cultural Pattern - the 'cultural pattern' was added using the following categories:
 - Land cover and land use;
 - Field pattern;
 - Vegetation pattern;
 - Settlement pattern.

7.3.19. These were entered separately into the GIS overlay and correlated to highlight areas of similar characteristics.

Site Verification

7.3.20. A site appraisal using the GIS overlay identified five areas of similar landscape character. These were refined using survey data from the fieldwork. The areas are summarised in Section 7.4.

Landscape Related Designations

7.3.21. The road corridor does not lie within any specially designated areas of ecological, historical or high visual value designations. The visual envelope contains a very small part of the Special Landscape Area at the south-western end of the scheme adjacent to Fen Street. There are no environmentally sensitive areas or local nature reserves within the Study Area.

Sensitivity to Visual Change

Condition and Quality

7.3.22. Each character area was subject to an appraisal which involved assessment of the attractiveness of its key components, and the presence and absence of detractors. Attractiveness does not necessarily imply scenic quality only, but may also recognise uniqueness or character of an area. It is essentially a subjective exercise but ordered by the presence or absence of components, features or characteristics considered to be attractive or unattractive.

Robustness

7.3.23. The ability of an area to withstand changes was also evaluated. An area's robustness is graded strong, moderate or weak according to the clarity and consistency of its landscape pattern (e.g. field/hedgerow pattern, extent of vegetation cover in rural areas or streetscape in urban areas) and the presence or absence of inappropriate elements.

Sensitivity

7.3.24. By combining the condition/quality grading and the perceived robustness of the character area, the sensitivity of the area was determined and a guiding management priority proposed. This is achieved using a standard matrix.

Example Sensitivity Matrix

Condition	Strength of character		
	<i>Weak</i>	<i>Moderate</i>	<i>Strong</i>
<i>Good</i>	Strengthen and reinforce	Conserve and strengthen	Safeguard and manage
<i>Moderate</i>	Improve and reinforce	Improve and conserve	Conserve and restore
<i>Poor</i>	Reconstruct	Improve and restore	Restore condition to maintain character

7.3.25. The relevant guiding priority for each character area (e.g. "safeguard and manage" or "conserve and restore"), should influence the design of the Bypass improvements and the extent of mitigation or off-site planting/conservation management that is provided

The Capacity of the Landscape to Accommodate Change

7.3.26. A capacity matrix was produced for each character area. This enables a profile of each character area to be produced. The process lists and gives weighting to a variety of permanent and temporary factors according to their significance in enabling an area to withstand change. This results in a range of scores for each area that indicate its ability to accommodate the road proposals.

7.3.27. A summary of the results of the landscape character assessment appears in Section 7.4.

Visual Effects

7.3.28. The visual impact of the proposed road was assessed using a methodology based on that in the *Design Manual for Roads and Bridges (DMRB) Vol. 11*, and *Guidelines for Landscape and Visual Impact Assessment, 2002*. The assessment was carried out by a Chartered Landscape Architect using a combination of desk-top study and field survey.

7.3.29. The field survey was carried out over a period of several days between July 2003 and March 2004, during clear weather with good visibility. The assessment takes into account seasonal changes, e.g. deciduous trees in winter.

7.3.30. The assessment was made from viewpoints (i.e. individual buildings and points on roads, public footpaths, bridleways, and points within areas of public open space) likely to experience visual change as a result of the A11 improvements. A record was made of the composition and quality of the existing view from each point and its sensitivity. The results of the visual survey were recorded on a series of proformae, which are reproduced in Volume 2, Part 4 of this ES, and are summarised in Section 7.4.

7.3.31. The process of visual assessment initially compares the quality of each of the existing views with those that would result under the following conditions and quantifies the degree of change:

- on a typical day during the construction period;
- on a winter's day, one year after the road opens;
- on a summer's day, 15 years after the road opens.

- 7.3.32. The following issues were considered in quantifying the degree of change (temporary, short-term, long-term and permanent) experienced at each viewpoint:
- the proximity of the viewpoint to the centreline of the proposed dual carriageway; in addition, at junctions, the distance to the closest boundary of the construction works
 - any relevant planning designations within the view, e.g. Listed Buildings;
 - the extent of the existing view;
 - any elements within the view that may detract or add to its quality;
 - the frequency of use of each point;
 - the viewer's familiarity with the overall scene;
 - the perceived activity of the viewer;
 - the nature of change – elements within the view that would be lost or gained.
- 7.3.33. Mitigation measures have been included as part of the engineering design of the Scheme in order to negate or minimise any potential adverse visual impact, both during the construction period and upon completion. The assessment was therefore based on the assumption that these mitigation measures are in place.
- 7.3.34. The following categories were employed to assess the degree of change:
- *severe* beneficial or detrimental, short-term, long-term or permanent change;
 - *moderate* beneficial or detrimental, short-term, long-term or permanent change;
 - *slight* beneficial or detrimental, short-term, long-term or permanent change;
 - *negligible* beneficial or detrimental, short-term, long-term or permanent change;
 - no perceivable change.
- 7.3.35. In accordance with the *Guidelines for Landscape and Visual Impact Assessment, 2002*, the significance of the predicted impacts on visual receptors was assessed using the following criteria:
- the sensitivity of the receptor or viewpoint, e.g. views from a residential house would be more sensitive than those from an industrial area;
 - the magnitude and duration of impact;
 - whether impacts are beneficial or adverse;
 - professional judgement;
 - any views expressed during consultations.

7.3.36. On the basis of the above, the following categories of impact significance were identified:

Table 7.1 - Significance of Visual Change

			High	Medium-High	Medium-Low	Low	
			Beneficial or Detrimental	Beneficial or Detrimental	Beneficial or Detrimental	Beneficial or Detrimental	Not Perceivable
Visual Receptor Sensitivity	Severe	Short term	Changes to a visual receptor of med - high sensitivity	Changes to a visual receptor of med - high sensitivity	Changes to a visual receptor of med - low sensitivity	Changes to a visual receptor of low sensitivity	N/A
		Long term or permanent	Changes to a visual receptor of med - high sensitivity	Changes to a visual receptor of med - high sensitivity	Changes to a visual receptor of med - low sensitivity	Changes to a visual receptor of low sensitivity	N/A
	Moderate	Short term	Changes to a visual receptor of high sensitivity	Changes to a visual receptor of med - high sensitivity	Changes to a visual receptor of med - low sensitivity	Changes to a visual receptor of low sensitivity	N/A
		Long term or permanent	Changes to a visual receptor of high sensitivity	Changes to a visual receptor of med - high sensitivity	Changes to a visual receptor of med - low sensitivity	Changes to a visual receptor of low sensitivity	N/A
	Slight	Short term	Changes to a visual receptor of high sensitivity	Changes to a visual receptor of med - high sensitivity	Changes to a visual receptor of med - low sensitivity	Changes to a visual receptor of low sensitivity	N/A
		Long term or permanent	Changes to a visual receptor of high sensitivity	Changes to a visual receptor of med - high sensitivity	Changes to a visual receptor of med - low sensitivity	Changes to a visual receptor of low sensitivity	N/A

Significance of Impact Key:

low	
med-low	
med-high	
high	

7.3.37. The following assumptions were made during the visual assessment:

- a *short-term* change in visual impact is considered to have a duration of 0 to 5 years;
- a *long-term* change in visual impact is considered to have a continuous duration of 5 plus years.

7.3.38. The Visual Impact assessment is included in full in Volume 2, Part 4 of this ES. The results are summarised in Section 7.4.

Sensitive Receptors

- A number of sensitive visual receptors have been identified in the vicinity of the Scheme. These consist of mainly domestic properties, but also include Bridleways/footpaths, commercial and agricultural properties.

7.4. Existing Conditions

Topography (Figure 7.1)

- 7.4.1. The information used to assess the topography of the landscape was gathered from site familiarisation exercises and photography. This information was cross-referenced with the existing contours in order to gain an accurate perception of the physical landscape.
- 7.4.2. The topography of the land around Attleborough and along the route of the existing A11 is gently undulating; the rise and fall consisting of a relatively small degree of level change across a large area. In general the land within the study area drops down to about 25m at the lowest point in the east and rises to about 75m at the highest point in the southeast.
- 7.4.3. The full results of the topography assessment are included in Volume 2, Part 4 of this ES.

Vegetation

- 7.4.4. A total of 218 standard trees, 41 groups of trees/shrubs (scrubby multi-stemmed vegetative cover), 78 hedgerows and 10 woodland areas were surveyed from within the study area. There are also extensive areas of grassland including pasture. This section of the report is concerned solely with the visual value of the vegetation; the ecological value, including the value of trees in terms of their potential to support roosting or hibernating bats, is considered in Chapter 6.

Vegetation Designations

Ancient Woodland

- 7.4.5. There are no Ancient Woodlands within the area of study.

Tree Preservation Orders (TPOs)

- 7.4.6. Consultation with Breckland District Council revealed that no trees within the study area are protected by TPOs. There is one TPO tree just outside the study area, shown on Figure 7.2e, but is unaffected by the Scheme both physically and visually.

Vegetation appraisal

- 7.4.7. The full results of the vegetation survey are included in Volume 2, Part 4 of this ES, and are to be read in conjunction with the vegetation appraisal drawings Figure 7.2 a-h.
- 7.4.8. Other vegetation within the study area consists of arable crops, pasture and private gardens.

Landscape Character

- 7.4.9. Five Landscape Character Areas (LCAs) have been identified within the Study Area (Figure 7.7). The existing condition of each of these is as follows:
- LCA 1: Low, open, predominantly arable farmland with some market gardening and horticultural uses. There are few hedges and farm buildings present. The urban edge of Attleborough is evident, especially to the southeast of the existing bypass.

- LCA 2: Valley landscape with small grazing pastures abutting the Attleborough Stream and larger fields on the higher land to the north of the Bypass. Land to the southeast, i.e. between bypass and town, is urban fringe.
- LCA 3: Large-scale open arable farmland containing few landscape features. Extensive views with little tree cover or evidence of settlements.
- LCA 4: Small-scale, low-lying pasture/arable land (remnant parkland) contained within the Attleborough Stream valley which straddles the A11 road corridor. Contains well-established hedgerows and some large, mature trees.
- LCA 5: Urban fringe: Largely residential, bordered by farmland/paddocks to the north.

7.4.10. The LCAs relate to the Scheme as follows:

Fen Street to West Carr Road

- Area 1: Arable plateau.

West Carr Road to Queens Road

- Area 1: Arable plateau;
- Area 2: Pasture/arable;
- Area 5: Urban fringe.

Queens Road to Besthorpe Junction

- Area 4: Attleborough stream valley;
- Area 3 Extensive arable;
- Area 5L: Urban fringe.

Visual Effects

7.4.11. The visual envelope used in the Assessment reflects the area likely to experience visual change as a result of the Scheme. The existing Attleborough Bypass however, has a more confined visual envelope due to the screening effects of a combination of landform and the highway embankment vegetation. Available views of the road are governed mainly by its vertical alignment.

Close Proximity Views (less than 200m)

Fen Street to West Carr Road

7.4.12. From the existing roundabout at the Fen Street A11/London Road junction to the West Carr Road Junction the existing Bypass is in cutting. The landform combined with boundary vegetation therefore effectively screens views of bypass traffic from close-proximity properties (i.e. within 200m) overlooking the A11 corridor. The road only becomes apparent when the cutting is shallower than the height of high-sided vehicles. Locations with close, but partially screened views include: Meadow Vicw, Fen Street; White Lodge

P.H., London Road, Newf Cottage and Wroo Farm, Wroo Road, Hillsend and Haverscroft House Farm, Hypocrite Lane; Meadow Cottage, Thatched Cottage and Hillsend Cottage, Hillsend Lane and Fettlebridge Cottages, 1 and 2 London Road - 1st floor rear view, tops of large vehicles only.

7.4.13. Close proximity open views of the existing Bypass are, however, available from the following viewpoints:

- Breckland Lodge – clear view;
- FP9 – clear view;

West Carr Road to Queens Road

7.4.14. From West Carr Road to chainage 3400 (just prior to Crowshall Lane) the existing bypass remains in cutting. This, in combination with extensive bunding to the east of the existing carriageway and existing vegetation, continues to screen views of the bypass from close-proximity properties (i.e. within 200m) overlooking the A11 corridor. These include Oakmead, Woodys Haulage, West Carr Road (west); West Farm, West Carr Road (west) and where views are screened additionally by an extensive bund between the property and carriageway; The Owlgarth, Sandown, Timaru, Guershade, Nirvana and Westland House, West Carr Road (east); Kingsmere, Dorengo, The Poplars, Bodo Fabrications, The Laurels Residential Home, Butterfly Hall (Attleborough Poultry Farms), Butterfly Croft, Carver's Lane; 18-30 (evens) Celandine Road; and properties in Celandine Road, Burdock Way, Thyme Close, Honeysuckle Way, Bilberry Close, Bracken Drive, Hazel Road and Willow Court.

7.4.15. Between Crowshall Lane and Queens Road, the existing bypass is on embankment. Views of the Bypass and more specifically the traffic using it are only partially contained by vegetation. Close-proximity properties (i.e. within 200m) which benefit from screening provided by vegetation and/or buildings include (to the south-east) those in Foxglove Road; Blackthorn Road; Jasmine Court; Elizabeth Close; Norfolk Drive; Alexandra Way; Bannister Close, and St. Marys Close. To the north of the existing Bypass these include, nos. 1 (Bridgenorth) and 3 Ellingham Road; and properties in Warrens Lane, and the west side of Ellingham Road. Open views are obtained as the bypass crosses the Queens Road on the Baconsthorpe Bridge. Properties are well screened from the approaches to the Bridge by the semi-mature Highway planting, now approximately 15-20 years old; although this is slightly more effective to the south than to the north.

7.4.16. Close proximity open views of the existing Bypass are, however, available from the following viewpoints (VIA No. indicated in brackets):

- Strawberry Fields – view of traffic (tops of large vehicles) to east [121];
- Woodlands, West Carr Road (west) – view of traffic (tops of large vehicles) to east [118];
- Nos. 1, 3-9 (odds) and 35 Blackthorn Road [123,128,137];
- No. 7 Willow Court [137];
- No. 14 Foxglove Road [136];

- Nos. 24-29 Jasmine Court [133,135];
- Nos. 1-4, 24-34, 37, 38 and 40 Elizabeth Close [132,131];
- Hazeldale, Blackthorn Road [139];
- Nos. 1-5, 18-21, 23, 24, 45-48, 57-62 Norfolk Drive [129,130];
- Nos. 1-6, 22, 32-34 Alexandra Way [126, 127];
- Nos. 1-14 Bannister Close [124,125];
- The Haven, 69 Queens Road [102];
- Nos. 51 (Ivanhoe), 53 (Hillcrest), 57 (Hillside), 67 (Bankside), Queens Road.

Queens Road to Besthorpe Junction

- 7.4.17. In this section the existing Bypass continues on embankment. Open views of the bypass are available from close-proximity properties (i.e. within 200m) with highway vegetation on the embankments providing the only screening. In general this provides more effective screening at the Queens Road end of the section than at Besthorpe.
- 7.4.18. Close (and occasionally partially screened) proximity views of the existing Bypass are available from the following viewpoints:
- No. 2 Ellingham Road [109];
 - The Mobile, Deopham Road [106];
 - Court Lawns (6+4), Vine House (10), 12-18 Ellingham Road [107,108];
 - No. 64 (Mariapfarr) Queens Road [93];
 - Nos. 52-62 (evens) Queens Road [94,95,96,97];
 - the cemetery and allotments off Queens Road;
 - No. 7 Queens Court [91];
 - Nos. 5-8 and 12 Hammond Way [85-88];
 - Nos. 1-7 (odds) Bayfield [85-88];
 - Attleborough Hall farm complex [103];
 - Nos. 112, 114, 116 and The Willows, Norwich Road [40, 43-45];
 - No. 73 Mill Lane [41];
 - Breckland Autos, Norwich Road [42].

7.5. Description of Impacts and Effects of Mitigated Scheme

Topography

7.5.1. The impact and effects of the mitigated scheme on the topography is considered significant and a more detailed description can be found in Volume 2, Part 4 of this ES.

7.5.2. The impact of the Scheme on the Attleborough Bypass would result in an accentuation of the features that were created during the original construction of the Bypass in the 1980s. As the Scheme consists of online improvements within an existing road corridor there would be no significant change to the existing vertical road alignment, thereby minimising its impact on the local topography.

Fen Street to West Carr Road

7.5.3. The impact on the topography of this area would result from widening the existing cutting to the North East. There would be **no adverse impact** on the wider landscape.

West Carr Road to Queens Road

7.5.4. The change to topography between chainages 2700 and approximately 3800 for the dualling would be '**moderate adverse**'. A new screen bund adjacent to West Farm would replace the existing bund. The new highway embankment would have an adverse impact on the Attleborough Stream valley and properties which lie to the north of the bypass in the vicinity of the Queen's Road bridge.

Queens Road to Besthorpe Junction

7.5.5. The impact of the new carriageway on the topography would not be severe. Although not in character with the surrounding landscape, the elevated status of the road is already well established and the dualling works would be seen within this context. Therefore the overall impact to the topography would be '**slight adverse**'. *this stretch includes Attleborough Hall Farm etc*

Vegetation

7.5.6. The results of the vegetation assessment are included in Volume 2, Part 4 of this ES, and are to be read in conjunction with the vegetation removal drawings Figure 7.3 (a-h).

Fen Street to West Carr Road

7.5.7. There would be a substantial loss of trees on the north-western side of the existing cutting. These trees are relatively immature and do not have an impact on the surrounding countryside because they do not project higher than the cutting sides. Therefore there would be no adverse impact except for road users.

West Carr Road to Queens Road

7.5.8. On this section the vegetation loss would be more prominent because although the vegetation remains immature, it is located on embankments rather than in cutting and provides some screening value for traffic. The greatest loss will be experienced at Queens Road where the embankment is at its highest; here the impact would be '**severe adverse**'.

Queens Road to Besthorpe Junction

- 7.5.9. The road would continue to be on embankment. Trees and shrubs on the northern side would be removed which would open up views of traffic over this sensitive section of the Attleborough Stream valley. This would have an impact on Attleborough Hall and its associated wet meadows, which would be 'moderate adverse' (veg.).

South and southeastern margins

- 7.5.10. It should be noted that the changes occurring as a result of vegetation loss would largely be confined to the north and north-western margin of the bypass. This means that changes to the south and southeast would be 'negligible'.

Landscape Character

- 7.5.11. The impacts on each Landscape Character Area (LCA) are considered separately as follows:

LCA 1: Fen Plantation to Crowshall Lane

- 7.5.12. The area is of average quality and moderate sensitivity, containing few dominant features but conversely few detractors. The visual change associated with the new construction could be accommodated provided that the long distance views are carefully respected. The proposed dualling within this character area will be for the most part in cutting (like the existing bypass), and therefore would have negligible impact on the LCA as a whole. The main impact would result from the proposed bridge and its associated embankments at West Carr Road.
- 7.5.13. Planting would help to mitigate the visual impact of the new earthworks at Fen Street and West Carr, but the Scheme would inevitably result in minor localised change to the character of this area.

LCA 2: Crowshall Lane to Queens Road

- 7.5.14. The valley floor within this area is attractive and sensitive, owing to the relationship between the pastures and their mature trees and hedges which create an interesting and intimate character. Losses to several of these features as a result of the proposed dualling and balancing ponds would erode the quality of this LCA. The higher and more open land to the north is less attractive and sensitive than the meadows, and located further away from the proposed works; consequently it would be less affected in this area.
- 7.5.15. Whilst mitigation planting would help to reduce the visual impact of the road, it would not compensate for the loss of the mature vegetation which so characterises the pastoral setting. The proximity to the Attleborough Stream and shortage of space for planting within would limit its effectiveness. The Scheme would therefore weaken this character of the Area.

