HIGHWAYS AGENCY

A47 Acle Straight - Single Carriageway Proposals

Environmental Assessment Report

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Hyder Consulting

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1 Introduction

1.1 The Scheme

1.1.1 The Highways Agency propose to improve a section of the A47 between Acle and Great Yarmouth a distance of approximately 11 km (see Figure1.1). This study is part of a package of measures to tackle transport problems between Norwich and Great Yarmouth which were announced by the Minster for Transport John Spellar on 22 August 2002. In particular Mr Spellar noted the need to investigate options for both single carriageway improvements and dualling of the A47 between Acle and Great Yarmouth, known as the Acle Straight. In recognition of the environmental sensitivity of the area, the importance of implementing a full environmental assessment on both of the options was stressed.

1.1.2 This Environmental Assessment report (EAR) considers a proposed scheme for improvements to the existing single carriageway with the objective of improving the general safety of the road. This involves widening the carriageway to the north on the existing embankment. The scheme is described in more detail in Chapter 2 of this report.

1.1.3 The Environmental Assessment Report provides a systematic and objective account of the environmental effects of the scheme and the measures proposed to mitigate them, that is to offset or reduce these effects. It does not aim to make judgements about the merits of the scheme but ensures that the likely effects on the environment are fully understood and taken into account before a decision on whether to proceed is made.

1.2 Report Structure

1.2.1 The Environmental Assessment consists of two volumes, along with supporting documentation. This written document is Volume 1 of the Environmental Assessment Report for the scheme. Volume 2 comprises supporting plans and cross sections. A glossary is provided at the end of Volume 1. Non-environmental issues are covered in the Scheme Assessment Report. The Environmental Assessment is supported by a number of detailed specialist reports. These are listed in Appendix 1.1. (Sources and references).

1.2.2 Following this introduction, Volume 1 is divided into the following chapters:

- Scheme Design includes a description of the options.
- This is followed by a number of chapters detailing the results of various specialist environmental studies. Each of these chapters presents the existing conditions and the anticipated environmental effects that may result from the construction and operation of each of the options. The

environmental effects have been assessed against a "do-minimum" baseline and likely mitigation measures. The assessment process has been closely integrated with design development to optimise the environmental performance of each option.

- Following consultations with statutory consultees a conclusions section will be prepared to draw together the most significant environmental effects and issues, and consider the overall environmental impact of each of the options.

1.3 Legal Basis

1.3.1 The Environmental Assessment Report presents an assessment of environmental effects likely to result from implementation and operation of the scheme. Should one of the options be progressed following a ministerial decision, the EAR for that option could be used as the basis for an Environmental Statement. In order that the EAR is of a standard suitable for adaptation as an Environmental Statement, is has been prepared in accordance with the requirements of the Highways Act 1980, Section 105A, as supplemented by the Highways (Assessment of Environmental Effects) Regulations 1988 (and amended in 1994 and 1999), which implement EC Directives 85/337/EEC and 97/11/EC.

1.4 Methodology

1.4.1 Methods used are those set out in official guidance published by the Government.

1.4.2 The "Design Manual for Roads and Bridges (DMRB), Volume 11: Environmental Assessment"[1] provides detailed guidance on EIA for road schemes in the UK. Stage 3 assessment methodologies from this guidance have been used for all the work presented in this report. Volume 10 of the DMRB "Environmental Design"[2] provides detailed guidance on environmental mitigation for road schemes and has been used as the primary reference for environmental inputs to the Scheme design.

1.4.3 The methodology for appraising highway projects to take account of multi-modal transport issues is indicated in the "Guidance on the Methodology for Multi-Modal Studies" (GOMMMS - 2000). This type of appraisal is a separate exercise from the statutory requirements for EIA derived from the EC Directive, which the DMRB addresses. It is designed to assess the extent to which transport schemes meet Government and Highways Agency objectives on sustainable development. However the appraisal topics from the GOMMMS Environment, Accessibility and Integration objectives overlap with many of the topics in the DMRB. The GOMMMS

[1] Highways Agency, Design Manual for Roads and Bridges, Volume 11, June 1993 and revisions
[2] Highways Agency, Design Manual for Roads and Bridges, Volumes 10 and 10A, 1992 and revisions

assessment methods are largely derived from the DMRB Stage 3 assessments and the relationship between the two documents is described in the report "Applying the Multi-modal New Approach to Appraisal to Highway Schemes" (DETR, 2001). Although based on the DMRB, the EIA for this scheme will take into account the requirements of GOMMMS where relevant.

1.5 Environmental Impact Assessment Process

1.5.1 Diagram 1.5.1 illustrates the process of the Environmental Impact Assessment (EIA) process and its relationship with the development of the scheme design. It is an on-going process, the aim of which is to optimise the environmental performance of the scheme, within engineering and economic constraints.

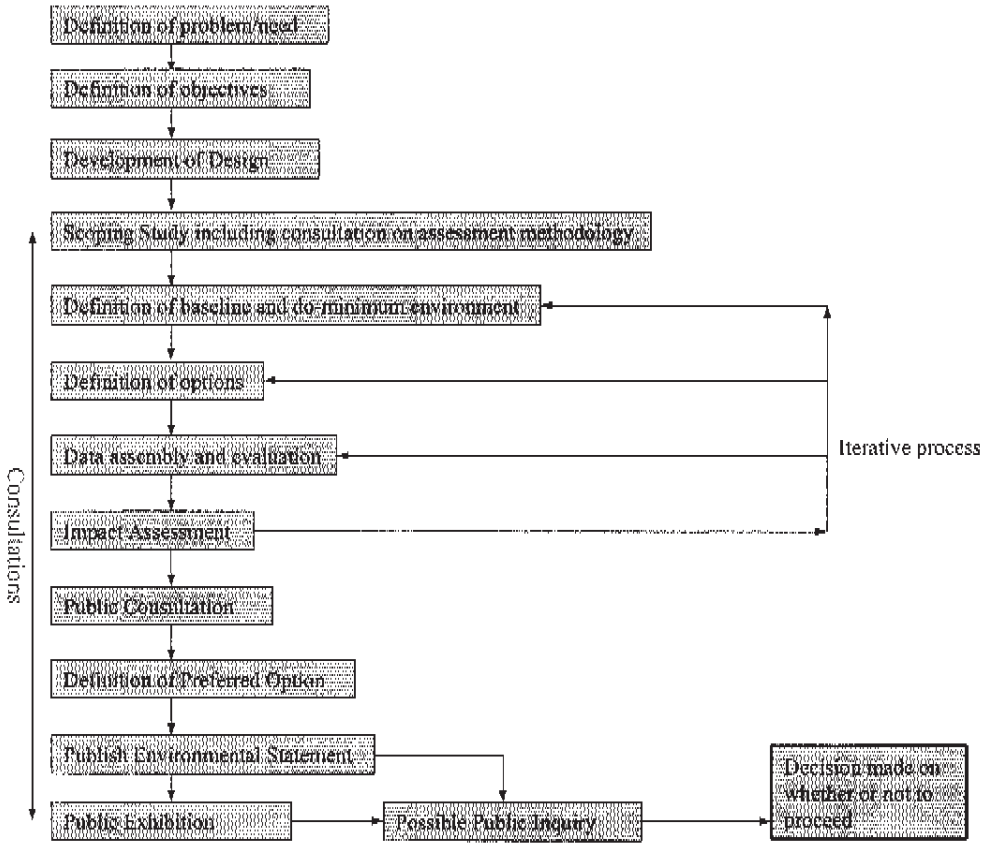

Diagram 1.5.1: The Environmental Impact Assessment Process for the A47 Scheme.

1.6 The Scope of the Environmental Impact Assessment

1.6.1 A scoping study of the potential environmental effects of the scheme was undertaken prior to the scheme design and presented in an Environmental Assessment Scoping Report published in October 2002[3]. The aim of the report was to set out the scope of the environmental assessment in line with the DETR's Good Practice Guide,[4] which indicates that the Scoping Report should define the following:

- the nature of the project;
- the breadth of the environmental assessment;
- the range of key issues;
- the extent to which each topic needs to be investigated, defining the study area, data collection and methodology.