LCA 3: Queens Road to Besthorpe Junction

- 7.5.16. The Scheme would not have a significant impact on this landscape. Most of the Area would not be directly affected by the dualling, apart from the balancing ponds and works to lower land adjacent to Deopham Road in order to extend the flood plain. The long distance, views within the character area, which include the A11, would not be adversely affected by the proposals.

LCA 4: Queens Road to Besthorpe Junction

- 7.5.17. This relatively high quality (above average) riparian landscape is linked to Attleborough Stream and the historic estate of Attleborough Hall. Although dissected by the existing Bypass, the area still retains its character and provides an important contrast to the surrounding arable land and urban area. It is relatively robust because of the extent of the existing semi-natural vegetation, including some large mature trees that contribute to its overall character. Whilst these could be vulnerable to indirect changes to the drainage and/or agricultural regimes, in addition to any direct losses, changes to their setting would weaken their contribution to the character of the LCA as a whole. For this reason the character of the pastures in their historic context is also vulnerable.
- 7.5.18. The Scheme would have a direct 'adverse' impact on this LCA. Mitigation measures would off-set some of the Scheme landscape and visual impacts, but in so doing would also weaken the historic character of this area, which is dependent upon more informal clumps of trees and hedge/ditch-side planting, rather than planting on artificial embankments.

LCA 5: Crowshall Lane to Attleborough Hall

- 7.5.19. This area, which is largely townscape with an urban edge character, is capable of accommodating change, but only where the impact on the residential community/community facilities is carefully considered and mitigated.
- 7.5.20. Mitigation planting, including that at the West Carr Road Junction (LCA 2), would help to screen the road although it would reduce the extent of long distance views from within LCA 5 and thereby increase its sense of enclosure.
- 7.5.21. Although much of the established planting on and around the existing Queens Road Junction would have to be removed to make way for the dualling and the associated slip roads, the most significant impact or degree of change occurred when the bypass was first constructed over what was then largely unaffected land. The degree and significance of the additional change now envisaged as a result of the dualling is therefore much less.

Visual Impact

- 7.5.22. The results of the visual impact assessment (VIA) are included in Volume 2, Part 4 of this ES, and are to be read in conjunction with the VIA drawings Figures 7.9, 7.10 (a-f), 7.11 (a-f), and 7.12 (a-f). The results are summarised below.

Visual change during construction

- 7.5.23. During the construction phase **moderate short-term deterioration** would be experienced by those properties which are located close to the proposed junctions at Fen Street and West Carr Road. At Queens Road on the north-western side, the adjacent properties would experience **severe short term deterioration**. This would be due to the engineering works associated with the construction of the NMU bridge at West Carr Road and additional bridge at Queen's Road, new road embankments, slip roads, junctions and drainage works. There would be clear views of construction machinery and temporary stockpiles of soil, ballast and building materials.
- 7.5.24. Similarly some properties located close to the scheme such as Hillsend, West Farm, and Attleborough Hall would experience **moderate short-term visual deterioration** because of

the construction operations. No.1 and No.2 Ellingham Road would experience **severe visual deterioration**

7.5.25. The Highways Agency would offer off-site planting, and in some cases this could be carried out in advance of the Scheme in order to reduce initial impact from the outset.

7.5.26. Eleven properties would experience severe adverse visual deterioration during construction, primarily due to their location in close proximity to the proposed works. However, the visual change would not be prolonged, largely being limited to the duration of the works and consequently the significance of the visual change would be reduced. It is for this reason that no high adverse entries have been recorded during the construction period.

7.5.27. The visual change resulting from the construction phase (Figure 7.10(a-f)) can be summarised as follows:

Table 7.2 Significance of Visual Change – Construction Year

Significance of visual change (No of properties)	High		Medium-High		Medium-Low		Low		Total
	Beneficial	Adverse	Beneficial	Adverse	Beneficial	Adverse	Beneficial	Adverse	
Fen St to West Carr									
Severe short term deterioration				1r					1
Moderate short term deterioration						1c			1
Slight short term deterioration						5r		4r/1f	6
West Carr to Queens Road									
Severe short term deterioration				4r				1a	5
Moderate short term deterioration						6r			6
Slight short term deterioration								13r/1c	14
Queens Road to Besthorpe Junction									
Severe short term deterioration				4r					4
Moderate short term deterioration						21r			21
Slight short term deterioration								20r/1c	21

Key to viewpoint types: a = agriculture c = commercial f = footpath/bridleway r = residential

Visual change Year 1 (winter)

7.5.28. The second stage of the visual assessment considered a scenario one year after the scheme opens on a winter's day in order to illustrate the worst-case situation. The vegetation, which existed prior to construction, would mostly have been removed, the new road, junctions, earthworks, signs and traffic would be evident, but the new planting, although mostly in place, would not yet be effective. As a consequence, those properties initially affected during construction would still experience detrimental visual change, although the temporary stockpiles and construction equipment would no longer be visible.

7.5.29. For the majority of the residential properties the visual deterioration would be 'slight', but in total over the Scheme there would be 21 'moderate adverse' affected and 2 would suffer 'severe' long-term deterioration.

7.5.30. The visual change as assessed on a typical day in winter, one year after the Scheme opens (Figure 7.11(a-f)) can be summarised as follows:

Table 7.3 Significance of Visual Change– Year 1

Significance of visual change (No of properties affected)	High		Medium-High		Medium-Low		Low		Total
	Beneficial	Adverse	Beneficial	Adverse	Beneficial	Adverse	Beneficial	Adverse	
Fen St to West Carr									
Severe long term deterioration		1r							1
Moderate long term deterioration				1c					1
Slight long term deterioration						5r		1f	6
West Carr to Queens Road									
Severe long term deterioration		4r				1a			5
Moderate long term deterioration				5r					5
Slight long term deterioration						13r			13
Queens Road to Besthorpe Junction									
Severe long term deterioration		5r							5
Moderate long term deterioration				21r					21
Slight long term deterioration						19r		1c	20

Key to viewpoint types: a = agriculture c = commercial f = footpath/bridleway r = residential

Visual change Year 15 (summer)

7.5.31. The third stage of the VIA considered a scenario fifteen years after the scheme opened on a summer's day, in order to assess the impact of mitigation planting. By now the new planting would be of a similar height and canopy spread to the trees and shrubs that are currently (2004) found on the cuttings and embankments of the existing Bypass. This existing vegetation was planted in 1988 and it is therefore anticipated that the proposed mitigation planting would provide screening, which would be at least as effective as that currently provided within the existing landscape of the Attleborough Bypass.

7.5.32. Two residential properties would continue to experience a severe long term visual deterioration, namely, No.1 and No.2 Ellingham Road. However, residential property 64 Queen's Road would achieve a medium high benefit by year 15 as the new road alignments, landform and planting would have achieved more effective mitigation than currently exists.

7.5.33. By year 15, many more receptors would experience 'slight' or 'negligible' visual change (although moderately adverse) as the screening capacity of the mitigation planting would begin to take effect. As the tree and shrub canopy size increases past year 15, it is likely that more properties would experience 'negligible' change and fewer would be affected by any adverse impact. The visual change as assessed on a typical day in summer fifteen years after the scheme opens (Figure 7.12 (a-f)) can be summarised as follows:

Table 7.4 Significance of Visual Change– Year 15

Significance of visual change (No of properties affected)	High		Medium-High		Medium-Low		Low		Total
	Beneficial	Adverse	Beneficial	Adverse	Beneficial	Adverse	Beneficial	Adverse	
Fen St to West Carr									
Moderate long term deterioration						1r			1
Slight long term improvement							1r		1
West Carr to Queens Road									
Moderate long term deterioration				6r					6
Slight long term deterioration						16r		1c	17
Slight long term improvement					1r				1
Queens Road to Besthorpe Junction									
Severe long term deterioration		1r							2
Moderate long term deterioration				7r					
Moderate long term improvement			2r						2
Slight long term deterioration						18r			18
Slight long term improvement						12r			12

Key to viewpoint types: a = agriculture c = commercial f = footpath/bridleway r = residential

7.6. Conclusions

- 7.6.1. In general the impact on topography would be '**neutral**', although some localised areas, predominantly embankments would be '**moderate adverse**'
- 7.6.2. During the construction phase, there would be a temporary '**moderate-severe**' deterioration in vegetation quality overall.
- 7.6.3. Whilst the extent of new tree and shrub planting far outweighs the extent lost in purely numerical terms, the mitigation planting would have little visual impact on the landscape at year 1.
- 7.6.4. At year 15, the new planting would be of a similar height and canopy spread to the trees and shrubs that are currently (2004) found on the cuttings and embankments of the existing Bypass. Over the long-term as planting reaches full maturity and screening impact (50 + years) there would be an overall '**negligible**' or beneficial improvement and impact on vegetation.
- 7.6.5. Between Fen Plantation and Crowshall Lane, the Scheme would result in '**negligible**' impact to Landscape Character Area (LCA) 1.
- 7.6.6. The Scheme would have a direct '**adverse**' impact on the landscape features that define LCA2 (Crowshall Lane to Queens Road).

- 7.6.7. Between Queens Road and Besthorpe Junction, there would be no impact on LCA3. However, the scheme would have a direct '**adverse**' impact on LCA4 (Queens Road to Besthorpe Junction).
- 7.6.8. There would be no impact on LCA5 which lies to the south of the Bypass. The established screen planting on the Thetford bound embankments of the road would remain largely intact, thus still effectively screening the north edge of Attleborough.
- 7.6.9. During the construction phase the majority of viewpoints would experience '**slight**' to '**moderate**' short-term deterioration in their visual quality. '**Severe**' short-term deterioration would be limited to those properties located in close proximity to the proposed junction at Queens Road.
- 7.6.10. Over the short-term, the proposed mitigation planting would not be effective as it would not be sufficiently established. Consequently those properties initially affected during construction would still experience detrimental visual change; however, for the majority of residential viewpoints the visual deterioration would be '**slight**'.
- 7.6.11. In the long-term, it is anticipated that the proposed mitigation planting would provide screening which is at least as effective or better than that currently provided within the existing landscape of the Attleborough Bypass. As the benefits of screen planting only accrue after about 15 years, it is likely that more properties would begin to experience only a '**negligible**' change and fewer would be affected by any adverse impact as time goes on.

14. Policies and Plans

14.1. Introduction

Purpose of the assessment

- 14.1.1. The Policies and Plans chapter of the assessment examines the status of the dualling in National, Regional and Local Government Planning and Transport Policy, and assesses the impact of the dualling on relevant land use policies. The purpose of this is to ensure that the scheme is compliant with, and compliments, the relevant policies and plans.

Summary of Key Issues

- 14.1.2. The dualling of the A11 Attleborough Bypass first entered the political agenda in the 1989 Government white paper 'Roads for Prosperity', and has since been reviewed by the current Government within the white paper 'A new deal for trunk roads in England' (July, 1998). The dualling of the A11 emerged as a Government priority for East Anglia within both documents.
- 14.1.3. Breckland District Council's Local Plan (Adopted 1999) and Norfolk County Council's Structure Plan (1999) contain strategic and land use policies relevant to the scheme on landscape, wildlife, agriculture and the historic environment. Employment and housing allocations are also relevant. The dualling site is a protected corridor within the Breckland Local Plan; consequently planning applications are not a key issue. Regional Planning Guidance 6 and Regional Planning Guidance 14 are also relevant to the scheme. National Planning Policy Guidance notes on transport, countryside, nature conservation, the historic environment and flood risk are also considered.

Scope of the assessment

- 14.1.4. The A11 Attleborough Bypass dualling proposal extends over approximately 5.5km to the north of the market town of Attleborough. The current single lane carriageway is a bypass constructed in 1985. This assessment considers local plan and structure plan policy relevant to Attleborough and the surrounding countryside, and also considers strategic and site specific regional and national planning policy.

Stages of the assessment process

- 14.1.5. The assessment process is as follows;
- Initial review of planning history;
 - Research into the relevant existing and proposed Local Plan allocations;
 - Review of the current planning status of the dualling in national, regional, county and district policy

14.2. Study Area

- 14.2.1. The Norfolk Structure Plan (1999) and Breckland District Local Plan (Adopted 1999) policies and allocations apply throughout the study area. Norfolk Local Transport Plan (2001/2002-2005/2006) policies also apply. Although no known sites exist within the study

- area, the Waste and Minerals Local Plan may be relevant if borrow pits are required by the Scheme.
- 14.2.2. The area around the Scheme is predominately rural and is defined within Breckland Local Plan as open countryside with part of a designated area of important landscape quality to the southwest. The Norfolk Structure Plan displays a protected area of agricultural land to the north of the existing Attleborough Bypass and also identifies an area of important wildlife quality to the south of the Scheme. The principal roads within the study area are the A1077 Watton to Buckenham Road and the A11, which is a trunk route.
- 14.2.3. The area of widening falls within a protected corridor defined in the Local Plan and this has therefore limited development and allocations within the areas directly affected.
- 14.3. Assessment Methodology**
- 14.3.1. A review of the relevant planning history of the proposed dualling of the A11 at Attleborough and adjacent development has been completed, and a search for background documents and previous studies relating to the proposed development area has been carried out.
- 14.3.2. Existing and proposed housing, and employment allocations were investigated and a plan based upon the Local Plan designations, has been assembled to show the current status of the allocations potentially affected by the proposal (see Figure 14.1). Listed Buildings and Tree Preservation Orders that may be impacted upon by the dualling were also investigated and a map detailing their location is provided (see Figure 14.2).
- 14.3.3. The assessment includes a summary of the current planning status of the scheme, based on analysis of national, regional, county and district policy. The status of the proposed development in terms of Breckland District Council's Local Plan review is also considered.
- 14.3.4. Mott MacDonald undertook consultation at the outset of the project in September 2001 in association with the Highways Agency. The findings of the enquiries that are relevant to the planning background are summarised below.
- 14.3.5. Establishment of the baseline data including comprehensive, up to date, recorded knowledge of the existing policies, plans and allocations, form the basis upon which to assess the proposals. Consultations, both informal and formal, add to the evolving planning view.
- 14.3.6. The following organisations have been consulted:
- Government Office for the East of England;
 - Norfolk County Council;
 - Breckland District Council;
 - The Countryside Agency;
 - English Nature;
 - The Environment Agency;
-

- Other bodies under General Development Procedure Order 1995 including:
 - The Department for Transport;
 - The Office of the Deputy Prime Minister;
 - English Heritage; and
 - The Department of the Environment, Food and Rural Affairs.

14.4. Existing Conditions

- 14.4.1. This route has been protected since the construction of the original bypass. Breckland District Council's Adopted Local Plan contains six relevant housing allocations at varying stages of construction and three relevant employment allocations. A number of trees protected by Tree Preservation Orders and Listed Buildings are located to the south of the bypass within Attleborough's housing settlement boundary and to the north of the bypass within the curtilage of Attleborough Hall. Attleborough Conservation Area encompasses the centre of Attleborough.
- 14.4.2. There are two Scheduled Ancient Monuments (SAMs) to the south of the bypass. The Norfolk Structure Plan (1999) defines areas of Important Landscape Quality within the Key Diagram. Breckland District Council's Adopted Local Plan (1999) endorses these areas and development is significantly limited on these sites. One such area of Important Landscape Quality is located to the southwest of the Scheme. The Norfolk Structure Plan (1999) designates an area of Important Wildlife Quality to the south of Attleborough. Areas of protected agricultural land (Grades 1 and 2) are also defined within the Norfolk Structure Plan (1999). An area of protected agricultural land is located to the north of the Attleborough Bypass.
- 14.4.3. Non-motorised road user provisions are located at West Carr Junction and Fen Street. Planning guidance on pedestrians, cyclists and equestrians is provided in PPGN.13: Transport. The Norfolk Local Transport Plan also contains strategies to protect and encourage these road users.
- 14.4.4. Mott MacDonald carried out initial consultation in 2001 in association with the Highways Agency. Ninety five percent of respondents to the initial consultation stated that improvements to the bypass were necessary. Of these ninety three percent lived in the locality. At this stage the respondents' principal concern was the increase of traffic in the town centre. Conversely, traffic studies reveal a decrease in town centre traffic flow due to the Scheme's provision of improved accessibility to the A11.

14.5. Description of Impacts and Effects of Mitigated Scheme

Background Documents and Previous Studies

- 14.5.1. Neither Norfolk County Council nor Breckland District Council have carried out previous studies that relate directly to this section of trunk road. Breckland District Council is currently undertaking an A11 economic development project. The most recent report 'Development Opportunities along the A11 Corridor' accentuates the possibility of promoting economic development along the length of the A11 from Norwich to the A14. Key initiatives identified relating directly to the A11 Attleborough Bypass include Gaymer's Industrial Estate, Attleborough (Local Plan allocation E2) and Attleborough

Business Park (Local Plan allocation E3). The dualling of the A11 improves accessibility to these sites.

Land Use

- 14.5.2. There are several locations where existing land uses may be affected, requiring partial relocation or demolition, such as the fruit farm at West Carr Junction. Sensitive receptors are mainly residential properties. Careful design and mitigation would aid in avoiding or reducing the associated potential effects. Mitigation measures include minimising land-take throughout the Scheme and avoiding compulsory purchase where licensing is appropriate. Planting to protect adjacent dwellings would require the compulsory purchase of some land adjacent to the road, whilst the off-site mitigation planting would be by landowner request. Landscape and ecological proposals would retain as much of the original vegetation and watercourse as possible, and appropriate native tree and shrub species would be planted to screen adjacent dwellings. Attleborough High School may wish to expand in the future. Land-take adjacent to the school playing fields has been minimised so that the proposed dualling Scheme does not obstruct expansion proposals.

Breckland Adopted Local Plan Allocations (September 1999)

- 14.5.3. Figure 14.1 identifies the Local Plan housing and employment allocations. Housing allocations H1, H2 and H3 have been completed; H4 and H6 are currently under construction. Housing allocation H5 has permission for 86 units and the development of the site is imminent. Due to the stage and scale of these allocations the local planning authority do not consider them to have an impact on the dualling of the A11 at Attleborough.
- 14.5.4. Approximately 500 dwellings are completed in the Breckland district per annum, 50% of which are on windfall sites. Attleborough has experienced less windfall development than the remainder of the district over the Local Plan period, however the town has a completion rate of 100 dwellings per annum due to the significant number of housing allocations in the Adopted Local Plan. Attleborough has moved down the development hierarchy since the adoption of Breckland Local Plan and the focus for the majority of new development is now on Thetford and Dereham. As a result, completion rates are likely to drop over the next three years and consequently the impact of housing development on the dualling of the A11 at Attleborough will not be significant. It is not possible to anticipate the location of windfall development, therefore no mitigation measures or access improvements can be provided for these sites.
- 14.5.5. Employment allocation E1 is isolated from the location of the proposed road construction and as a result the site's development would have a '**negligible**' impact. Employment E2 is allocated for B2 and B8 uses (industrial and warehousing), although the site is unlikely to come forward within the proposed timescale of dualling completion. Employment allocation E3 is for B1 (office/business use) and the Scheme would improve accessibility to the site indirectly.
- 14.5.6. The setting and curtilage of Listed buildings would be affected at Attleborough Hall and to the north of Attleborough within the housing settlement boundary. Grade one Listed Buildings in the locality include St Mary's Church, Attleborough, and All Saints Church, Besthorpe. The Scheme would not have an impact on All Saints Church, as traffic flows in the surrounding area will remain unchanged. The Scheme would have a positive impact on the conservation of St Mary's Church, as traffic flows would decrease by 3% on Church Road.

- 14.5.7. Attleborough Conservation Area is located within the town centre. The proposed scheme would reduce town centre traffic flows. Trees protected by Tree Protection Orders would not be directly impacted upon by the proposed dualling Scheme.
- 14.5.8. Attleborough Hall is a Grade 2* listed building. There is a separate Grade 2* listing for the moat and the wall within the curtilage of Attleborough Hall. Tree planting would mitigate against the detrimental impacts of the dualling on these Grade 2* listed features. However, the dualling would have a significant impact on Attleborough Hall and curtilage, due to the increased noise caused by the increased speed of traffic (See Figure 14.2).
- 14.5.9. The proposed dualling would not have a direct or significant impact on the SAMs in the locality of Attleborough, identified in Breckland District Council's Local Plan, as the sites are remote from the Scheme. However, the designated area of important landscape quality to the southwest of the bypass would be affected. Measures taken to mitigate against this impact include careful design, off-site planting including the position of native hedging, and habitat creation. The dualling would not have a significant impact on the Norfolk Structure Plan allocation of Outstanding Wildlife Quality to the south of the Scheme.

The Current Planning Status of the Dualling

- 14.5.10. The overall Scheme integrates with, and enhances, economic policies at central government, regional and local levels. Economic activity benefits through the improvement of the access to Attleborough's commercial centre (Breckland Adopted Local Plan, 1999).
- 14.5.11. Since the town is already bypassed, the economic and integration effects upon land use planning would not be a critical issue. However, improved signage and enhanced access to existing and future commercial and town centre sites would improve the general amenity of the area. Breckland District Council have not received any planning applications that would have a significant impact on the proposed dualling, nor are they undertaking any pre-application negotiations that are likely to have a significant impact.

Central Government Policy

- 14.5.12. Planning Policy Guidance Notes (PPGN) set out Central Government's principles and policies that apply to the different aspects of land use planning. Local planning authorities must take their contents into account in preparing their development plans. The guidance may also be material to decisions on individual planning applications and appeals. PPGN relevant to the dualling Scheme includes PPGN 13: Transport, PPGN 7: Countryside and Rural Economy, PPGN 9: Nature Conservation, PPGN 15: Planning and the historic environment, PPGN 16: Archaeology and Planning, and PPGN 25: Development and Flood Risk.
- 14.5.13. Central government intends to reform the planning system and the proposals are detailed within the green paper 'Planning: A fundamental change'. As part of the proposed changes PPGNs are to be replaced with Planning Policy Statements (PPS). Consultation drafts of some PPS documents have been prepared. However, as the PPSs are prepared as consultation drafts, their contents are not yet applicable to the proposed dualling of the A11.
- 14.5.14. PPGN 13 places an emphasis on the provision of public transport as well as provision for pedestrians and cyclists. Access to facilities and services is a key issue identified within the guidance note, as are reducing the need to travel and transport safety. The proposed dualling of the A11 complies with the guidance set out in PPGN 13 as access for pedestrians and cyclists is considered within the scheme, and local access to facilities and services is

- improved through reduced congestion in Attleborough town centre. The proposed dualling Scheme would significantly improve the safety of the A11 Attleborough Bypass.
- 14.5.15. Annex B of PPGN 13 refers to the Transport White Paper and the roads review document (*A new deal for trunk roads in England*, July 1998) in which the dualling of the A11 is identified as a priority for the East Anglian region. The annex reiterates the importance of safety management.
- 14.5.16. The current PPGN 7 document emphasises the importance of the protection of high grade agricultural land, the protection of local countryside and landscape designations, and countryside. The protected area of agricultural land to the north of the bypass and the designated area of Important Landscape Quality to the southwest of the bypass have been carefully considered in the layout and mitigation of the proposed dualling.
- 14.5.17. PPGN9 sets out the criteria for safeguarding England's natural heritage under domestic and international law including the status of nature conservation and wildlife designations, and role of planning in conserving wildlife. None of the designations considered within PPGN 9 are in the locality of the dualling Scheme. Protected species issues are dealt with under PPGN 9 Nature conservation and wildlife have been considered from the outset of the project in compliance with the relevant legislation.
- 14.5.18. Methods of protecting Conservation Areas and Listed Buildings and their settings are described within PPGN 15. The document also contains a section relating specifically to traffic and transport, which states that all traffic management and transport projects must consider their impact on the historic environment. This has been fully considered within the Environmental Impact Assessment. PPGN 16 contains guidance on development and archaeology, prescribing early review of archaeological issues in development projects. The staged approach to archaeological investigation proposed in PPGN 16 has been adopted in this project.

Regional Government Policy

- 14.5.19. Regional Planning Guidance (RPG) sets out the regional framework for Development Plans and is a material consideration in determining planning applications. The RPGs relevant to the dualling Scheme include RPG 6 East Anglia and RPG 14 East of England (Consultation Document, 2004). Draft RPG 14 makes extensive provision for additional housing in the East of England. Breckland District Council are anticipating guidance to make provision for an additional 14,000 houses across district in the next 20 years. Much of this growth will go to Thetford and Dereham, although it is inevitable that some of it will now go to Attleborough. However, as RPG 14 is yet to be adopted these figures are not definitive and may be updated, consequently the figures are not represented in this analysis. RPG.6 does not have the full scope of a Regional Transport Strategy (prescribed for RPG in PPGN 11: Regional Planning). However, Chapter 6: Sustainable Transport sets out objectives for the regional transport strategy.
- 14.5.20. Key transport objectives within RPG 6 include improved accessibility, sustainable modes of transport, IT and communications reducing the need to travel and integrated land uses reducing the need to travel, as well as safety and security. The document also considers improvements to existing infrastructure, stating that it should be maintained to an appropriate standard to meet the needs of users. The A11 is identified as part of the core trunk road network in East Anglia and the dualling of the Attleborough Bypass is identified

as a priority. RPG 6 also refers to the Government's Targeted Programme of Improvements, which includes the Attleborough Bypass dualling.

- 14.5.21. The Government Planning Region has been replaced by the East of England Region, which includes the area 20 within the East Anglian region and part of the South Eastern Region. RPG 14: East of England will be published in the summer of 2004. The document will not only cover a larger area, but will also have a stronger spatial context. In January 2004 the East of England Local Government Conference issued a consultation RPG 14 in which sets out options for a Regional Transport Strategy. Measures to improve transport provision include stimulating efficient use of existing infrastructure and providing high standard road improvements to support regeneration. The document also states that regional and local transport policy must make the best use of existing infrastructure. RPG 14 defines the regional strategic network; within this document the A11 is defined as a strategic national link (category A) serving a major national purpose.

Local Government Policy

- 14.5.22. The Norfolk Structure Plan is written in accordance with the Government white paper '*A new deal for trunk roads in England*'; July 1998, which reassesses the policies and strategies described in the 1989 white paper '*Roads for prosperity*' and identifies the dualling of the A11 as a priority for the East Anglian region. Consequently, the dualling of the A11 complies with Structure Plan policy.
- 14.5.23. Relevant Structure Plan policy includes;
- T.1 Transport Strategy, which aims to ensure that schemes enhance safety, are sympathetic to the character of the area and minimise environmental impacts, all of which are achieved through the proposed dualling Scheme.
 - Policy T9 identifies the dualling of the A11 as one of the principal transport priorities for Norfolk.
 - Policy T10 classifies the A11 as part of Norfolk's Strategic Road Network, which traffic will be encouraged to use.
- 14.5.24. Policy TCR 1 outlines the commercial functional hierarchy of town centres in Norfolk. Attleborough is defined as a small town centre within the functional hierarchy and as such Norfolk County Council aims to improve accessibility, pedestrian circulation and the local environment. These objectives would be achieved through the proposed dualling Scheme due to the resulting reduction of traffic in Attleborough Town Centre. Policy ENV 1 Overall Environment Strategy states that the County Council will allot high priority to protecting Norfolk's environmental assets. The environmental mitigation measures set out in the dualling proposal the Scheme respect policy ENV1.
- 14.5.25. Strategic Principle Five of the Breckland Adopted Local Plan (September, 1999) identifies the dualling of the A11 as a key priority. Although the Local Plan review is not at a stage in which the inclusion of the bypass dualling is appropriate, the dualling is supported through national, regional and local policy and the project has member support.

15. Key Effects and Conclusions

15.1. Introduction

15.1.1. The results of the Environmental assessment are summarised in the Environmental Impacts Tables (EIT) which are presented in this Chapter. They have been prepared in accordance with the *Design Manual for Roads and Bridges* (DMRB) Volume 11, Section 4, Part 4.

15.1.2. The EIT is a tabular presentation of the data summarising the main likely and indirect impacts of the Published Scheme, compared with the 'Do-Minimum', taking account of agreed mitigation. The EIT comprises three tables.

A. Appraisal Groups Table

1. Local people and their communities.
2. Travellers
3. The Cultural and Natural Environment
4. Policies and Plans

B. Land Use Table

C. Mitigation Table

15.1.3. The first table, Appraisal Groups Table, is given in Table 14.1. It summarises the effects of the Published Scheme compared with the Do Minimum, under the four appraisal groups defined in the DMRB.

15.1.4. The second table, Land Use Table, given in Table 14.2, lists the existing uses of land to be taken by the Scheme and quantifies the areas of each required, both as permanent land-take and land required temporarily during the construction.

15.1.5. The third table, Mitigation Table, given in Table 14.3 lists mitigation measures proposed to reduce the environmental impact of the Scheme, notwithstanding measures already incorporated into the design of the Scheme, together with maintenance requirements and practicality.

Table 15.1 APPRAISAL GROUP TABLE
GROUP 3: THE CULTURAL AND NATURAL ENVIRONMENT

SUB GROUP	EFFECTS	UNITS	THE SCHEME	DO MINIMUM	COMMENTS
CULTURAL HERITAGE					
Scheduled Monuments Other Archaeological Sites Unknown Archaeology Historic Buildings Conservation Areas Historic Landscape					The assessment of the effects on sites of historic or archaeological interest is based on an assessment of Direct Impacts (loss or damage to a site) and Indirect Impacts (changes in noise visual effects and context). The visual assessment is based on winter views in the worst case (Year of Opening).
Sites and features listed below are categorised by their value					
National					
Attleborough Hall, Grade 2* listed building	Construction Phase Operational Phase	Burial of associated landscape features Degradation of setting	Burial of additional part of approach avenue within landtake area under earthworks during construction; compaction of deposits under earthworks and further disruption of landscape and visual setting during operational the	No change	Avenue segments would be preserved <i>in-situ</i> by their burial under earthworks. Landscape and visual screening would offset the impact of the road on the Hall's setting.

Table 15.1 APPRAISAL GROUP TABLE
GROUP 3: THE CULTURAL AND NATURAL ENVIRONMENT

SUB GROUP	EFFECTS	UNITS	THE SCHEME	DO MINIMUM	COMMENTS
<i>Regional</i>					
Late Bronze Age/Early Iron Age settlement site.	Construction Phase	Loss of archaeological deposits	Destruction of all archaeological deposits and features within landlake area by construction excavations.	No change	Preservation by record required to offset the loss of information
Neolithic/Bronze Age site	Construction Phase	Loss of archaeological deposits	Overall impact considered Moderate	0	Site lies outside scheme area and will not be affected by either the construction of operation phases.
Post-Medieval Water Meadows	Construction Phase	Loss of archaeological deposits Burial of archaeological deposits	Destruction of all archaeological deposits and features within balancing pond area. Compaction of deposits buried under earthworks.	No change	Preservation by record required for those parts of the site within area of balancing pond. Parts of site under earthworks would be preserved <i>in-situ</i> .
Unknown Archaeological Remains	Construction Phase	Loss of archaeological deposits. Burial of archaeological deposits	Overall impact considered Moderate Destruction of all archaeological deposits and features within areas of construction	No change	Preservation by record for those sites occurring within construction excavation areas.

Table 15.1 APPRAISAL GROUP TABLE
GROUP 3: THE CULTURAL AND NATURAL ENVIRONMENT

SUB GROUP	EFFECTS	UNITS	THE SCHEME	DO MINIMUM	COMMENTS
Historic Buildings	Construction Phase	Demolition	excavation. Compaction of deposits buried under earthworks. Overall impact considered Minor	0	Historic buildings lie outside area of the Scheme and will not be affected by either the construction of operation phases
Conservation Area	Construction Phase	Demolition	0	0	The historic core of Attleborough is a designated Conservation Area and lies outside the area of the Scheme.
Besthope Common Historic Landscape	Construction Phase	Loss of landscape features	0	0	No landscape features will be lost as a result of construction activities.
Unknown Cultural Heritage Value					
Roman and Medieval Metalwork Findspot	Construction Phase	Loss of archaeological deposits.	Destruction of all archaeological deposits and features by construction excavations for flood compensation area. Overall impact considered Minor	No change	

Table 15.1 APPRAISAL GROUP TABLE
GROUP 3: THE CULTURAL AND NATURAL ENVIRONMENT
ECOLOGICAL AND NATURE CONSERVATION

SUB GROUP	EFFECTS	UNITS	THE SCHEME	DO MINIMUM	COMMENTS
<i>Sites of 'Very High' value</i>					
Swangey Fen SSSI, cSAC	Construction and operational phases: Sediment liberation and movement; pollution.		Slight risk that sediment liberated during construction, pollution from construction site, or pollutants from spillages during the operational phase of the road could be carried downstream to the cSAC.	Higher risk of pollutants reaching the cSAC	The Scheme is more than 500m from cSAC boundary. Drainage improvements to new and existing carriageway drainage would result in a slight benefit in terms of water quality.
<i>Sites of 'Lower' value</i>					
River Thet	Construction phase: Sediment production Pollution Habitat loss Operational phase: Pollution		Dislodged sediment laden with pollution from roadside runoff. Small amounts of habitat loss (outfall construction). Balancing ponds will reduce pollution after construction. Long term: Minor positive.	Continued risk of pollution from A11 through uncontrolled discharge.	
Attleborough Stream	Construction phase: Habitat loss Pollution		Extensive short-term loss of habitat due to channel diversions.	Continued risk of pollution from A11 through uncontrolled	

Table 15.1 APPRAISAL GROUP TABLE
GROUP 3: THE CULTURAL AND NATURAL ENVIRONMENT

SUB GROUP	EFFECTS	UNITS	THE SCHEME	DO MINIMUM	COMMENTS
	Sediment production Operational Phase: Pollution		Replacement habitat will be of higher value than present. Dislodged sediment laden with pollution from roadside runoff. Balancing ponds will reduce pollution after construction. Overall: Neutral	discharge.	
Species-rich hedgerows	Construction and operational phases: Habitat loss Habitat fragmentation Dust deposition Spray drift		36% loss of five affected hedgerows. Short-term: Minor adverse. Overall: Neutral	No change.	
*Important Hedgerows	Construction and operational phases: Habitat loss Habitat fragmentation Dust deposition Spray drift		Loss of 30% and 24% of two hedgerows affected. Short-term: Minor adverse. Overall: Neutral	No change.	
Species-rich road verges	Construction phase	Habitat loss	Loss of 50% of habitat type along the Scheme. Overall: Neutral	No change.	The habitat lost would be recreated relatively rapidly
Semi-natural broadleaved woodland	Construction phase	Habitat loss Dust deposition	Loss of 0.1ha of habitat type (5-10% of the habitat type along the Scheme). Overall: Neutral	No change.	

Table 15.1 APPRAISAL GROUP TABLE
GROUP 3: THE CULTURAL AND NATURAL ENVIRONMENT

SUB GROUP	EFFECTS	UNITS	THE SCHEME	DO MINIMUM	COMMENTS
<i>Fauna</i>					
Aquatic macro-invertebrates	Construction phase Operational phase	Habitat loss Sedimentation Pollution Sedimentation Pollution	Overall enhancement of habitat value and improvement in water quality. Therefore: Minor beneficial	No change. Based on habitat appraisal, unlikely to affect any protected or endangered species along the corridor	
Reptiles	Construction phase	Habitat loss Incidental mortality	Creation of reptile sites as mitigation. Therefore, overall: Neutral	No change.	
Breeding birds	Construction phase	Loss of habitat, noise and visual disturbance	Minor adverse in the short-term, reducing to Neutral as planting matures.		
Water voles	Operational phase Construction phase	Road casualties Loss of habitat Fragmentation of habitat Incidental mortality	Slight adverse Creation / enhancement of available habitat for water voles as a result of mitigation measures. Therefore, overall: Moderate beneficial	No change.	
Others	Construction phase Operational phase	Habitat degradation Disturbance Road casualties	Small potential for short-term disturbance to resident animals. Also some potential for habitat degradation. Otter-proof fencing will divert individuals to culverts with ledges thereby reducing the number of road casualties.	No change.	

Table 15.1 APPRAISAL GROUP TABLE

GROUP 3: THE CULTURAL AND NATURAL ENVIRONMENT					
SUB GROUP	EFFECTS	UNITS	THE SCHEME	DO MINIMUM	COMMENTS
			Improvements in water quality and riverine habitat. Overall a Neutral impact.		

Table 15.1 APPRAISAL GROUP TABLE
GROUP 3: THE CULTURAL AND NATURAL ENVIRONMENT

SUB GROUP	EFFECTS	UNITS	THE SCHEME	DO MINIMUM	COMMENTS
LANDSCAPE					
<i>Designated Sites</i> (See Section on Policy Below)					
Character Zones					
Landscape Character Area 1:	Visual Impact	Arable Plateau	Only a slight impact as the road is largely in cutting and therefore impact is confined.	No change	
Landscape Character Area 2:	Visual Impact	Pasture/ arable	Slight short term detrimental impact due to sensitivity of landscape. Long term negligible impact.	No change	
Landscape Character Area 3:	Visual Impact	Extensive arable	Slight to negligible visual impact on this area due to distance from road.	No change	
Landscape Character Area 4:	Visual Impact	Athleborough Stream Valley	Moderate detrimental visual impact due to scale of proposed change in an intimate landscape.	No change	
Landscape Character Area 5:	Visual Impact	Urban Fringe	Negligible change as the existing screen planting will be retained on the south and eastern banks of the existing bypass.	No change	

Table 15.1 APPRAISAL GROUP TABLE
GROUP 3: THE CULTURAL AND NATURAL ENVIRONMENT

SUB GROUP	EFFECTS	UNITS	THE SCHEME	DO MINIMUM	COMMENTS
WATER					
Hydrology and Drainage					
Hydrology	Operational phase	Stream diversion and works on culvert	Potential beneficial impact due to culvert improvements	No change	Much larger culvert at Attleborough hall will improve flow.
Flood Storage	Construction phase and Operational phase	Loss of floodplain storage capacity	Up to 16,000m ³ loss. Potentially major impact, but with proposed mitigation a negligible adverse impact.	No change	Construction of flood storage compensation area will mitigate the adverse impact.
Road runoff	Construction phase and Operational phase	Increase in peak runoff to rivers due to increase in hardstanding	Up to 61,000m ³ hardstanding, but this increase will be mitigated for, so impact is negligible adverse.	No change	Construction of 5 balancing ponds will mitigate the increase in runoff to Greenfield runoff.