1.6.2 The Scoping Report was circulated to the statutory consultees and their responses are summarised in Appendix 1.2.

1.6.3 The Scoping Report identified the following issues, which would be subject to more detailed environmental survey and assessment:

- Planning
- Land Use and Accessibility
- Geology and Soils
- Water Environment
- Landscape
- Biodiversity
- Cultural Heritage
- Air Quality
- Traffic Noise and Vibration
- Journey Ambience
- Disruption due to construction

1.6.4 These issues have been assessed in this Environmental Assessment Report although the following chapter headings have been substituted in this report in line with current Highways Agency practice:

[3] A47 Acle Straight Study: Environmental Scoping Report (GD00555/RT/03)

[4] Preparation of Environmental Statements for Planning Projects that require Environmental Assessment: A Good Practise Guide. DETR 1995.

- Planning is renamed Policies and Plans;
- Accessibility is renamed "Pedestrians, Cyclists, Equestrians and Community Effects;
- Water Environment is renamed Water Quality and Drainage;
- Biodiversity is renamed Ecology and Nature Conservation;
- Journey Ambience is renamed Vehicle Travellers.

1.7 Consultations

1.7.1 Extensive consultations concerning the gathering of data and the assessment of environmental effects of the scheme have been undertaken since the early stages of the EIA process. The aim of this dialogue is to anticipate and mitigate any concerns early in the design process. Consultations have been undertaken with organisations with statutory obligations relating to the scheme (statutory consultees) as well as other organisations with an interest in the scheme (non-statutory consultees).

1.7.2 The statutory consultees comprise the following organisations:

- Broadland District Council
- Broads Authority
- Countryside Agency
- English Heritage
- English Nature
- Environment Agency
- Great Yarmouth Borough Council
- Norfolk County Council

1.7.3 The non-statutory consultees include the following organisations:

- British Waterways
- Broads Environmental Services Ltd
- British Trust for Ornithology
- DEFRA
- Great Yarmouth Bird Club
- Kings Lynn Consortium Internal Drainage Board
- Local WEBS counter
- Norfolk Landscape Archaeology
- Norfolk Wildlife Trust

- Meteorological Office
- Other local Wildlife Recorders
- RSPB
- Sustrans

1.7.4 Appendix 1.2 of this Environmental Assessment Report contains summaries of the views of the consultees relating to each specialist environmental topic assessed.

2 Scheme Design

2.1 Project Objectives

2.1.1 The main objectives of the single carriageway proposals (Options 1, 1A and 1B) are to improve road safety and reduce traffic congestion whilst minimising adverse effects on the environment.

2.2 The Route and it's Setting

2.2.1 The Acle Straight is a single carriageway section of the A47, which consist of two straights, 3.5km and 7.5km long respectively, connected by one short curve. The carriageway is constructed on embankment with a height of 1 to 1.5m above surrounding ground levels. The carriageway width varies between 6.8m and 7.3m. There are no metre strips and the road is bordered by drainage dykes located at the foot of the embankment for the vast majority of its length.

2.2.2 There is only one junction along the route, it comprises a T junction with the unclassified road from Halvergate. There are 84 direct farm / property accesses along the length of the route, of which 15 are paved access and the remaining 69 are minor unpaved accesses such as field gates. Five properties also have a frontage along the route, the Stracey Arms Public House (now Pontiac Roadhouse), Stracey Arms Mill – foot access, Scaregap Cottages, the railway sidings at Great Yarmouth and Vauxhall Caravan Park.

2.2.3 Proposed safety improvements resulting from the 2001 Road Based Study will be implemented within the next few years. This includes implementation of a 50 mph speed limit along the Acle Straight and improved variable message signage along the A47 corridor to help incident management.

2.2.4 There are currently five sub standard laybys on the A47 between Acle and Great Yarmouth. These facilities are on one side of the road only at each location and their layouts are only suitable for vehicles stopping in emergencies.

2.2.5 Footpaths are located either side of the River Bure and these are linked to a number of footpaths which connect to and across the A47. Cyclists share the use of the A47 and local roads with motorised vehicles and there are no specific cycling provisions along the existing route.

2.2.6 The existing A47 runs approximately parallel to the River Bure and crosses marshland tributaries to the river. The route also crosses a number of

dykes which are important in draining or supplying water to the marshes. Dykes also run parallel to both sides of the existing road and are located at the foot of the road embankment.

2.2.7 Most of the area through which the A47 Acle Straight runs is designated as part of the Broads Authority, which has equivalent status to a National Park and therefore the landscape is considered to be of national importance. This is a flat landscape, located below sea level with expansive wetland of which grazing pastures / marshes are particularly characteristic. The marshland is also designated as an Environmentally Sensitive Area, which aims to protect and where possible enhance the distinctive pastoral character of the Broads area.

2.2.8 Existing water levels within the marshes are artificially maintained through pumping which is carried out to accommodate individual farming requirements. The grazing marsh and ditches along the majority of the scheme are considered by English Nature to meet the criteria for designation as Site of Special Scientific Interest (SSSI), although much of it has not been designated. At its western end it abuts the Damgate Marsh SSSI, which is also a candidate Special Area of Conservation (cSAC) and Ramsar Site. At its eastern end near Great Yarmouth, the scheme corridor passes close to Breydon Water SSSI which is designated as a Special Protection Area (SPA) and Ramsar site in recognition of its international importance as a wetland habitat of value to birds.

2.2.9 Near to Halvergate Junction there is a grade two listed building (a drainage mill) in close proximity to the road, and also two non-scheduled World War 1 pillboxes are located on either side of the road towards the eastern end.

2.3 Scheme Proposals

Option 1 - Single Carriageway Improvement

2.3.1 The overall width of the existing embankment provides enough width for a standard single (S2) 7.3m carriageway with 1.0m hard strips and 2.5m verges (see Figure 2.2). It is proposed to widen the existing single carriageway to S2 standard (7.3m carriageway plus 2 x 1.0m hardstrips) within the width of the existing road embankment. This option would result in varying verge widths, with a minimum of approximately 2 x 0.6m. The height of the embankment would remain virtually the same as the existing situation. In view of the sub standard access road junction arrangements (see clause 2.3.10 below), it is proposed to retain the 50mph speed limit which is due to be implemented as part of a package of short-term safety measures on the existing road.

2.3.2 In order to consolidate the number of field/minor accesses to the existing road, access tracks with an unsealed surface would be constructed parallel with the road, outside the roadside dykes. This would allow access for all

owners/tenants to a limited number of junctions with the A47. Localised widening of the embankment would be necessary at these junctions and elsewhere. This would result in localised diversions of existing roadside ditches on both sides of the road. The precise extent of roadside ditch relocation is subject to confirmation following detailed design, however approximate lengths of diverted ditch are indicated on the plans (Figure 2.1).

Option 1A – Single Carriageway Improvement- Access Track Diversion

2.3.3 The proposed widening of the existing carriageway in Option 1A is fundamentally the same as Option 1, with widening of the carriageway largely contained within the existing embankment. However with Option 1A the access track would be temporarily upgraded to the north (or south at the eastern end of the scheme) for use as a temporary diversion route for one-way traffic during construction. This would require provision of a sealed surface however once construction is completed the access track would be downgraded and constructed in an environmentally sympathetic manner with an unsealed surface. This option would provide the Contractor with more working space and hence result in a potentially shorter construction period.

Option 1B

2.3.4 The proposed widening would be the same as Option 1 except that a 60mph speed limit would be reinstated on the improved road.

Halvergate Junction

2.3.5 It is proposed to incorporate a single dualling priority junction at Halvergate. Whist this may be substandard with respect to the mainline traffic flows the existing junction is lightly trafficked and the provision of a central island allowing space for queuing vehicles would provide enhanced levels of safety and improved traffic flow. The strategy put forward has been made on the basis that a 50 mph speed limit will be imposed along this section of road as part of the proposed interim safety enhancements.

Access Tracks

2.3.6 The access tracks would be single lane (4m wide) with passing places located strategically along their length. It is proposed that a minimum 2m offset be allowed between the access tracks and the edge of existing ditches. The proposed maximum distance between passing places is 500m. The access tracks would be simply constructed as near to existing ground level as drainage and ground conditions allow.