Table 15.1 APPRAISAL GROUP TABLE					
GROUP 3: THE CULTURAL AND NATURAL ENVIRONMENT					
SUB GROUP	EFFECTS	UNITS	THE SCHEME	DO MINIMUM	COMMENTS
<i>Surface Water Quality</i>					
Quality of site runoff	Construction phase	Increase in pollution load to rivers via site runoff due to construction works	Construction pollution may lead to major adverse impact, but with mitigation the adverse impact should be negligible	No change	Good environmental site practice would prevent most adverse impact during construction and would include good emergency procedures to minimise effects in case a pollution incident does occur.
Quality of road runoff	Operational phase	Increase in pollution load to rivers via road runoff	DMRB load in runoff: 0.058 kg of Copper 0.268 kg of Zinc Increase in pollution load, but with mitigation the adverse impact will be negligible	DMRB load in runoff: 0.039 kg of Copper 0.187 kg of Zinc	Pollution control ditches and ponds with vegetation will mitigate for the increase in pollution load
Accidental spillage	Operational phase	Increase in risk of an accident occurring AND leading to a serious pollution event in rivers	DMRB spill risk: 1 in 188 years Increase in spill risk, but with mitigation the adverse impact will be negligible	DMRB spill risk: 1 in 200 years	The pollution control ditches, the treatment ponds and the shut-off valves will mitigate for any potential increase in spill risk
<i>Groundwater</i>					
Groundwater level and flow	Construction and operational phases. Modification of groundwater levels and extension of limit of depression in the groundwater table in the	Potential derogation of licensed water supply well at Wroo Farm.	Wroo Farm is the only source potentially at risk. Groundwater level monitoring is proposed and remedial measures will be implemented in the event that derogation of the source	No change	Impacts on groundwater level and flow will be restricted to the cutting section between Fen Street and West Carr Road.

Groundwater quality	cutting between Feu Street and West Carr Road.		is predicted. Overall impact is minor .		Impacts likely to be limited to western side of new road alignment.
Operational phase Improvement in groundwater quality	Reduction in risk of groundwater pollution.	The French drains, which control groundwater levels in the cutting will be isolated from the carriageway drainage system, resulting in an improvement in groundwater quality.	No change – continued potential risk to groundwater quality as a result of leakage from French drains		The scheme provides an overall benefit in respect of groundwater quality.
			Overall impact is beneficial .		

Table 15.1 APPRAISAL GROUPS TABLE GROUP 4: POLICIES AND PLANS					
POLICY	AUTHORITY	INTEREST	THE SCHEME	DO MINIMUM	COMMENTS
Transport Policy					
(a) A New Deal for Transport: Better for Everyone, July 1998	UK Government	Integrated transport policy, designed to achieve environmental, safety, economic and accessibility objectives	The scheme is identified as a priority for the East Anglia region within 'A new deal for Trunk Roads in England' and the scheme complies with other policy through provision for pedestrians and cyclists, improved access to facilities and services and safety improvements. Overall impact: Beneficial	Non compliance with policy	
(b) A New Deal for Trunk Roads in England, July 1998					
(c) Transport 2010: The Ten Year Plan, July 2000					
(d) PPG13: Transport, March 2001					
(e) Regional Planning Guidance 6: East Anglia Policy 27	UK Government	Sustainable modes	The scheme includes provisions for pedestrians and cyclists. Overall impact: Moderate Beneficial	No change	
Policy 31		Consideration of environmental impacts	The scheme respects the countryside, valued landscapes, natural habitats and mineral resources. Overall impact: Moderate beneficial	No change	
Policy 34		Objectives for investment	The scheme improves safety and considers environmental impacts. The scheme also makes a contribution to the local cycle network. Overall impact: Minor Beneficial	No change	

Table 15.1 APPRAISAL GROUPS TABLE
GROUP 4: POLICIES AND PLANS

POLICY	AUTHORITY	INTEREST	THE SCHEME	DO MINIMUM	COMMENTS
Policy 35		Managing and maintaining existing infrastructure	The scheme aids in the maintenance of footpaths and cycleways. Overall impact: Minor beneficial	No change	
Para 6.29		Improvements to the strategic road network	The dualling of the A11 is identified as a priority for the East Anglia region. Overall impact: Beneficial	Non compliance with policy	
Cultural Heritage					
(a) PPG16: Archaeology and Planning, November, 1990	UK Government	National policies, priorities and controls for archaeological sites, including World Heritage Sites and Scheduled Monuments	PPG16 contains guidance on development and archaeology, prescribing early review of archaeological issues in development projects. Overall impact: Beneficial	Non compliance with policy	
(b) PPG15: Planning and the Historic Environment, September 1994	UK Government	National policies, priorities and controls for historic buildings, conservation areas, and other elements of the historic environment.	The project's impact on the historic environment has been fully considered within the Environmental Impact Assessment. Overall impact: Beneficial	Non compliance with policy	
(c) Regional Planning Guidance 6: East Anglia Policy 37	UK Government	Management principles for conserving and enhancing the natural, built and historic environment	The impact on Grade 1 and 2 Listed Buildings and on Scheduled Ancient Monuments is adverse in some cases Overall impact: Neutral	No change	
Policy 40		Conservation of the built and historic environment	The impact on Listed Buildings and on Scheduled Ancient Monuments is adverse in some	No change	

Table 15.1 APPRAISAL GROUPS TABLE
GROUP 4: POLICIES AND PLANS

POLICY	AUTHORITY	INTEREST	THE SCHEME		COMMENTS
			DO	MINIMUM	
(f) Breckland Local Plan, 1999 Policy ENV21	Breckland District Council	Scheduled Ancient Monuments	The development will not have an impact on the two Scheduled Ancient Monuments to the south of the bypass. Overall impact: Neutral	No change	
Policy ENV24		Archaeological assessment	An archaeological assessment was carried out as part of the Environmental Impact Assessment. Overall impact: Neutral	No change	
Policy ENV43		The impact of road schemes on the historic environment	The scheme will have a negative impact on Attleborough Hall and it's curtilage. Overall impact: Adverse	No change	
Landscape					
(a) A Better Quality of Life – A Strategy for Sustainable Development for the United Kingdom, May 1999	UK Government/ Dept. of Environment	Damage to landscape and wildlife.	The scheme is temporarily likely to have a slightly detrimental impact on landscape and wildlife, but mitigation proposals are in proposed to remedy damage.	No change	
Our Countryside: The Future – A Fair Deal for Rural England, November 2000	UK Government/ Dept. of Environment	Evolving landscapes and the consideration of all landscapes in planning decisions.	The sensitive care and consideration of the landscape through planning has been undertaken in conjunction with this scheme.	No change	
(c) PPG7: The	UK Government/	Land use planning in rural	The route of this scheme is	No change	

**Table 15.1 APPRAISAL GROUPS TABLE
GROUP 4: POLICIES AND PLANS**

POLICY	AUTHORITY	INTEREST	THE SCHEME		DO MINIMUM	COMMENTS
			designed to effectively minimise the impact on local land use and no designated areas will be affected by the scheme.			
Countryside, February 1997		areas, protection of agricultural land and designated areas				
(d) Regional Planning Guidance 6: East Anglia Policy 37	UK Government	General management principles for conserving and enhancing the natural, built and historic environment. Landscape and Recreational open spaces- Designated areas	Proposed mitigation measures will aid the protection and restoration of damaged features within the landscape. There are no designated areas within the scheme and no areas in the vicinity of the scheme will be affected either.	No change No change No change		
Policy 38/39						
Nature Conservation and Biodiversity						
(a) A Better Quality of Life – A Strategy for Sustainable Development for the United Kingdom, May 1999	UK Government	Protection and enhancement of wildlife.	The Scheme has been designed to minimise impacts on designated areas and protected species, in accordance with policy objectives.	No effect		
(b) Our Countryside: The Future – A Fair Deal for Rural England, November 2000	UK Government	Sites of Special Scientific Interest (SSSI's) and Biodiversity Action Plans.				
(c) Regional Planning Guidance Policy 31	UK Government	Reducing the impact of transport policy on the environment	Use of existing infrastructure has reduced the impact of	No effect		

Table 15.1 APPRAISAL GROUPS TABLE
 GROUP 4: POLICIES AND PLANS

POLICY	AUTHORITY	INTEREST	THE SCHEME	DO MINIMUM	COMMENTS
<i>Water</i>			improvement works on the environment		
(a) A Better Quality of Life - A Strategy for Sustainable Development for the United Kingdom, May 1999	UK Government	Safeguarding freshwater resources and water quality	The scheme will have a minimal impact on water resources and water quality. Overall impact: Neutral	No change	
(b) Development and Flood Risk, PPG25, July 2001	UK Government	Development and management of flood risk	A significant element of the scheme is within a flood plain. But mitigation measures will take place Overall impact: Neutral	No change	
(d) Regional Planning Guidance 6: East Anglia Policy 44	UK Government	Areas at risk from flooding	A significant element of the scheme is within a flood plain. Overall impact: Adverse	No change	

Table 15.1 APPRAISAL GROUPS TABLE
GROUP 4: POLICIES AND PLANS

POLICY	AUTHORITY	INTEREST	THE SCHEME	DO MINIMUM	COMMENTS
Geology and Soils					
(a) A Better Quality of Life – A Strategy for Sustainable Development for the United Kingdom, May 1999	UK Government/Dept. of Environment	National policy to minimise the loss of soils to development	Loss of 16.1ha of agricultural land	No change	Policy objectives to conserve best and most versatile agricultural land have been weighed alongside other environmental objectives. Soil resource will be re-used within the Scheme wherever possible.
(b) The Countryside: Environmental Quality and Economic and Social Development, PPG7, February 1997	UK Government	Government policy on development of agricultural land. Premium, versatile agricultural land should not be developed.	Loss of 3.9ha of Best and Most Versatile land	No change	
(c) Our Countryside: The Future – A Fair Deal for Rural England, November 2000	UK Government	Government policy on development of agricultural land – needs to be weighed alongside other environmental assets.	Loss of 16.1ha of agricultural land	No change	
Noise and Vibration					
(a) PPGN24: Planning and Noise	UK Government	National planning policies for noise and vibration		No change	Negative noise effects during construction would be temporary.
(b) Our Countryside: The Future – A Fair Deal for Rural England, November 2000	UK Government	Policies to preserve rural tranquility	The scheme could increase transport movements on the A11, impacting on the surrounding rural area, however the transport movements on the surrounding rural	No change	

Table 15.1 APPRAISAL GROUPS TABLE
 GROUP 4: POLICIES AND PLANS

POLICY	AUTHORITY	INTEREST	THE SCHEME	DO MINIMUM	COMMENTS
Air Quality					
(a) Air Quality Strategy for England, Scotland and Wales	UK Government/Dept. of Environment		roads are likely to decrease. Overall impact: Neutral		
(b) A Better Quality of Life - A Strategy for Sustainable Development for the United Kingdom, May 1999	UK Government/Dept. of Environment	National strategy to reduce pollution	The Scheme would have negligible impacts on air quality so policy context is not affected to any substantive degree	No change	Operational and construction effects on air quality are negligible for travellers, residents, visitors and sensitive receptors.
(c) Planning and Pollution Control		National policies on planning and pollution control		No change	

Table 15.1 APPRAISAL GROUPS TABLE
GROUP 4: POLICIES AND PLANS

POLICY	AUTHORITY	INTEREST	THE SCHEME	DO MINIMUM	COMMENTS
Community Effects					
(a) PPG 17: Sport and Recreation	UK Government/Dept. of Environment	National policies to promote sport and recreation.	Provision is made for pedestrians, cyclists' and equestrians within the scheme. Overall impact: Beneficial	No change	
(b) PPG7: The Countryside	UK Government/Dept. of Environment	National policies to encourage informal recreation in the countryside	Provision is made for pedestrians, cyclists' and equestrians within the scheme. Overall impact: Beneficial	No change	
(c) PPG21: Tourism	UK Government	National policies to protect and enhance tourism assets	The scheme will improve accessibility for tourists in Norfolk. Overall impact: Beneficial	No change	
(d) Our Countryside: The Future – A Fair Deal for Rural England, November 2000	UK Government	National policies to encourage countryside recreation	Provision is made for pedestrians, cyclists' and equestrians within the scheme. Overall impact: Beneficial	No change	
(d) Regional Planning Guidance 6: East Anglia Policy 63	UK Government	Enhancing countryside recreation	Provision is made for pedestrians, cyclists' and equestrians within the scheme. Overall impact: Beneficial	No change	

Table 15.1 APPRAISAL GROUPS TABLE
 GROUP 4: POLICIES AND PLANS

POLICY	AUTHORITY	INTEREST	THE SCHEME	DO MINIMUM	COMMENTS
Disruption during construction – Waste Management					
(a) PPGN10: Planning and Waste Management	UK Government/Dept. of Environment	National waste policy, including proximity principle	Beneficial The scheme will have no impact on waste management. Overall impact: Neutral	No change	

Table 15.3 MITIGATION TABLE

MITIGATION MEASURE	LOCATION, PURPOSE AND FORECAST BENEFIT	FORECAST MAINTENANCE REQUIREMENT AND METHOD	COMMENTS
Cultural Heritage			
Attleborough Hall	Along landtake boundary (TM05129502). Landscaping and visual screening to off-set the impact of the road on the Hall's setting.	Affercare (watering, weed and shrub control).	Avenue segments directly affected by the Scheme will be preserved <i>in-situ</i> under earthworks.
Late Bronze Age/Iron Age Settlement.	Northeast of Hillsend (TM03109417). Archaeological excavation to compensate for the destruction of archaeological deposits and features by construction activities	None	Preservation by record.
Post-Medieval water Meadows	Southwest of Attleborough Hall (TM04809590). Salvage recording (Archaeological Watching Brief) to compensate for the destruction of archaeological deposits and features by drainage lagoon construction	None	The part of the site within the roadline will be preserved <i>in-situ</i> by its burial under earthworks.
Unknown Archaeological Remains	Scheme construction excavation areas. Salvage recording (Archaeological Watching Brief) to compensate for the destruction of archaeological deposits and features by construction activities	None	
Roman and Medieval Metalwork Findspot	East of Deopham Road (TM04409588). Salvage recording (Archaeological Watching Brief) to compensate for the destruction of archaeological deposits and features by flood compensation area construction	None	

Table 15.3 MITIGATION TABLE

MITIGATION MEASURE	LOCATION, PURPOSE AND FORECAST BENEFIT	FORECAST MAINTENANCE REQUIREMENT AND METHOD	COMMENTS
Ecology and Nature Conservation			
Hedgerow translocation	Along Fen Street (TM025930). To compensate for loss of existing hedgerows and create new wildlife corridors	Aftercare (watering) Ecological monitoring Laying on a 7-10 year rotation	
Balancing ponds	Five ponds (TM024929; TM038956; TM043957; TM049959; TM055963) to attenuate and control pollution leaking into the River Thet and Attleborough Stream	Inspection of pollution control ditches Management of pond vegetation as required	
Seeding of species-rich road verges	Road verge between Fen Street roundabout and West Carr Road to replace habitat lost	Cut twice each year in early March and late August, and remove arisings Ecological monitoring	
Woodland planting	At Fen Street (TM025930) to replace habitat lost and provide a 'buffer' for retained habitat	Aftercare (weed control, watering) Coppicing after 5 years Ecological monitoring	
New Plantings	Throughout route. Create links between existing habitats, via hedge translocations and new plantings.	Aftercare (weed control, watering) Coppice shrub species on a 5 yearly rotational basis	
Translocation and plantings of new watercourses and use of environmentally sensitive bank protection	New sections of the Attleborough Stream at Ellingham Road (TM 043958), Deopham Road (TM045959) and Attleborough Hall Driveway (TM051960)	Regular inspections to ensure structural viability of materials.	
Fish	Works affecting watercourses. Rescue of fish ahead of construction works	None	
Reptiles	Throughout route. Capture and translocate prior to construction, provide suitable receptor site at Fen Street (TM026931)	Receptor site creation (shrub planting, hibernaculum creation), and installation of reptile-proof fence Release of animals Ecological monitoring	
Bats	Provision of bat boxes, to replace potential bat roost sites in mature trees lost. In areas of retained woodland or mature trees in retained hedgerows throughout the route (by agreement with landowners)	Ecological monitoring	

Table 15.3 MITIGATION TABLE

MITIGATION MEASURE	LOCATION, PURPOSE AND FORECAST BENEFIT	FORECAST MAINTENANCE REQUIREMENT AND METHOD	COMMENTS
Water voles	Advance creation of receptor site (pond adjacent to re-aligned Attleborough Stream; TM040957). Capture and relocation of animals prior to works from ditch south of the A11 at Queens Road (TM046952) and sections of the Attleborough Stream to be diverted at Ellingham Road (TM 043958) and Deopham Road (TM045959), to protect animals during the works and provide additional habitat within the stream corridor to reduce fragmentation effects	Pond creation using pre-planted coir fibre rolls. Installation of water vole-proof fencing Release of animals Ecological monitoring of water vole populations Cutting of vegetation within pond on a rotational basis (after 5 years).	
Others	Provision of otter fencing and ledges in culverts on Attleborough Stream at Ellingham Road (TM043958) and Deopham Road (TM044958). Provision of otter ledge in culvert at Attleborough Hall Driveway (TM051960). Minimise road casualties, maintain existing populations.	Regular inspections to ensure continued effectiveness of ledges and fencing Monitoring of use by others	
Landscape			
Restorative Planting	Throughout scheme in order to replace planting lost through construction. This planting is an essential part of landscape restoration adding to and enhancing the landscape as well as being of benefit to wildlife and other local users.	Annual or biannual trim once planting has established in order to prevent planting getting out of control and obscuring lines of vision.	
Screen Planting	Throughout scheme, but particularly important around West Carr Road and also at Ellingham Road where the proposed planting will act as a screen to the adjacent properties.	Annual or biannual trim once planting has established reached the desired level. This should prevent the planting getting out of control and obscuring lines of vision.	
Bunds	One to be located at Fen Street, helping to screen headlight glare. A bund will also be located at West Farm, replacing the existing bund and helping to screen the property from the highway.	No maintenance required	
Input to engineering design	Contribution to both the vertical and horizontal alignment design in order to minimise the impact on the landscape.	Continual input to design as and when required.	

Table 15.3 MITIGATION TABLE

MITIGATION MEASURE	LOCATION, PURPOSE AND FORECAST BENEFIT	FORECAST MAINTENANCE REQUIREMENT AND METHOD	COMMENTS
Land Use			
Minimise loss of crops and grassland used for fodder.	Appropriate timing of access to land to minimise loss of established crops	None	
Compensate for loss of livestock fodder crops	If timing of entry to land cannot be altered, compensation for such losses to be made to ensure alternative supplies can be purchased.	None	
Minimise impact of severance of land drains	New header or collector pipes would be connected, with this work carried out during drier months where possible	One check for effectiveness of new drainage system the following winter.	
Provision of alternative water supplies to drinking troughs	This only applies to land at Attleborough Hall and alternative source to be identified early to ensure no interruption to supply.	None	
Access to properties and fields for harvest	Design of works throughout route to minimise severance of agricultural routes during construction and the provision of suitable access points post-construction. New main access to Attleborough Hall off Deopham Road provided. Upgrading of existing farm track to enable year-round access between farm buildings at Attleborough Hall and Fiddes Farm.	None	
Limit physical intrusion beyond the construction boundary	Throughout route. Good communication maintained with affected landowners	None	
Limit noise and dust generation, particularly near housed livestock	Throughout route but in particular close to the Attleborough Poultry Farm. Good communication maintained with affected landowners to ensure up to date information available on the location of livestock	None	
Minimise loss of agricultural land	On-line widening results in the minimum amount of land take.	None	
Relocation of Fruit Farm	Farm unit becomes unviable due to Scheme. Relocate to site with appropriate soils and capacity/water supply for trickle irrigation system.	None	
Traffic Noise and Vibration			

Table 15.3 MITIGATION TABLE

MITIGATION MEASURE	LOCATION, PURPOSE AND FORECAST BENEFIT	FORECAST MAINTENANCE REQUIREMENT AND METHOD	COMMENTS
Where eligible properties will be offered noise insulation packages	To reduce internal noise levels to dwellings most affected by the scheme.	Maintenance will be the responsibility of the householder	No major noise impacts are predicted.
No environmental noise mitigation measures are proposed			
Pedestrians, Cyclists, Equestrians and Community Effects			
To be completed			
Water Quality and Drainage			
Introduction of 5 permanent attenuation and treatment ponds	The 5 balancing ponds will reduce the peak runoff from the new hardstanding areas to an acceptable Greenfield runoff. The ponds would also remove pollutions from the runoff and would temporarily contain serious spills for slow release or transport off site to treatment plant.	Cleaning after serious spill. Normal balancing pond maintenance.	
Introduction of flood storage compensation area.	The storage compensation area will be situated near Queen's Road Junction and will mitigate for the loss of floodplain storage volume caused by the widening and the 5 ponds (with embankment) constructed in the floodplain.	Management depends of use of the land, but any raising of the ground levels will not be allowed. The area should be clearly classified as floodplain.	
Appropriate techniques and management of on-site activities to reduce the potential for spillages and pollution during construction works	The Environmental Management Plan for the construction phase would include the CIRIA and EA pollution prevention guidelines. This would ensure that the construction impact on the water quality is minimised and that emergency procedures are in place to deal with pollution incidents appropriately.	Keep construction site safe and tidy. Any spills on site should be cleaned up immediately. River water quality should be monitored regularly. Any pollution into watercourses should be dealt with immediately and the EA should be notified.	
Geology and Soils			

Table 15.3 MITIGATION TABLE

MITIGATION MEASURE	LOCATION, PURPOSE AND FORECAST BENEFIT	FORECAST MAINTENANCE REQUIREMENT AND METHOD	COMMENTS
Sealed highway drainage system	Prevention of seepage of potentially contaminated road runoff to underlying groundwater in both the chalk and the glacial deposits. Results in an improvement on the current drainage system.	General regular maintenance of the highway drainage system.	
Groundwater level monitoring	In boreholes alongside cutting between Fen Street and West Carr Road to determine impact of road widening on groundwater levels, extent of groundwater depression and risk to Wroo Farm well. Interpretation of results allows implementation of remedial measures for water supply, if required.	Monitoring of groundwater levels prior to and during construction and following completion of works. In the event of derogation of the Wroo Farm well supply a replacement supply to be provided (either as a deeper borehole into the chalk aquifer or by connection of the property to mains supply).	
Minimising sediment generation from stockpiles of soil	Appropriate site management and adoption of best practice will minimise the potential risk of sediment generation and pollution of watercourses.	None	
Possible land despoilation during the formation of earthworks embankments or the widening of existing cuttings would be controlled by the implementation of appropriate engineering control measures.	These measures could include providing support to the face of cuttings and managing the gradient of embankments during the placement of materials. If risks remain, use of biodegradable geotextile blankets will ensure stability until full vegetation cover is achieved.	None	
Construction of the permanent attenuation ponds and their respective outfalls to watercourses would be undertaken prior to the commencement of any major earthworks	Attenuation ponds would be in place and capable to attenuating flow and trapping sediment from the construction works areas, providing further water quality protection in addition to adoption of best practice site runoff management.	None	

17. Glossary and Abbreviations

17.1. Glossary

Abrasive blasting	Cleaning a hard surface by rubbing or grinding
Aggregates	Sand, gravel and crushed rock used in the manufacture of concrete
Alluvial deposits	Sediments (mainly sands, gravels and silts) laid down by streams or rivers in their channels or on the floodplain. These sediments will exhibit a degree of sorting to give, for example, very silt-rich sediments
Appropriate Assessment	A formal assessment of potential impacts required by European law where a project may have a potentially significant effect on a site designated as of European importance
Aquifer	Water-bearing strata
Archaeological resource	The surviving archaeological record composed of the physical evidence relevant to the understanding of human communities and their activities in past times, as defined by archaeologists at any given point in time
Armatex material	A cellular geotextile with an upstand of 100mm from the covered surface, capable of holding topsoil in place on moderately steep slopes such as those in impoundment channels etc
Artefact	An object produced or shaped by human craft that is of historical interest.
Assemblage	A general term for a collection of plants and/or animals
At grade	A term used to express a road or crossing at ground level
Attenuation	Slowing down the rate of flow to prevent flooding and erosion, with a consequent increase in the duration of flow
Attractiveness (landscape)	A largely subjective evaluation of the contribution of scenic quality, landscape character and uniqueness to the visual quality of a landscape
Auger borings	Small cores of soil taken using a hand held device to assess soil properties and characteristics
Balancing pond	A pond designed to collect and temporarily hold surface and storm water runoff from a site or road and release it at a slower rate than it is collected
Ballast	Coarse gravel or crushed rock laid to form a bed for roads
Bankseats	Bridge foundations built into an earth embankment
Baseline (conditions)	The existing conditions on a site prior to development or redevelopment
Baseflow	The groundwater component of river flow
Bat Boxes	An artificial roost box used as mitigation for the loss of other potential bat roosting sites. There are both summer and hibernation bat boxes
Berm	A flat area separating slopes above and below; a break in slope
Biomass (fish)	The total weight of organisms (fish) in a biological community
Biodiversity	The existence of a wide range of different types of organisms in a given place at a given time
Biogenetic Reserve	Protected areas enjoying legal status and characterised by one or more typical, unique, endangered or rare habitats, biocenoses or ecosystems
Black top	Black bituminous material used for paving roads or other areas

Bridleway	A public Right of Way over which the right is on foot and on horseback, possibly with an additional right to drive animals
Bronze Age	Period following the Neolithic from 3100BC to 700BC, characterized by the use of implements and ornaments of copper or bronze <i>2000 in Vol 2</i>
Buffer (zone)	An area of land specifically designed to separate one zoning use from another, for example road side planting between a woodland and a road
Bund	A low earth embankment used as a screen or as a means of preventing water run-off
Cable percussive borehole	A borehole drilling technique suited to the drilling of boreholes in unconsolidated materials
Capacity Matrix	A repeatable and consistent methodology which enables the evaluation of proposed changes to a landscape and provides an indication of how successfully a Landscape Character Area will be able to accommodate new development without experiencing permanent damage or change
Catchment (sub-catchment)	The area contributing either surface water or groundwater flow to a given point on the flow path
Chainage	Distance in metres along the length of the Published Scheme
Character (Landscape)	The distinct pattern of elements (geology, landform, vegetation, land use and settlement pattern) that occur consistently within a landscape and the perception of these patterns
Class 6A	Specific grade of granular material used in earthworks
Class 6K	Specific grade of granular material used in earthworks
Class 6N	Specific grade of granular material used in earthworks
Coir fibre rolls	Natural fibre roll used to break wave action, prevent soil loss on bottom of slopes and encourage vegetation growth
Consultees	A group from which advice and information are sought
Contractor	Performs services at a specified price, especially for construction work
Contaminated land	Areas of land defined as 'Contaminated Land' under Section 78A(2) of Part IIA of the Environmental Protection Act 1990
Controlled Waters	All coastal waters, inland freshwaters and groundwaters, as defined in Section 104. Water Resources Act 1991
Cropmark	Visual variations in plant growth, observable at ground level and/or from the air, in growing field crops and pasture that broadly reflect, in a variety of ways, the position, extent and character of buried features such as walls, ditches, pits or geomorphological structures
cSAC	SAC (Special Area of Conservation) is an area designated under the European Community Council Directive on the Conservation of Natural Habitats and Wild Fauna and Flora (92/43/EEC), commonly known as the Habitats Directive. The prefix 'c' (candidate) indicates that official designation is pending
Culvert(ed)	A pipe, tunnel or small bridge under a road or embankment. Culverts may be used for drainage, access under a road or as mitigation for wildlife.
Cumulative (Impact)	Two or more impacts that act on the same receptor at the same time but that don't cancel each other out
Cut and fill	The use of excavated material (sub-soil) to create new a landform.

Cyprinids	Any of numerous often small freshwater fishes of the family Cyprinidae, which includes minnows and carps
Cutting	Road built below the ground surface with sloping banks on each side
Decibel (dB)	A unit of level derived from the logarithm of the ratio between the value of a quantity and a reference value. It is used to describe the level of many different quantities. For sound pressure level the reference quantity is 20 μ Pa, the threshold of normal hearing is in the region of 0 dB, and 140 dB is the threshold of pain
Desk Study	Desk based, information gathering exercise involving contacting record holding centres and other specialist groups
Design Manual for Roads and Bridges (DMRB)	A Highway Agency document providing guidance on aspects of road design, construction and maintenance
Design year	The future year used for traffic capacity, noise & air quality assessments, conventionally 15 years after the scheme opens to the public
Dewatering	Artificial removal of groundwater
Direct	Caused by activities which are an integral part of the project
Do-minimum	The road network and/or traffic flow scenario describing the situation without the proposed scheme but with all other committed changes in place
Do-something	The road network and/or traffic flow scenario describing the situation with the proposed scheme in place
Drawdown	Lowering of the groundwater level as a result of drainage, dewatering or pumping
Dual Carriageway	A road comprising of 4 separate lanes, two in each direction. Different directions of traffic are separated by a central reserve and often a safety fence or barrier
Dualling	The process of converting a single carriageway road to a dual carriageway
Dumbbell roundabout	A term used to describe a junction arrangement that consists of two roundabouts connected by a short link road
Earthwork (archaeological)	One or more archaeological features, such as a bank, ditch, wall, mound or setting of one kind, that appears in the topographical relief in the ground surface, usually as a rise, projection or a series of 'humps and bumps'. An earthwork normally represents the decayed remains of some kind of structure
Earthworks	The process of changing the profile of the land to form the shape of the new road often using large excavators and dump trucks to move material from one location to another
Ecological Clerk of Works (EcoW)	A site based ecologist who oversees all works on site which may have an ecological impact
Ecosystem	A functional ecological unit in which the biological, physical and chemical components of the environment interact
Environment	The supporting matrices of life (water, earth, atmosphere and climate) but which are in turn modified strongly by the presence and activity of living creatures and which includes many elements inimical to life
Environmental	Of the environment

Environmental strategic plan (HA)	The Highway Agency's environmental strategic plan 'Towards a balance with nature'. It sets out the HA's strategy for sustainable development, maintenance and operation of the trunk road network while minimising the impact on the natural and built environment
Evapo-transpiration	The component of rainfall that is returned to the atmosphere through the process of evaporation from a vegetated ground surface
Farmstead	A farm, its land and buildings
Fen	A wetland ecosystem receiving at least some of its nutrients from flow of groundwater, dominated by herbaceous plants, in which the water table approximately coincides with the soil surface at the drier times of year
Field Capacity	The amount of water the soil can hold once gravitational water has drained away; this water is mostly capillary water held to soil particles with at least 0.3 bars of suction
Filter Type A	A specific grade of granular material for forming filter drains
Findspots	Isolated occurrences of individual artefacts
Fish Rescue	An operation to catch and rescue fish during the draining of a watercourse or waterbody
Flexible composite	Surfacing made up of cement bound materials in the lower sections topped off with bituminous surfacing
Floodplain	A plain bordering a river and subjected to flooding periodically
Flushes	Areas of wet/damp habitat supported by flows of mineral-rich groundwater, typically characterised by mosses and small sedges and rushes, lacking dominant grasses
Footpath	A Right of Way over which the right is on foot only and not on horse-back, pedal cycle or by motorised vehicle
Footprint (of the scheme)	The area to be physically changed by construction activities, including the highway route, soil disposal sites and dewatering sites
Footway	The pedestrian-only area normally adjacent to a road and often separated from it by means of a kerb, also referred to as a pavement, although it should be noted that 'pavement' in some Environmental Statements refers to the road carriageway
French Drains	A type of permeable drain often running along the side of a road
Fugitive dust	Dust that is not emitted in a controlled manner through a stack
Geomorphology	The study of landforms and the processes that have formed them
Geotextile	A woven fabric used in construction to strengthen and separate soil layers
GIS overlay	A discrete element within a Geographical Information System Project which refers to a particular landscape component
Glacial deposits	Sediments laid down by glaciers. Generally these do not show a high degree of sorting as shown by alluvial deposits (see till).
Glaciofluvial drift	Sediment that has been carried by glaciers that is then reworked by streams flowing below or from the end of the glacier. Can often cover large tracts of land.
Gleying	The changes to ions in the soil that occur due to temporary or permanent waterlogging. This is often visible in a soil due to the formation of mottles, small patches of orange to red coloured soil.
Grade I Listed Building	Buildings of exceptional interest. ✓
Grade II Listed Building	Buildings of special interest, warranting every effort to preserve them. ✓

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Grade-separated junction	A road junction where roads cross at different levels (GSJ)
Granular pipe bedding	A granular material for supporting and laying around drainage pipes in the ground
Groundwater receptor	A water feature which is dependent, or partially-dependent, on groundwater and which potentially could be affected by changes in groundwater level or flow. These include groundwater sources (wells and boreholes) as well as streams, ponds etc which receive groundwater baseflow. Swangey Fen SSSI is such a feature
Guidance for the Methodology on Multi-Modal Studies (GOMMMS)	Issued by the government in March 2000. This document sets the new standard for the assessment of the environmental impact of different transport schemes.
Habitat	The locality, site and particular type of environment occupied by an organism
Haul road	A designated route within the site for the use of construction vehicles
High Growth	A term used in economic appraisals to represent the highest predicted increase in traffic volume
Highway Planting	Tree and shrub planting on Highways Agency land within the road corridor
Hot rolled Asphalt	Road paving material laid hot and compacted with a road roller, with stone chippings spread and rolled into the surface
Hydrabrake manholes	A circular concrete ring manhole with a sealed concrete floor, a standard entry pipe and fitted at its outlet with a stainless steel constriction device, which limits the outgoing flow of water to a previously agreed level
Hydraulic continuity	The absence of a barrier to water movement between two locations
Hydrology	The scientific study of the properties, distribution and effects of water on the earth's surface, in the soil and underlying rocks and in the atmosphere
Hydrogeology	The study of the occurrence, distribution and movement of sub-surface water
'Important' Hedgerows	A hedgerow which would be classified as important under the Hedgerow Regulation 1997
Imported Class 6F1 Capping	A specific grade of granular material beneath the subbase
Imported Acceptable 1A	A specific grade and type of fill material
In-channel works	Works within a watercourse
Indirect	Due to activities that are not part of the project; for example, changes to HGV volumes on trunk roads
Integrated water management systems	A water management plan that brings together all relevant issues into one system
Intermediate piers	Bridge supports at intervals along the length of the bridge
Iron Age	Period following the Bronze age, characterized by the use of iron implements from 700BC to 43AD

Joint Character Map	A national map produced jointly by The Countryside Agency and English Nature, with involvement from English Heritage, which shows natural and cultural landscape elements
Key Performance Indicators	Defined targets that are monitored to indicate progress towards overall goals
L _{A10,T} (18 hour)	The A weighted level of noise exceeded for 10% of the specified measurement period, T. It gives an indication of the upper limit of fluctuating noise, such as from road traffic. L _{A10} (18-hour) is the arithmetic average of the 18 hourly L _{A10} (1-hour) values from 06:00 to 24:00
Land-take	Land that is lost to the scheme
Landform	Combinations of slope and elevation which produce the form of the land
Landscape	Those physical components, which together form the appearance of land, including its shapes, colours and textures. Landscape also reflects the way in which these various components combine to create distinctive landscape characters that are particular to localities
Lined bored piles	Lined bored piles are underground structures to support the foundation of a superstructure
List I substances	Substances listed in EC Directive 80/68/EEC, the 'Groundwater Directive', which should be prevented from entering groundwater. These substances include, mercury, hydrocarbons, cyanides and organochlorides
List II substances	Substances listed in EC Directive 80/68/EEC, whose introduction into groundwater should be limited to avoid pollution. These substances include various metals, ammonia and nitrates
Loam	A soil comprised of a mixture of clay, silt, sand and organic matter. Often highly fertile.
Local air quality	Relates to air pollutants that are of interest in the local context rather than on a regional or greater scale
Long-term (Impact)	Impacts whose effects will be detected over a long time period
Medieval	Relating to or belonging to the middle ages dating from the 10th to 14th centuries AD
Medium-term (Impact)	Impacts whose effects will be detected for a medium time period
Mitigation	Measures taken to avoid, reduce or remove environmental impacts. Mitigation can moderate adverse effects and enhance the beneficial ones arising from the whole or specific elements of the Scheme
Monument	A definable building, structure or work that has archaeological integrity because it represents the contemporary embodiment of the physical context, setting, or result of one or more activities that took place in the past
Multidisciplinary walk-over survey	A walkover survey where all features of ecological value are recorded
Nationally important species	A species that does not meet the criteria for international importance but exceeds those of regional or lower importance. Criteria for classifying a species as nationally important vary from taxon to taxon but include rarity, population status (state of decline) and value as an indicator of the 'health' of a wider habitat type

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Nationally scarce species	Species estimated to occur within the range 31-100 10km squares of the national grid system
Nature Conservation Value	The level at which an ecological receptor is valued
Neolithic	Period referring to the earliest agricultural communities in the latter half of the stone age dating from from 4,300BC to 3,100BC
Notifiable Weed	A weed that is listed in the 1959 weed act
Noise index	A measure of noise over a period of time which correlates well with average subjective response
Off-Line	
Oil interceptors	Type of shut-off valve that can be used to temporarily isolate balancing ponds in case of serious pollution incidents
On-Line (widening)	Road widening which incorporates the existing road as part of the new road
Open Aspect	The overall appearance of a bridge across a road cutting created by having bankseats so that the road cutting's sloping banks continue uninterrupted under the bridge
Opening year	The year in which the scheme is due to open to the public (i.e. 2007)
Outfall	The structure through which water is allowed to drain from an attenuation basin
Overbridge	A bridge that carries a side road over the main road
Oxides of Nitrogen	Term referring to Nitric Oxide + Nitrogen Dioxide
Pavement	The part of the road on which vehicles travel; the construction make-up of the road carriageway. Note that 'pavement' as used in some Environmental Statements is not the pedestrian walkway adjacent to a road (see footway)
Penstock valve	Type of shut-off valve that can be used to temporarily isolate balancing ponds in case of serious pollution incidents
Percentile	Refers to the position of a particular concentration value within an overall ranking of values from a measured or modelled concentration series. The 100 th percentile is the highest ranked concentration in the series and the 50 th percentile concentration is the middle ranked concentration. Some short-term air-quality objectives are specified in terms of percentile and a concentration value; this means that measured or modelled concentrations should remain below the specified values for the specified percentage of overall time
Permeability(k)	A measure of an aquifer's capacity to transmit groundwater through a unit of its saturated thickness (units in m/day)
Phase 1 Habitat Survey	A standard ecological survey technique devised by the Joint Nature Conservation Committee that identifies and maps the main habitat types in an area.
Physiography	Topography (q.v.)
Piling	A means of transferring the weight of a bridge support to stronger ground at a greater depth, often using concrete columns
Plant	Mechanical construction equipment e.g. excavators, dump trucks, rollers, cranes
Poaching (soils)	Characteristic damage to topsoil caused by the hooves of stock animals