2.3.7 The proposed scheme layout drawings depict an arrangement for these access track junctions based on a simplistic assessment without consultation with landowners and other affected bodies. The number of accesses directly on to the trunk road has been limited to two/three junctions per straight section to minimise disruption to the A47 traffic flow and potential accident locations.

2.3.8 Access tracks have not been provided to Acle Junction due to the difficulties and potential cost of constructing the tracks through a wetland area known as the Acle Slough on the north side of the road and woodland carr to the south. Paths for pedestrians and equestrians are proposed to link the lengths of access tracks in the locations indicated on Figure 2.1. In rural areas these would be unsurfaced.

2.3.9 Where access tracks and link paths cross existing ditches, bridges would be provided and these would be designed to minimise effects on the profile of the ditch.

2.3.10 At the farm access junctions single carriageway dualling would be provided to cater for storage of an agricultural vehicle. This treatment would form a visual reference for vehicles travelling on the A47, and also protect the turning vehicle and prevent possible delays and accidents resulting from a turning vehicle overhanging into the through lane.

Lay-bys

2.3.11 Proposed lay-by locations are illustrated on the layout drawings (Figure2.1). Between Acle and Halvergate an existing lay-by to the west of Tunstall Dyke would be upgraded to current emergency standard and a new emergency lay-by would be constructed for the opposing carriageway in accordance with the standards for the single carriageway option. The installation of an emergency lay-by arrangement has been proposed at this location due to geometric and environmental constraints, and the distance from rest facilities at the Acle Roundabout and the Stracey Arms.

2.3.12 Between Halvergate Junction and Great Yarmouth there are three existing lay-bys. The eastern most lay-by is in close proximity to the Great Yarmouth Roundabout and would be discarded. The other lay-bys would be replaced by a single pair of lay-bys located at a convenient location along the straight between the proposed access track junctions, as shown on the scheme layout plans. The addition of further lay-bys at 2.5km spacing in accordance with current standards would be damaging environmentally to this sensitive site and have therefore not been added.

Lighting

2.3.13 The existing street lighting consists of 10m high columns with 135W low pressure sodium lanterns at 35 to 40M spacing, located at the roundabouts

at either end of scheme and at Halvergate Junction. An outline design has been prepared (see Figure 2.1), which meets current trunk road design standards but attempts to minimise daytime and night-time visual impact. The location of proposed street lighting for Options 1 and 1A would be the same as the existing road, i.e. at Halvergate Junction and the approaches to the Acle and Vauxhall roundabouts. The arrangement of lighting columns would remain the same as existing at the approaches to the Acle and Vauxhall roundabouts. At Halvergate Junction there would be a rearrangement of lighting columns to suit the new road layout however the new columns would be the same height and at similar spacing as the existing situation. The lanterns would be 150W high pressure sodium, flat glass full cut-off lanterns at all three locations and this would substantially reduce the amount of light trespass beyond the road corridor and significantly reduce sky glare.

2.3.14 The height of lighting columns could be reduced from 10M to 8M but this would result in closer spacing of lighting columns resulting an approximate a 20% increase in the number of units. In view of the sensitivity of the area through which this scheme passes, departures from standard such as dimming lighting late at night, low level lighting units etc, may be feasible, but this would be subject to further study and design.

Signage

2.3.15 A preliminary review of the existing signage indicates that directional informatory signs (advance direction signs and direction signs) are only provided at the three major junctions on this scheme, the Acle roundabout, Halvergate junction and the Vauxhall Roundabout at Gt. Yarmouth. The signs at the approach to Vauxhall Roundabout are located beyond the road scheme and would not be affected by the proposals. The advance direction signs are generally the largest signs and there are four within the area of the scheme, one at the approach to Acle roundabout and the other three located at each of the approaches to Halvergate Junction. These signs vary in size between approximately 3M and 4M high. Advance warning signs are also provided for these junctions along with "sharp bend" warning signs on the approaches to the Halvergate and the Gt. Yarmouth junctions. None of the numerous access tracks that join the A47 along this stretch have any directional informatory signs or junction warning signs.