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Poly tunnels	A cover for crops, usually constructed of plastic stretched over a metal frame, to provide protection from wind and frost and to provide more constant conditions (such as temperature and humidity).
Population	1. a group of organisms of one species occupying a defined area and usually isolated to some degree from other similar groups. The place occupied by a population is not always clear-cut. Current theory stresses the concept of sub-populations, which interact to some extent to form one larger 'metapopulation' 2. the total number of individuals of the taxon in question
Post-medieval	Relating to or belonging to the period of time after the medieval period
Preferred Option	The scheme design and layout, selected from a number of possible designs, that best meets design, environmental and economic criteria
Prehistory	A cover-term for the earlier part of England's past, generally taken to mean the period before the existence of written records. In practice, however, prehistory in England is taken to end with the Roman invasion in the mid first century AD. Prehistory is conventionally divided into five broad phases: Palaeolithic, Mesolithic, Neolithic, Bronze Age and Iron Age (q.v.)
Quaternary age	The youngest of the geological periods, stretching from 1.6 million years ago to the present. The Quaternary is the time of the great ice ages with widely fluctuating climates and sea levels.
Ramsar Site	A site designated under the RAMSAR convention 1971. The convention provides a framework for the conservation and wise use of wetlands and their resources.
Rare (Rarity)	Infrequently occurring
Receptor	A location where environmental impact may be gauged to occur
Receptor site	A site in which plants or animals displaced during construction work can be relocated
Red Data Book species	Species listed in an official publication describing species of high conservation concern at a given geographical level. The term is usually used to refer to the national red data books, though such books exist at international levels (e.g. global/European) and sub-national levels (e.g. county)
Red List (RSPB)	High Conservation Concern – Birds. For criteria refer to: The Population Status of Birds in the UK – Birds of Conservation Concern: 2002-2007 RSPB et al
Residual (Impact)	that remain after the positive influence of mitigation measures are taken into account
Riparian	Refers to a habitat adjacent to a watercourse, e.g. river
Roadside reflectors	Reflectors which divert car headlights up the road verge to act as a deterrent to animals, particularly deer from crossing the road
Robustness (landscape)	The capacity of a landscape to absorb new elements. The degree to which landscape character, visual character and ecology are able to withstand the addition of new development
Roman	Period referring to the Roman occupation of lowland Britain from AD43 to AD410
Route Announcement	Announcement by the Secretary of State for Transport of his preferred route for a road scheme
Runoff	That part of precipitation, snowmelt, or irrigation water that flows directly from the land to streams or other surface waters

Salmonids	Of, belonging to, or characteristic of the family Salmonidae, which includes the salmon, trout, and whitefish
Saxon	Period following the Roman occupation extending from the 4th to 10th centuries AD subdivided into Early or Pagan Saxon (4th to 7th centuries AD, Middle Saxon (7th to mid-9th centuries AD) and later Saxon (mid 9th to 10th centuries AD)
Scheduled Ancient Monument	Any monument (q.v.) for the time being included on the Schedule of Monuments (q.v.) and therefore subject to various controls and measures contained in the <i>Ancient Monuments and Archaeological Areas Act 1979</i> (as amended for England)
Scheme Corridor	The proposed improvement works and the land either side (of a given width)
Scheme	This refers to the proposed improvement works
Scoping	The area covered by a given activity or function.
Screen Planting	The use of tree and shrub planting to create visual barriers between sensitive receptors (e.g. housing) and a development
Secondary (Impact)	A consequence of a primary impact; for example, changes to aquatic fauna as a result of altering a watercourse
Semi-natural	Applied to habitats which appear natural and which have arisen largely through natural processes, but which have been influenced by man
Short-term (Impact)	Impacts whose effects can only be detected in the short term.
Shuttered Pour	Constructed form to pour concrete in, to be removed when concrete is hard
Signal Controlled Junction	Junctions controlled by traffic signals
Significant / Significance (Ecological)	Based on the relative importance of the site, features, assemblage, or species, the degree to which it would be affected, the scale of any change; whether or not there would be cumulative impacts; whether the impact would be temporary or permanent, and if temporary, its likely duration; and the degree to which mitigation could be achieved
Site (archaeological)	(1) a geographically definable place where a monument formerly existed (as in: 'long barrow, site of'); (2) an area of land, which may be anything from a few square metres to many hectares, within which some kind of archaeological intervention or 'event' (e.g. an archaeological excavation) has taken place that has resulted in the observation and recording of some aspect of the archaeological resource
Site clearance	Removal of vegetation and buildings prior to construction works commencing
Slip Road	A one way road within a junction between the main road carriageway and the local road network
Soft release pens	A cage structure used to release an animal from captivity into the wild in a manner which provides it with continued food and/or shelter for a given period of time, whilst it becomes accustomed to its new environment
Soil born pathogens	Diseases that survive in the soil as spores that germinate and infect plants, in particular crops. The spread of soil containing these spores will result in a potential spread of the disease.

Soil horizon	Layer of soil or soil material approximately parallel to the land surface and differing from adjacent genetically related layers in physical, chemical, and biological properties or characteristics (c.g. colour, structure, texture, etc.)
Spatial	Refers to the geographical extent of a feature or study area
Species Action Plan	Part of a biodiversity action plan relating to a particular species. A species action plan will include information of policies, conservation strategies and targets all pertaining to a particular species
Species-poor hedgerow	A hedgerow containing four or fewer woody species
Species-rich hedgerow	A hedgerow containing five or more woody species
Standpipes	Small diameter probholes and boreholes installed for groundwater level monitoring
Street furniture	Refers to roadside fixtures and fittings such as street lighting, Armco barriers and overhead gantries
Sub base	The road foundation underneath the bituminous layers
Subsoil	The soil layer beneath the topsoil
Surface Water Runoff	Precipitation (such as rain) that flows from hardstanding areas
Surface Dressing	A thin layer of stone chippings laid on top of an existing road surface and bonded to it with a bituminous coating
Sustainable Urban Drainage Systems (SuDS)	This is a concept that includes long-term environmental and social factors in decisions about drainage. It takes account of the quantity and quality of runoff to reduce the potential impacts on increased flood risk and pollution of waterbodies, whilst also providing potential landscaping and ecological benefits
SUSTRANS	A sustainable transport charity. Coordinates 8,000 miles of National Cycle Network, including links, plus over 7,000 miles of other signed cycle routes
Suspended particulate matter (PM ₁₀)	Particles with a diameter less than 10 microns (1 micron is a millionth of a metre)
Swale	A shallow grassed channel for collecting and directing storm water
Targetted Programme of Improvements (TPI)	The Agency's programme of investment in improvements to the Highways Agency Trunk road and Motorway road network. The schemes comprise of a number of major schemes each costing more than £5m, funded either conventionally or by public-private partnership
Till	Unsorted sediment deposited by a glacier consisting of sand, clay, gravel and boulders mixed together
Topography	The physical profile of a landscape described by changes in gradient
Topsoil	The uppermost layer of soil, usually containing more organic matter and higher fertility than the underlying layers
Topsoil strip	Removal of topsoil on the alignment of the new works. It is temporarily stockpiled and re-used within the scheme
Traffic management	A temporary installation of traffic cones, road signs and road markings allowing road users to continue to use a road where traffic restrictions are necessitated as a result of construction works
Translocated / translocation	To move 'something' (a habitat/population/individual) to another place

Tributary	A branch of a watercourse that flows into the main river channel
Trunk Road	A main road forming part of the Trunk Road Network, which is a system of strategic routes of national importance that caters for the through movement of long distance traffic. The network includes motorways ("M") and all-purpose ("A") roads
UK National Air Quality Strategy	Sets challenging health-based targets for eight main air pollutants. These are benzene, 1,3-butadiene, carbon monoxide, lead, nitrogen dioxide, ozone, fine particles (PM ₁₀) and sulphur dioxide
Underbridge	A bridge that carries the main road over a side road
Uniform negative surface texture	A surface texture description which when used to describe a road surface indicates that the surfacing materials are specifically designed to reduce the noise from vehicles tyres as the vehicles move along the road
Vertical Alignment	For a road, the relative height and curvature of the along its length in the vertical direction; the alignment is designed using defined geometric mathematical criteria to achieve a smooth shape and meet standards for vehicle occupant safety and comfort
Visual Effects	The visual change in a landscape as a result of development.
Visual Envelope	The surrounding area from which a development is visible. The boundary will be formed by changes in topography or physical elements such as blocks of woodland
Visual scanning	Systematic visual searching of soil surfaces for archaeological materials
Watching brief (archaeological)	A formal programme of observation and investigation conducted during any operation carried out for non-archaeological reasons. This will be within a specified area or site on land, inter-tidal zone or underwater, where there is a possibility that archaeological deposits may be disturbed or destroyed. The programme will result in the preparation of a report and ordered archive
Waterproofing (aerosol)	Chemical treatment in order to protect the structure against water intrusion
(Thin) Wearing course	The final or surface layer of the road construction on which vehicles travel
Windfall site / development	Development / sites that have not been anticipated by the Local Authority when preparing the development plan
Window sample holes	Small diameter probeholes drilled using a hand-held hollow tube, ground sampling drilling technique

17.2. Abbreviations

µg/l	Micrograms per litre
°C	Degrees Celsius
AADT	Annual Average Daily Traffic
ALC	Agricultural Land Classification
AOD	Above Ordnance Datum (refers to height above sea level)
AQMA	Air Quality Management Area
AURN	Automatic Urban-Rural Network (relates to nationwide ambient air quality monitoring sites)
BAP	Biodiversity Action Plan
BGS	British Geological Survey
BMV	Best and Most Versatile (part of the classification of agricultural land)
BNL	Basic Noise Level
BOD	Biochemical Oxygen Demand
BS	British Standard
CFA	Continuous Flight Auger
CIRIA	Construction Industry Research and Information Association
CLEA	Contaminated Land Exposure Assessment
COD	Chemical Oxygen Demand
COMAH	Control of Major Accident Hazards
CRoW	Countryside and Rights of Way (Act)
CRTN	Calculation of Road Traffic Noise (publication)
cSAC	Candidate Special Area of Conservation
CWS	County Wildlife Site
dB	Decibel(used to describe the level of a quantity and reference value, e.g. Sound pressure level)
Defra	Department for the Environment, Food and Rural Affairs
DETR	(the former) Department of Environment, Transport and the Regions
DMRB	Design Manual for Roads and Bridges
EA	Environment Agency
EC	European Community
ECI	Early Contractor Involvement
EcIA	Ecological Impact Assessment
EEC	European Economic Community
EIT	Environmental Impact Table
EQS	Environmental Quality Standards

ES	Environmental Statement
FCD	Field Capacity Day
FRA	Flood Risk Assessment
GOMMS	Guidance on the Methodology for Multi-Modal Studies
GQA	General Quality Assessment
ha	Hectare (equals 2.47 acres)
HA	Highways Agency
HABAP	Highways Agency Biodiversity Action Plan
HAPAS	Highways Authorities Product Approved Scheme
HER	Historic Environment Record
HGV	Heavy Goods Vehicle
HMSO	Her Majesty's Stationery Office
IDB	Internal Drainage Board
IoH	Institute of Hydrology
IPC	Integrated Pollution Control
IPPC	Integrated Pollution Prevention and Control
ISO	International Standards Organisation
km	Kilometre
KPI	Key Performance Indicator
$L_{A10,T}$ (18 hour)	The A weighted level of noise exceeded for 10% of the specified measurement period, T. It gives an indication of the upper limit of fluctuating noise, such as from road traffic. L_{A10} (18-hour) is the arithmetic average of the 18 hourly L_{A10} (1-hour) values from 06:00 to 24:00
LAQM	Local Air Quality Management (undertaken by local authorities)
LBAP	Local Biodiversity Action Plan
LCA	Landscape Character Assessment
m	Metre
MAFF	Ministry of Agriculture, Fisheries and Food
mg/l	Milligrams per litre
$\mu\text{g}/\text{m}^3$	Micrograms (of pollutant) per cubic metre (of air)
mph	Miles per Hour
NATA	New Approach to Appraisal
NETCEN	National Environmental Technology Centre (AEA Technology)

NMUs	Non Motorised Users
NO ₂	Nitrogen Dioxide
NO _x	Oxides of Nitrogen
NWT	Norfolk Wildlife Trust
OS	Ordnance Survey
PAH	Poly Aromatic Hydrocarbons
pH	Potential Hydrogen (A measure of acidity/alkalinity on a scale of 0 – 14, where 7 is neutral, greater than 7 is alkaline and less than 7 is acidic)
PM ₁₀	Particles with diameter less than 10 microns (1 micron is a millionth of a metre)
PMP	Project Management Plan
PPG	Pollution Prevention Guidelines
PPGN	Planning Policy Guidance Note
PPS	Planning Policy Statement
QA	Quality Assurance
QC	Quality Control
RIGS	Regionally Important Geological and Geomorphological Sites
RPG	Regional Planning Guidance
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SAM	Scheduled Ancient Monument
SPA & pSPA	Special Protection Area & potential Special Protection Area
SPZ	Source Protection Zone (groundwater)
SSSI	Site of Special Scientific Interest
TPI	Targeted Programme of Improvement (refers to the principal trunk road improvement schemes promoted by the Highways Agency)
TPO	Tree Protection Order
TRL	Transport Research Laboratory
UKBAP	United Kingdom Biodiversity Action Plan
VIA	Visual Impact Assessment
WQO	Water Quality Objective

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2.1 Introduction

This report presents an evaluation of the impacts on the cultural heritage likely to result from the construction phase of the Scheme. The report provides a characterisation of the nature of the cultural resource within and adjacent to land-take areas by synthesising the results of a desk-top study and field evaluation carried out by the Norfolk Archaeological Unit in June and October 2003 (Penn 2003; Birks 2003). It also assesses the significance of scheme impacts on identified cultural resources and identifies appropriate mitigation measures for those resources directly affected by the Scheme.

The cultural heritage considered in this report falls into three broad categories for assessment purposes:

- **Archaeological Sites:** The material remains of human activity dating from the Palaeolithic to modern times and include isolated artefacts, buried deposits, upstanding earthworks, ruins, crop and soil marks, and finds scatters. Also included within this category are palaeoenvironmental deposits containing evidence for past environments found within geological deposits such as gravels, colluvium, alluvium and peat.
- **Historic Landscapes:** The visible elements of the countryside fashioned by human activity and include field patterns, hedgerows, historic woodlands, drainage patterns, parks and gardens and other man-made landscape features.
- **Historic Buildings:** These include buildings with statutory designations (Listed Building Grades 1, 2* and 2), locally listed buildings and other features identified by local authorities and interest groups and encompasses conservation areas and structures of historic merit such as railway bridges, milestones and boundary stones.

The study area comprised a corridor 1km wide on each side of the existing A11 alignment extending from c. 600m south of the existing Fen Street Junction to c. 1km north of where the road joins the dual carriageway (c. 6.8km in total). This corridor was divided into inner and outer 500m wide strips to characterise the range of cultural resources occurring within the environs of the Scheme and to identify potential avoidance areas for temporary landtake areas. The built areas of Attleborough were excluded from the study corridor.

2.2 Desk-Top Study

2.2.1 Methods

The Norfolk Historic Environment Record was consulted for information concerning archaeological sites, historic environments and historic buildings (Listed Buildings). Information concerning site or findspot location, type, relative date, statutory designations and local listings were recorded for the corridor, tabulated and plotted by period and/or category. Selected aerial photographs for the corridor held by the Norfolk Aerial Photograph Library and numerous published and unpublished sources were also reviewed by the study. Cartographic information held by the Norfolk Record Office was not examined as a result of its closure due to the move to new premises. Maps held by the Norfolk Historic Environment Record, the Archaeology and Environment Division Library and elsewhere, however, were consulted as part of the study.

Guidelines set out in the documents *Standard and Guidance for Archaeological Desk-Based Assessments* (Institute of Field Archaeologists 1994), and *Standards for Field Archaeology in the East of England* (Gurney 2003) were followed throughout the work.

2.3 Existing Conditions

2.3.1 Introduction

The desk-based study and field evaluation identified 97 cultural resources within the study corridor. Fifty-two of these are situated within the inner 500m areas of the corridor and 41 within the outer 500m areas of the corridor. A further four historic landscapes extend across the 1km corridor areas on either side of the existing A11 carriageway.

The resources are described in this section according to the three broad categories of archaeological sites, historic landscapes and historic buildings with archaeological sites organised chronologically into Pre-Iron Age (c. 300,000 to 700BC), Iron Age and Roman (700BC to AD450), Saxon and Medieval (AD450 to AD1540), and Post-Medieval and Modern (AD1540 to present). The Pre-Iron Age encompasses the Palaeolithic (c. 300,000 to 10,000BC), Mesolithic (10,000 to 3,500BC), Neolithic (3,500 to 2,000BC) and Bronze Age (2,000 to 700BC) periods. ✓

2.3.2 Archaeological Sites

Pre-Iron Age (Table 2.1, Fig. 2.1)

The earliest object recorded for the study corridor is a Lower Palaeolithic cordate handaxe 25257 found adjacent to Attleborough Stream. This artefact is very rolled and suggests that it is not *in situ*.

Mesolithic settlement within the study area is represented by a concentration of worked flint at 24037 and suggests the presence of a former "activity site" possibly located close to a former wetland. Neolithic activity is represented by a possible settlement formed by 24143, 24144 and 29630, and a series of isolated axes, arrowheads and other material at 9150, 9139, and 19399. Additional finds of undated flint flakes and other materials are recorded at 314590, 31231, 29632, 29644, 29654, 28617, 23292, 28618 and 30102. These finds generally represent isolated artefacts scattered across the landscape and rarely indicate any particular centre of activity or settlement.

Bronze Age finds include bronze axes and other metalwork from 30098, 30101, 33181 and 30938. Settlement evidence consists of burnt flint mounds recorded at 29642, 29643 and 23291 and a hearth at 9171. Ring-ditches representing former burial mounds are recorded for 9156, 9155 and 17219. An undated rectangular cropmark enclosure partially destroyed by the existing A11 carriageway recorded for 12973 may also date from the Bronze Age.

The areas of archaeological interest for the Pre-Iron Age within the study corridor comprise:

- Worked flints and a burnt flint mound have been found to either side of the shallow valley west of Attleborough at sites 23291, 23292, 28617 and 28618, perhaps indicating a valley-edge activity focus.
- Mesolithic worked flint concentration at 24037.

- Possible Neolithic settlement indicated at 24143, 24144 and 29630
- Ring-ditches at 9155, 9156 and 17219.
- Possible fen edge activity represented by burnt flint mounds at 29642 and 29643.

Iron Age and Roman (Table 2.2, Fig. 2.2)

Iron Age activity is poorly represented within the study corridor and comprises two lynch pins at 29302, a coin at 33182 and pottery sherds at 29630 and 29954. These finds are likely to represent casual losses rather than any form of settlement.

Roman material is widespread within the study area with pottery sherds and stray coins recorded at 29631, 31590, 29654, 29644, 9184, 32415, 29896, 30098, 31415, 37484, 16233, 16234, 16235, 29303 and 29302. A possible building occurs at 9095 and a settlement of some form is suggested by the concentration of brooches and coins at 33182, 33184 and 36563 along the eastern margin of the study corridor. Possible Roman roads are represented by 4380 with side ditches and 3392 seen as a low bank near Fiddes Farm. The current Hargham Road follows the alignment of 4380.

The areas of archaeological interest within the study corridor for the Iron Age and Roman periods comprise:

- Possible building at 9095
- Possible settlement at 33182, 33184 and 36563
- Possible Roman road represented by 4380

Saxon and Medieval (Table 2.3, Fig. 2.3)

The settlement of Attleborough has the place name *Aetla's burgh* which means the burgh or estate centre of *Aetla*, and suggests some early importance to the town. The town may have been a minster centre in the Late Saxon period, if not earlier, and the centre of an early land unit. It was therefore a centre of activity in the Saxon and medieval period and most findspots reflect this fact, with no major occupation sites within the study area apart from Attleborough itself.

Saxon material within the study corridor is minimal and comprises isolated finds of pottery, metalwork and other objects at 23269, 25612, 29303, 30389 and 31083. These finds are likely to represent casual losses rather than any form of settlement.

The few medieval settlements within the corridor generally contain later post-medieval components. At the northern end of the corridor HER 1056 is a scheduled monument (SAM 340) composed of moats and earthworks, and possible fishponds and supply ditches. Attleborough Hall at 7009 comprises a medieval moat and a 17th century house with associated fishponds and 19th century farm buildings. Track/road 33952 runs from the Hall to moated site 1056. Moated site 20087 lies on the western edge of the study corridor and comprises two moats, associated fishponds and other earthworks. This site is considered to be the location of Little Rectory or West Carr manor.

The areas of archaeological interest for the Saxon and Medieval periods within the study corridor comprise:

- Moat complex 1056
- Moated site 7009 (Attleborough Hall)
- Moat complex 20087
- Track/road 33952
- Metalwork finds 31415

Post-Medieval and Modern (Table 2.4, Fig. 2.4)

A small number of Post-Medieval and Modern archaeological resources occur within the study area. These comprise the sites of water meadows at 20028 and 4380, a workhouse at 15965, a 1911 infirmary at 34339, a 17th century house at 5566, a Second World pillbox at 32715, a 19th century building at 14972, two windmills at 15964 and a cropmark of two possible Second World War buildings at 35956.

The areas of archaeological interest within the study corridor for the Post-medieval and Modern periods comprise:

- 17th century house at 5566
- Second World War pillbox at 32715
- Windmills at 15964
- Water meadow sites 20028 and 4380

2.3.3 Historic Landscapes

Within the study corridor there are no real indications of ancient field systems, except possibly towards the southern end, near Wroo Farm where curving field boundaries may suggest former strip fields. To the north of Attleborough Hall the curving field boundaries at 30388 may represent the line of a former Medieval park boundary.

Faden's map of 1797 shows that there were several commons around Attleborough with houses scattered along their edges (these commons are depicted on Figs. 1 to 5). Bryant's map of 1826 and the 1838 Tithe Map show these commons enclosed and divided into fields. Comparisons with the OS 1884 and 1907 6" and 1948/1965 2½" maps document very little change in the landscape since enclosure other than the loss of hedgerows and the growth of Attleborough. The 1999 2½" OS map shows that there has been a much greater loss of hedgerows since 1965 within the study area.

The historic landscapes identified within the corridor are predominately enclosed former commons. Fettle Bridge Common is situated along Hargham Road with a group of associated early post-medieval buildings (Potmerc Farm, Haverscroft House). Westcarr/Workhouse Common occurs predominately in the western half of the study corridor with moat complex

20087 at its west end and later farms within it (Walnut Tree Farm, Corner Farm, West Carr Farm, West Farm). Further north is the fragmentary Hill House/Attleborough Lodge Common. At the northern end of the corridor is Besthorpe Common with an arrangement of small closes of rough pasture and marsh carr associated with the scheduled moat complex 1056.

The 17th century Attleborough Hall at 7009 inside its medieval moat is also the centre of a historic landscape including 19th century farm buildings, an approach avenue, Stewards Cottage, remnants of parkland, 17th century fishponds and track/road 33952 running to moat complex 1056.

The areas of historic landscape interest within the study corridor comprise:

- Attleborough Hall at 7009 and associated landscape.
- Besthorpe Common with associated scheduled moat complex 1056
- Westcarr/Workhouse Common with moat complex 20087

2.3.4 Historic Buildings

A number of historic buildings occur within the study corridor outside of the built areas of Attleborough. These buildings include those with statutory designations and a number of others without any legal or quasi-legal status that are of some antiquity. Several buildings with statutory designations are not recorded in the Norfolk Historic Environment Record.

Listed Buildings (Table 2.5, Fig. 2.5)

Buildings with statutory designations within the study area comprise the White House Inn, the house and barns at Potmere Farm, Corner Farmhouse, the house 'Arosa', the house and barn at West Farm, Hill House/Attleborough Lodge and an adjacent dovecote, Grange Farmhouse, Attleborough Hall and the bridge and retaining walls for its moat, Stewards Cottage, the houses at Silver and Village Farms and Church House.

Unlisted Buildings (Table 2.5, Fig. 2.5)

Buildings without formal status within corridor comprise the house at Fen Farm, two cottages and Haverscroft House along Hargham Road and the houses at West Carr and Walnut Tree Farms.

2.4 Field evaluation

2.4.1 Methods

A field evaluation of selected locations intersected by the preferred roadline was undertaken after discussions with Norfolk Landscape Archaeology. Ten trenches were excavated across HERs 20028, 4380 and 33952 to assess subsurface survival and 57 test pits excavated between Fen Street and West Carr Junctions (chainage 700m to 2500m) to determine if any unknown archaeological sites were intersected by the roadline. The evaluation of HER 12793 was not considered necessary as aerial photographs showed the surviving features of this site to be located east of the existing A11 alignment and outside of proposed landtake areas. Trenches and test pits were initially excavated by machine to the surface of undisturbed

subsoil and any exposed archaeological features sample excavated and recorded using a proforma recording system.

Guidelines set out in the documents *Standard and Guidance for Archaeological Field Evaluations* (Institute of Field Archaeologists 1994) and *Standards for Field Archaeology in the East of England* (Gurney 2003) were followed.

2.4.2 Results

The field evaluation of the Scheme roadline found buried deposits at one of the known post-medieval water meadows (HER 20028) and buried deposits of a previously unknown Late Bronze Age/Early Iron Age settlement (HER 39690) c. 200m north-east of Hillsend within the landtake area. No buried deposits were found within the area of the Scheme for the other post-medieval water meadow (HER 4380) and the Roman/Medieval roadway (HER 33952) identified from aerial photographs. Buried deposits for these sites are likely to survive elsewhere outside of the Scheme area. Evaluation areas for the Scheme are shown in Figure 6.

Late Bronze Age/Early Iron Age Settlement (HER 39690)

Two features of late Bronze Age/Early Iron Age date were exposed in two test pits (Nos. 11 and 12). One feature [48] was a sub-circular rubbish pit (Fig. 7, Table 2.6) with a series of fills (72, 50, 49) containing charcoal, pottery, worked flint, a bone/jet object and faunal remains. The other was a ditch [51] (Fig. 8, Table 2.6) orientated north-south with a silty fill (52) and containing pottery. The archaeological features indicate the survival of buried settlement deposits within this area of the scheme.

Post-Medieval Water Meadows (HER 20028)

Thirteen features of post-medieval date were exposed in three trenches (Nos. 8, 9, 10; Figs. 9 to 12, Table 2.7). These comprised two north-south orientated ditches [38, 10] with a third ditch [7] cut into one of the other two [10] and following the same alignment two gullies [12, 18, 20] and [22], four possible oval-shaped pits [53, 57, 60, 67] with a number of fills (54, 58, 61, 62, 63, 64), and a ceramic land drain [65]. Five natural features [27, 29, 33, 35, 55] also occurred in one trench (No. 10). Artefactual material recovered from various features comprised post-medieval pottery, brick and tile and clay pipe stems.

2.5 Assessment

2.5.1 Methods

The adopted methodology involved an evaluation of the construction requirements associated with the Scheme to identify potential impacts and their likely effects on the cultural resource and an assessment of the importance of cultural resources and the significance of identified impacts and effects on them. Where appropriate procedures outlined in the *Design Manual for Roads and Bridges*, Volume 11, Section 3 Part 2 "Cultural Heritage" were followed.

Importance Criteria

The importance of cultural resources was determined using a subset of the non-statutory criteria set out by English Heritage for scheduling ancient monuments and listed buildings. Selected criteria included formal status, period, type, rarity, fragility and condition or survival. For archaeological sites these criteria were supplemented by an assessment of the potential survival of buried deposits using a three scale qualitative scoring system: little or no

potential, possible potential, and high potential. Resources were graded A to D in importance based on one or both sets of criteria:

- add
not
not
- A. Resource of national importance: An archaeological site, historic landscape or building with legal status or of such rarity that it is of national importance.
 - B. Resource of regional/county importance: An archaeological site, historic landscape or building with local authority designations or of such a character that it is of regional importance.
 - C. Resource of unknown importance: An archaeological site, historic landscape or building where little is known or recorded and it was not possible to assess its importance.
 - D. Resource of little or no importance: An archaeological site, historic landscape or building with little or no regional importance. Examples may include isolated archaeological objects and poorly preserved fragments of historic landscape features.

Identification of Impacts and Effects

Potential impacts on cultural resources were identified by reviewing the construction requirements of the Scheme in terms of temporary or permanent landtake, severance, excavation and earthworks. The effects of predicted impacts on cultural resources were then evaluated according to the following categories:

- direct damage or destruction caused by construction excavation,
- indirect damage as a result of compaction through burial under earthworks, — direct?
- loss of visual integrity due to severance (loss of feature relationships). — indirect?

Predicted impact severity on cultural resources was estimated by considering the type, condition and fragility of the resource and proportion of it affected.

Significance ^{of Effects} Criteria

The significance of effects was determined by integrating resource importance with the severity of predicted impact and categorising them according to a three point scale:

- Major Effects which breach national statutory designations and policy and affect archaeological sites, historic landscapes and buildings of national importance. These effects are likely to be of importance to national agencies, local authorities, special interest groups and the general public.
- Moderate Effects which conflict with national designations and local authority policies. This category also includes effects that have a major impact on archaeological sites, historic landscapes and buildings which are of particular importance at a regional level with local authorities and special interest groups.
- Minor Effects which may be identified by local authorities and special interest groups that do not breach national and or local policies.

2.5.2 Resource Importance

The results of the importance assessment are set out for individual resources in Tables 2.8 to 2.12. Resources identified as of national importance are restricted to two archaeological sites and a number of historic buildings with the majority of the areas of archaeological and historic landscape interest of regional/county or unknown importance. Resources of little or no importance within the study corridor are generally isolated findspots of archaeological materials.

National Importance

The two archaeological sites of national importance within the study corridor comprise:

- Moat complex HER 1056 (SAM 340)
- Attleborough Hall (HER 7009) its moat bridge and moat retaining walls are Grade 2* listed buildings with the associated cottage listed Grade 2.

Buildings with Grade 2 listed designations within the study area comprise:

- White House Inn,
- Potmere Farm: house and associated barns
- Corner Farm: house
- The house 'Arosa'
- West Farm: house and barn
- Hill House/Attleborough Lodge and associated dovecote
- Grange Farm: house
- Silver Farm: house
- Village Farm: house
- Church House.

Regional/County Importance

Archaeological sites identified as being of regional/county importance within the study corridor comprise the following:

- Burnt flint mound sites HERs 29642, 29643 and 23291
- Mesolithic site HER 24037.
- Ring-ditch sites at HERs 9155, 9156 and 17219.
- Possible Neolithic/Bronze Age sites at HERs 23292 and 28617

- Late Bronze Age/Early Iron Age settlement site HER 39690
- Roman building site HER 9095
- Roman road HER 4380
- Moat complex HER 20087
- Track/road HER 33952
- Second World War pillbox site HER 32715
- Windmill site HER 15964
- Water meadow site HER 20028

Three historic landscapes of regional/county importance occur within the study corridor:

- The landscape associated with Attleborough Hall.
- Besthorpe Common with associated scheduled moat complex HER 1056
- Westcarr/Workhouse Common with associated moat complex HER 20087

Unknown Importance

A small set of archaeological resources were identified within the corridor where it was not possible to assess their importance on national and/or regional/county levels. All comprise findspots of isolated material which may indicate the location of an archaeological site with surviving subsurface deposits. These comprise:

- Possible Pleistocene deposits containing Lower Palaeolithic artefacts at HER 25257
- Possible Neolithic settlement indicated at HERs 24143, 24144 and 29630
- Possible Neolithic/Bronze Age and Medieval site at HER 28618
- Possible Roman settlement at HERs 33182, 33184 and 36563

Little or No Importance

Archaeological, historic landscapes and buildings identified as of little or no importance comprise the majority of the resources identified for the study area. These include isolated findspots, areas of historic landscape with few surviving features and buildings of historic interest but without local authority designations. They are listed in Tables 2.8 to 2.12.

2.6 Scheme Impacts and Effects

Five archaeological resources of national or regional/county importance occur within or immediately adjacent to Scheme areas. In addition to these, a site of unknown importance is situated immediately adjacent to the flood compensation area. These are listed below and shown on Figure 13. They are also summarised in Tables 2.8 to 2.12.

1. Attleborough Hall (HER 7009).
2. Late Bronze Age/Early Iron Age settlement (HER 39690).
3. Site of Neolithic/Bronze Age date composed of worked flint and a burnt flint mound (HERs 23291, 23292).
4. Site of post-medieval water meadows (HER 20028).
5. Besthorpe Common historic landscape.
6. Site of findspots of a Roman coin and Medieval metalwork (HER 31415). Site of unknown importance.

Three of these sites have already been affected to some extent by the construction of the original Attleborough bypass and will be subjected to further impacts during the construction phase of the current Scheme. These sites are Attleborough Hall (Site 1) and the post-medieval water meadows (Site 4). The previously unrecorded Late Bronze Age/Early Iron Age settlement (Site 2) is also likely to have been partially destroyed by the construction of the original bypass.

Attleborough Hall (Site 1)

The site is located adjacent to an area of fill for the Scheme. Road construction will have no direct impact on the Hall or its associated archaeological deposits and buildings. The setting of the site, however, will be subjected to further severance and loss of visual appearance by the increase in landtake area and any deposits associated with the approach avenue to the Hall buried by earthworks and subjected to a small amount of permanent compaction. The effects identified for the avenue are considered to be of minor significance whereas the further disruption of the site's landscape and visual setting is of moderate significance as it conflicts with local authority policies regarding historic landscapes (Norfolk Structure Plan Policy ENV13:i.; Breckland Local Plan Policy Env.1).

Late Bronze Age/Early Iron Age settlement (Site 2)

The most severe impact of the construction phase will be on the surviving deposits of this site. It is located within the proposed cut for the road extending from Fen Street Junction to West Carr Road (chainage 700m to 2700m). Excavations undertaken as part of road construction will destroy all archaeological deposits surviving within the landtake area. These effects are of moderate significance as they conflict with local authority policies (Norfolk Structure Plan Policy ENV13:iii.; Breckland Local Plan Policy Env.16).

Post-Medieval water meadows (Site 4)

Part of this site is located within an area of fill for the Scheme. A further part of the site lying south of Attleborough stream has been designated as a location for a drainage lagoon (No. 3). The part of the site within the area of fill will be buried by earthworks and subjected to a small amount of permanent compaction. All archaeological deposits within the lagoon area (c.1,040m²) south of Attleborough Stream will be destroyed by construction excavations. The effects identified for the site are of moderate significance as they conflict with local authority policies (Norfolk Structure Plan Policy ENV13:iii.; Breckland Local Plan Policy Env.16).

Site of Roman and Medieval metalworkfindspots (Site 6)

This site is located adjacent to the flood compensation area and is of unknown importance. Buried archaeological deposits may survive and extend into the designated area and have the potential to be either destroyed or severely damaged by construction excavations. Further information is required to assess the importance of this site and the likely impacts of construction activities on it.

Besthorpe Common (Site 5)

Construction of the road will have no impact on this site as no additional landscape features will be lost as a result of construction activities.

Neolithic/Bronze Age Site (Site 3)

Roadworks will also not have an impact on this site as it is situated to the north-west of Attleborough Stream and lies outside the landtake area.

Unknown sites

The impact of the scheme elsewhere on known archaeological resources is of relatively minor significance as these have been identified as of low importance. However, given the archaeological potential of the area surrounding the proposed scheme, there is a strong possibility that further archaeological sites and deposits will emerge during road construction. The proposed drainage lagoons at Fen Street, north of Crowshall Lane and northeast of Attleborough Hall (lagoon nos. 1, 2 and 4), the areas of Attleborough Stream realignment, and the diversion linking Wroo Road with the Fen Street Junction roundabout have a high potential for the occurrence of unknown archaeological resources.

2.7 Mitigation

2.7.1 Introduction

In line with PPG16 *Archaeology and Planning* (1990) and in accordance with County and District policies for the archaeological resource (Norfolk County Council 1999; Breckland District Council 1999), mitigation measures for the cultural resources affected by the scheme will comprise either *in-situ* preservation or preservation by record in advance of their destruction.

Preservation *in-situ* will be possible for those sites or parts of sites located within fill areas of the scheme or adjacent to but outside of landtake areas. Preservation by record will be required for those sites or parts of sites directly affected by groundworking operations.

2.7.2 Mitigation Measures

Mitigation measures for individual sites directly affected by the Scheme are listed below and summarised in Table 2.13.

Site 1. Attleborough Hall

Landscaping and visual screening will be required to offset the additional loss of its visual appearance by the increase in landtake area. Avenue segments within the landtake area for the road will be preserved *in-situ* by their burial under earthworks.

Site 2. Late Bronze Age/Early Iron Age settlement

Archaeological excavation of an area 100m by 30m centred on the location of the features identified by the field evaluation will be required to record surviving deposits prior to their destruction by highway construction.

Site 4. Post-Medieval water meadows

An archaeological watching brief will be required during the excavation of the drainage lagoon for the salvage recording of any exposed features and deposits. The part of the site within the landtake area for the road will be preserved *in-situ* by its burial under earthworks.

Other Groundworking Areas of the Scheme

An archaeological watching brief will be required during groundworks to allow for the identification and salvage recording of hitherto unknown archaeological remains. Areas of particular importance comprise the other drainage lagoons (Nos. 1, 2 and 4), the Attleborough Stream realignment area and the diversion linking Wroo Road with the Fen Street Junction roundabout.

Site 6. Roman and Medieval metalwork findspots

A field evaluation of Site 6 is required to assess the importance of this site and the likely impacts of the excavation of the flood compensation area on any surviving buried archaeological deposits.

2.7.3 Conclusions

All archaeological sites and deposits within the areas of construction excavation will be destroyed by groundworking operations. These include the Late Bronze Age/Iron Age site discovered by the field evaluation (Site 2), areas of the post-medieval water meadows south of Attleborough Stream (Site 4), and any hitherto unknown archaeological sites and deposits located elsewhere within Scheme areas. The excavation and salvage recording measures proposed for the Scheme will be highly effective in insuring that an appropriate record is made of threatened archaeological sites and deposits prior to their destruction by groundworking operations.

The burial of archaeological deposits within fill areas of the Scheme will insure that deposits are preserved *in-situ* underneath earthworks without being damaged by the Scheme. This will include the area of the post-medieval water meadows south of Attleborough Stream (Site 4) and the Attleborough Hall approach avenue (Site 1) lying within the landtake area and any unknown archaeological sites and deposits located elsewhere within fill areas.

The proposed field evaluation for Site 6 will be highly effective for characterising the importance of the site and determining the most appropriate mitigation measures for minimising the potential impacts of construction excavations on buried archaeological deposits.

2.8 References

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**ENVIRONMENTAL
STATEMENT: VOLUME 2
CULTURAL HERITAGE**

APPENDIX 2.1: SURVEY DATA

Table 2.1: Pre-Iron Age Archaeological Resources

Period	HER No.	Description	Period	HER No.	Description
Palaeolithic	25257	Flat-bitted cordate handaxe	Bronze Age	9155	AP: Possible ring-ditch
				9156	AP: Possible ring-ditch
Mesolithic	24037	Flint axe, flakes, blades, burnt flint		9171	Hearth
				17219	AP: Possible ring-ditch
Neolithic	9139	Flint axe		9184	Bronze spearhead
	9150	Polished flint axe		23291	Burnt flint mound, ditches
	19399	Flint arrowhead		29642	Two burnt mounds, prehistoric pottery
	24143	Flint knife, scrapers (part of 29630)		29643	Burnt flint mound, worked flint
	24144	Worked flint (part of 29630)		30098	Bronze spearhead
	29630	Worked flint		30101	Bronze pin
				30398	Bronze axe
Undated (poss. Neolithic)	23292	Worked flint, prehistoric pottery		33181	Axe
	28617	Worked flint			
	28618	Worked flint			
	29644	Prehistoric pottery	Undated (poss. Bronze Age)	12973	AP: Rectangular enclosure
	29654	Worked flint			
	30102	Worked flint			
	31231	Worked flint			
	31590	Worked flint			

Table 2.2: Iron Age and Roman Archaeological Resources

Period	HER No.	Description
Iron Age	23292	Pottery sherd
	29630	Pottery sherds
Iron Age & Roman	29302	Iron Age lynch pins, Roman coin
	33182	Iron Age coin, Roman brooch
Roman	4380	Possible road
	9095	Possible building
	9184	Coin
	16233	Coin
	16234	Coin
	16235	Brooch
	29303	Objects
	29631	Pottery sherds
	29644	Pottery sherds
	29654	Pottery sherds
	29898	Coins
	30098	Coins
	31415	Coin
	31590	Pottery sherds
	33184	Coins
	33952	Possible road
	36563	Brooches
	37484	Coin

Table 2.3: Saxon and Medieval Archaeological Resources

Period	HER No.	Description	
Saxon	23269	Pottery sherd	
	25612	Hanging bowl mount	
	31083	Spindlewhorl	
Saxon & Medieval	30089	Saxon object, Medieval objects	
	30389	Saxon mount, Medieval object	
Medieval	1056	Moat, fishponds; Scheduled Ancient Monument No. 340	
	9135	Possible park boundary	
	16236	Coins	
	17273	Brooch	
	20087	Moats, earthenworks	
	28617	Objects, pottery sherds	
	28618	Pottery sherds	
	28618	Object	
	28619	Object	
	29302	Object	
	29630	Pottery sherds	
	29631	Pottery sherds	
	29644	Pottery sherds	
	29954	Pottery sherds	
	29896	Objects	
	30097	Objects	
	30099	Object	
	30100	Objects	
	30101	Objects	
	30935	Bell	
	30936	Object	
	30938	Objects	
	31415	Objects	
	33178	Objects	
	33952	Track/road	
	Medieval & Post-Medieval	7009	Attleborough Hall, Medieval moat, 17th cent house
		30103	Medieval and Post-Medieval sherds, flint and brick

Table 2.4: Post-Medieval and Modern Archaeological Resources

Period	HER No.	Description
Post-Medieval	5566	17th century house
	14972	19th century building
	15964	Two windmills
	15965	Workhouse
Modern	32715	Second World War pillbox
	34339	1911 Infirmary
	35956	AP: Possible Second World War buildings

Table 2.5: Historic Buildings

HER No	Description	Designation
14704	Potmere Farmhouse, Haverscroft Street. 17th century.	L
14704	Barns adjacent to Potmere farmhouse	L
35192	Arosa, London Road	L
7009	Attleborough Hall, 17th c building in medieval moat.	L
7009	Bridge and walls to moat at Hall	L
-	Stewards Cottage, Attleborough Hall	L
-	Corner Farm, West Carr early 18th century.	L
-	White Lodge, London Road, c 1700.	L
17668	West Farmhouse, Carvers Lane, 17th c.	L
17668	Barn adjacent to West Farmhouse	L
-	Grange Farm, Deopham Road.	I.
-	Village Farm, Besthorpe	L
-	Silver Farm, Besthorpe	L
19786	Church House, Besthorpe	I.
-	Hill House/Attleborough Hall.	L
-	Dovecote 30m east of Attleborough Lodge.	L
-	Fen Farm, Fen Street 19th century.	-
-	Westcarr Farm, Westcarr Road, 17th century	-
-	Walnut Tree Farm, Westcarr Road 18th century.	-
-	Cottage south of Haverscroft Farm, Haverscroft Road, 17th c.	-
-	Haverscroft House, Hargham Road 17th century.	-
-	Cottage, opposite Haverscroft House, 17th century	-

I*
II*
II
II
II

Table 2.6: Feature descriptions and materials recovered for the Late Bronze Age/Early Iron Age Site

Feature	Fill	Description	Worked Flint	Burnt Flint	Pottery	Bone	Fired Clay	Brick/Tile	Other
48		Pit							
	49	Light grey sandy silt	5	14	36	1	-	-	1
	50	Dark grey charcoal-rich sandy silt	-	14	18	1	-	-	-
	72	Mixed yellow & brown sandy silty clay	1	5	23	23	38	-	3
51		Ditch							
	52	Light grey sandy silt	-	-	2	-	-	-	-

Table 2.7: Feature descriptions and materials recovered for Post-Medieval Water Meadows

Feature	Fill	Description	Worked Flint	Burnt Flint	Pottery	Bone	Fired Clay	Brick/Tile	Other
37		Ditch							
	39	Mid grey brown silty sand	-	-	-	-	-	3	1
	40	Light to mid brown silty sand	-	-	-	-	-	-	-
	41	Mid brown silty sand	-	-	-	-	-	3	1
39		Ditch							
	42	Mid yellow brown silty sand and flint gravel	-	-	-	-	-	-	-
	43	Mid grey brown silty sand and flint gravel	-	-	-	-	-	-	-
	44	Mid brown silty sand and flint gravel	-	-	-	-	-	4	-
	45	Mid grey brown silty sand	-	-	-	-	-	-	-
	46	Mid yellow brown silty clay	-	-	-	-	-	-	-
	47	Mid to dark brown silty sand	-	-	-	1	-	-	-
7		Ditch (cut into Ditch 10)							
	2	Light whitish brown silty sand	-	-	-	-	-	-	-
	3	Mid yellow brown sandy silt	-	-	2	-	-	18	1
	4	Mid yellow brown sandy silt	-	-	-	-	-	-	-
	5	Mid yellow brown sandy silt	-	-	-	-	-	2	-
10		Ditch							
	6	Mid yellow brown sandy silt	-	-	-	-	-	1	-
	8	Light yellow brown sandy silt	-	-	-	-	-	-	-
	9	Mid to light yellow brown sandy silt	-	-	-	-	-	-	-
	25	Mid yellow brown sandy silt	-	-	-	-	-	-	-
15		Gully terminus							
	13	Mid to light grey brown sandy silt	-	-	-	-	-	-	-
	14	Light brownish grey fine sand	-	-	-	-	-	-	-
12		Gully terminus							
	11	Light yellow brown sandy silt	-	-	-	-	-	-	-

Feature	Fill	Description	Worked Flint	Burnt Flint	Pottery	Bone	Fired Clay	Brick/Tile	Other
18		Gully							
16		Mid yellow brown sandy silt	-	-	-	-	-	-	-
17		Mid grey brown sandy silt	-	-	-	-	-	-	-
20		Gully	-	-	-	-	-	-	-
19		Mid to light yellowish brown sandy silt	-	-	-	-	-	-	-
22		Gully	-	-	-	-	-	-	-
23		Mid greyish brown sandy silt	-	-	-	-	-	-	-
27		Natural feature	-	-	-	-	-	-	-
28		Light brown grey gravelly sand	-	-	-	-	-	-	-
29		Natural Feature (tree hole)	-	-	-	-	-	-	-
30		Mid orangey brown sandy silt	-	-	-	-	-	-	-
31		Mid greyish brown sandy silt	-	-	-	-	-	-	-
32		Pale orangey brown coarse sand	-	-	-	-	-	-	-
33		Natural feature	-	-	-	-	-	-	-
34		Pale to mid greyish brown silty sand	-	-	-	-	-	-	-
35		Shallow pre/natural feature	-	-	-	-	-	-	-
36		Mid orangey brown sandy silt	-	-	-	-	-	-	-
53		Linear feature	-	-	-	-	-	-	-
54		Mid brownish grey sandy silt	-	-	-	-	-	-	-
55		Natural feature	-	-	-	-	-	-	-
56		Mid greyish brown sandy silt	-	-	-	-	-	-	-
69		Mid greyish brown silty sand	-	-	-	-	-	-	-
57		Pit/natural feature	-	-	-	-	-	-	-
58		Mid brown silty sand	1	-	-	-	-	-	-
59		Dark brownish grey slightly clayey silt	-	-	-	-	-	-	-
60		Pit	-	-	-	-	-	-	-
61		Mid grey sandy silt and flint gravel	-	-	-	-	-	-	-
62		Mid grey clayey silt	-	-	-	-	-	-	-
63		Mid grey silty sand with patches of yellow sand	-	-	-	-	-	-	-
64		Pale grey sand	-	-	-	-	-	-	-
65		Gully containing modern land drain	-	-	-	-	-	-	-
66		grey silty sand	-	-	-	-	-	-	-
67		Pit	-	-	-	-	-	-	-
68		Mid grey silty sand	-	-	-	-	-	-	-
70		Land drain	-	-	-	-	-	-	-
71		Fill of land drain trench	-	-	-	-	-	-	1
74		Natural Feature (tree hole)	-	-	-	-	-	-	-
75		Mid greyish brown silty sand	-	-	-	-	-	-	-
76		Natural depression	-	-	-	-	-	-	-
77		Mid to dark greyish brown silty sand	-	-	-	-	-	-	-

Table 2.8: Resource Assessment for the Pre-Iron Age (Palaeolithic, Mesolithic, Neolithic).

Period	HER No.	Description	Impact	Duration of Impact	Formal Status	Type	Rarity	Fragility	Group Value	Condition/ Survival	Buried Deposits	Importance	Significance of Effects
Palaeolithic	25257	Flat-butted cordate handaxe	-	-	-	Findspot	3	3	1	0	2	C	-
Mesolithic	24037	Flint axe, flakes, blades, burnt flint	-	-	-	Site	3	3	1	2	2	B	-
Neolithic	9139	Flint axe	-	-	-	Findspot	1	1	1	1	1	D	-
	9150	Polished flint axe	-	-	-	Findspot	1	1	1	1	1	D	-
	19399	Flint arrowhead	-	-	-	Findspot	1	1	1	1	1	D	-
	24143	Flint knife, scrapers (part of 29630)	-	-	-	Findspot	1	3	2	1	2	B	-
	24144	Worked flint (part of 29630)	-	-	-	Findspot	1	3	2	1	2	B	-
	29630	Worked flint	-	-	-	Findspot	1	3	2	1	2	B	-
	23292	Worked flint, prehistoric pottery	-	-	-	Findspot	1	3	2	1	2	B	-
Undated (puss. Neolithic)	28617	Worked flint	-	-	-	Findspot	1	3	2	0	2	B	-
	28618	Worked flint	E	T	-	Findspot	1	0	2	0	0	D	-
	29644	Prehistoric pottery	-	-	-	Findspot	1	1	1	0	0	C	-
	29654	Worked flint	-	-	-	Findspot	1	1	1	1	1	D	-
	30102	Worked flint	-	-	-	Findspot	1	1	1	1	1	D	-
	31231	Worked flint	-	-	-	Findspot	1	1	1	1	1	D	-
	31590	Worked flint	-	-	-	Findspot	1	1	1	1	1	D	-

Table 2.9: Resource Assessment for the Pre-Iron Age (Bronze Age)

Period	HER No.	Description	Impact	Duration of Impact	Formal Status	Type	Rarity	Fragility	Group Value	Condition/ Survival	Buried Deposits	Importance	Significance of Effects
Bronze Age	9155	AP: Possible ring-ditch	-	-	-	Cropmark	1	2	1	2	3	B	-
	9156	AP: Possible ring-ditch	-	-	-	Cropmark	1	2	1	2	3	B	-
	9171	Hearth	-	-	-	Site	2	2	0	2	3	D	-
	17219	AP: Possible ring-ditch	-	-	-	Cropmark	1	2	1	2	3	B	-
	9184	Bronze spearhead	-	-	-	Findspot	1	1	1	1	1	B	-
	23291	Burnt flint mound, ditches	-	-	-	Site	2	3	2	2	3	B	-
	29642	Two burnt mounds, prehistoric pottery	-	-	-	Site	2	3	2	2	3	D	-
	29643	Burnt flint mound, worked flint	-	-	-	Site	2	3	2	2	3	D	-
	30098	Bronze spearhead	-	-	-	Findspot	1	1	1	1	1	D	-
	30101	Bronze pin	-	-	-	Findspot	1	1	1	1	1	D	-
	30398	Bronze axe	-	-	-	Findspot	1	1	1	1	1	D	-
	33181	Axe	-	-	-	Findspot	1	1	1	1	1	D	-
	39690	Pit, ditch, pottery, bone	E	P	-	Site	3	3	2	2	3	B	Moderate
	12793	AP: Rectangular enclosure	-	-	-	Cropmark	1	3	1	1	2	D	-
	Undated (poss. Bronze Age)												

Table 2.10: Resource Assessment for the Iron Age and Roman periods.

Period	HER No.	Description	Impact	Duration of Impact	Formal Status	Type	Rarity	Fragility	Group Value	Condition/Survival	Buried Deposits	Importance	Significance of Effects
Iron Age	23292	Pottery sherd	-	-	-	Findspot	1	1	1	1	1	D	-
	29630	Pottery sherds	-	-	-	Findspot	1	1	1	1	1	D	-
Iron Age & Roman	29302	Iron Age lynch pins, Roman coin	-	-	-	Findspot	1	1	1	1	1	D	-
	33182	Iron Age coin, Roman brooch	-	-	-	Findspot	1	0	2	0	0	C	-
Roman	4380	Possible road	-	-	-	Feature	2	2	1	1	2	B	-
	9095	Possible building	-	-	-	Site	2	3	1	2	3	B	-
	9184	Coin	-	-	-	Findspot	1	1	1	1	1	D	-
	16233	Coin	-	-	-	Findspot	1	1	1	1	1	D	-
	16234	Coin	-	-	-	Findspot	1	1	1	1	1	D	-
	16235	Brooch	-	-	-	Findspot	1	1	1	1	1	D	-
	29303	Objects	-	-	-	Findspot	1	1	1	1	1	D	-
	29031	Pottery sherds	-	-	-	Findspot	1	1	1	1	1	D	-
	29044	Pottery sherds	-	-	-	Findspot	1	1	1	1	1	D	-
	29654	Pottery sherds	-	-	-	Findspot	1	1	1	1	1	D	-
	29898	Coins	-	-	-	Findspot	1	1	1	1	1	D	-
	30098	Coins	-	-	-	Findspot	1	1	1	1	1	D	-
	31415	Coin	E	P	-	Findspot	1	1	1	1	0	C	Moderate
	31590	Pottery sherds	-	-	-	Findspot	1	1	1	1	1	D	-
	33184	Coins	-	-	-	Findspot	1	0	2	0	0	C	-
36563	Brooches	-	-	-	Findspot	1	0	2	0	0	C	-	
37484	Coin	-	-	-	Findspot	1	1	1	1	1	D	-	

Table 2.11: Resource Assessment for the Saxon and Medieval periods.

Period	HER No.	Description	Impact	Duration of Impact	Formal Status	Type	Rarity	Fragility	Group Value	Condition/Survival	Buried Deposits	Importance	Significance of Effects
Saxon	23269	Pottery sherd	-	-	-	Findspot	1	1	1	1	1	D	-
	25612	Hanging bowl mount	-	-	-	Findspot	1	1	1	1	1	D	-
	31083	Spindlewhorl	-	-	-	Findspot	1	1	1	1	1	D	-
Saxon & Medieval	30089	Saxon object, Medieval objects	-	-	-	Findspot	1	1	1	1	1	D	-
	30389	Saxon mount, Medieval object	-	-	-	Findspot	1	1	1	1	1	D	-
Medieval	1056	Moat, fishponds;	-	-	Scheduled	Site	2	3	3	3	3	A	-
	9135	Possible park boundary	-	-	-	Feature	1	1	1	1	1	D	-
	16236	Coins	-	-	-	Findspot	1	1	1	1	1	D	-
	17273	Brooch	-	-	-	Findspot	1	1	1	1	1	D	-
	20087	Moats, earthworks	-	-	-	Site	2	3	3	3	3	B	-
	28617	Objects, pottery sherds	-	-	-	Findspot	1	1	1	1	1	D	-
	28618	Pottery sherds	-	T	-	Findspot	1	0	2	0	0	D	-
	28619	Object	-	-	-	Findspot	1	1	1	1	1	D	-
	29302	Object	-	-	-	Findspot	1	1	1	1	1	D	-
	29630	Pottery sherds	-	-	-	Findspot	1	1	1	1	1	D	-
	29631	Pottery sherds	-	-	-	Findspot	1	1	1	1	1	D	-
	29644	Pottery sherds	-	-	-	Findspot	1	1	1	1	1	D	-
	29954	Pottery sherds	-	-	-	Findspot	1	1	1	1	1	D	-
	29896	Objects	-	-	-	Findspot	1	1	1	1	1	D	-
	30097	Objects	-	-	-	Findspot	1	1	1	1	1	D	-
30099	Object	-	-	-	Findspot	1	1	1	1	1	D	-	
30100	Objects	-	-	-	Findspot	1	1	1	1	1	D	-	
30101	Objects	-	-	-	Findspot	1	1	1	1	1	D	-	
30935	Bell	-	-	-	Findspot	1	1	1	1	1	D	-	
30936	Object	-	-	-	Findspot	1	1	1	1	1	D	-	
30938	Objects	-	-	-	Findspot	1	1	1	1	1	D	-	
31415	Objects	-	E	P	Findspot	1	1	1	1	1	C	Moderate	
33178	Objects	-	-	-	Findspot	1	1	1	1	1	D	-	
33952	Trackroad	-	BW	P	Crommark	2	3	3	3	2	0	B	-
Medieval & Post-Medieval	7009	Attleborough Hall, Medieval moat, 17th cent house	L	P	Listed Elements	Site	3	3	3	3	3	A	Moderate
	30103	Medieval and Post-Medieval sherds, flint and brick	-	-	-	Findspot	1	1	1	1	1	D	-

Table 2.12: Resource Assessment for the Post-Medieval and Modern periods.

Period	HER No.	Description	Impact	Duration of Impact	Formal Status	Type	Rarity	Fragility	Group Value	Condition/ Survival	Buried Deposits	Importance	Significance of Effects
Post-Medieval	5566	17th century house	-	-	-	Site	1	1	1	1	1	D	-
	14972	19th century building	-	-	-	Site	1	1	1	1	1	D	-
	15964	Two windmills	-	-	-	Site	2	2	1	2	2	B	-
	15965	Workhouse	-	-	-	Site	1	1	1	1	1		-
	20028	Watermeadows	E/EW	P	-	Site	2	3	3	3	3	B	Moderate
	4830	Watermeadows	EW	P	-	Site	2	2	1	1	1	D	Moderate
Modern	32715	Second World War pillbox	-	-	-	Site	1	1	1	3	1	B	-
	34339	1911 Infirmary	-	-	-	Site	1	1	1	1	1	D	-
	35956	AP: Possible Second World War buildings	-	-	-	Site	1	1	1	1	2	D	-

Table 2.13: Sites of archaeological interest lying within or immediately adjacent to Scheme areas.

Site No	HER No	Description	Importance	Impact	Effect	Significance of Effect	Mitigation Measures
1	7009	Attleborough Hall Approach Avenue	National Regional/County	Severance Earthworks	Loss of visual appearance Burial	Minor	Landscaping and Visual Screening Preservation <i>In-Situ</i>
2	39690	Late Bronze Age/Iron Age Settlement	Regional/County	Excavation	Destruction	Minor	Archaeological Excavation
3	23291, 23292	Neolithic/Bronze Age Site	Regional/county	-	-	Moderate	Preservation <i>In-Situ</i>
4	20028	Post-Medieval Water Meadows North of Attleborough Stream South of Attleborough Stream	Regional/County	Excavation Earthworks	Destruction Burial	Moderate	Archaeological Watching Brief Preservation <i>In-Situ</i>
5	-	Besthorpe Common	-	-	-	-	-
6	31415	Roman Coin and Medieval Metalwork	Regional/County Unknown	Excavation	Destruction	Unknown	Field Evaluation