2.3.16 There are a number of lay-bys (6 eastbound and 2 westbound) along this stretch of road that are equipped with emergency telephones. Each of these has a sign at the entrance to the lay-by and an advance warning sign either a quarter or a half-mile in advance of the lay-by. A number of "slippery road ahead" signs have also been provided together with a number of warning signs for cattle and agricultural vehicles in the road ahead.

2.3.17 A preliminary sign design has been prepared for the scheme based on a speed limit of 50 mph (see Figure 2.1). This indicates the same four

number of advance direction signs as the existing situation and these would be in similar locations to the existing road. To comply with current guidance these signs would be approximately 35% larger and the height of the signs would vary with one approximately 1.4M high and the others varying from 4M to 5.5M high.

2.3.18 In the proposed scheme a number (4 westbound and 4 eastbound) of the access tracks are linked together before joining the main carriageway. Junction warning signs on the main carriageway would be provided for these but this would be offset by a reduction in the number of warning signs required at present for individual access tracks and the reduction in the number of lay-bys and associated signs from eight at present to four. However the lay-by signs would be larger than at present and overall there would be a small increase in the number of larger signs but a net reduction in the total number of signs.

2.3.19 The above sign design meets current trunk road design standards but attempts to minimise visual impact. In view of the sensitivity of the area through which this scheme passes, departures from standard such as reductions in mounting height and sign size, may be feasible, but this would be subject to further study and design.

Pavement

2.3.20 The existing road surface is conventional 'hot rolled asphalt' which is generally in a sound condition. However the skid resistance is poor in places and a new asphalt surface will be required along the whole route within the next few years prior to the year scheduled for completion of the proposals in 2012. It is Highways Agency policy that all new schemes shall be surfaced with a modern 'low noise surface' rather than a conventional road surface. Likewise it is policy to resurface existing trunk roads with 'low noise surface' as part of routine maintenance. Both the proposals and the existing road would therefore have a similar low noise surface by 2012.

Drainage

2.3.21 The existing road is cambered and there are currently no pollution control measures incorporated into the highway drainage system with runoff from the carriageway draining over the edge of the embankment into two ditches located on each side of the road at the foot of the embankment. The roadside ditches link into the surrounding system of dykes which have been developed over the centuries to drain this former area of marshland. At present there are no measures in place to deal with any accidental spills of hazardous liquids on the carriageway with consequential risk of contamination of the surrounding, ecologically sensitive dyke system.

2.3.22 The existing road incorporates two low bridge structures one crossing Tunstall Dyke and the other situated just east of Acle Roundabout. IDB

drainage infrastructure maps indicate that seven main drains cross the Acle Straight, these are culverted and shown on Figure 7.1. The route of the road crossed many other dykes when it was built in the 19th century and a lot were blocked off at that time. Other dykes were culverted however these are in a varying state of repair and some of the culverts have collapsed so that not all remain fully operational.

2.3.23 The highway drainage for Options 1 and 1A would remain as over the edge runoff from a cambered road into the roadside ditches. The carriageway would be built with a crossfall instead of a camber at bends formed at the approach to Halvergate junction and at the Great Yarmouth end of the scheme. Therefore at these locations all of the runoff would drain to just one ditch rather than to two ditches on both sides of the road. Any increased runoff resulting from the scheme would be dealt with by additional pumping capacity to maintain water within the dykes at existing levels.

2.3.24 Some of the existing roadside ditches would require diverting, particularly at Halvergate Junction and where the embankment has to be locally widened to accommodate lay-bys and the farm access crossings Where water connectivity remains between the dykes on each side of the existing road embankment the collapsed culverts would be reinstated. Elsewhere otter underpasses would be provided at a minimum spacing of 500M to re-establish linkages for animals which were severed when the road was built in the 19th century (see Figure 2.1). The existing and reinstated culverts and the otter underpasses would be extended to accommodate localised lengths of widened embankment. Where required all culverts would be provided with otter ledges which would be designed in line with current guidelines as far as is possible given the constraint of the low embankment height.

2.3.25 The biodiversity value of the Broadland dyke system is dependant on the quality of the water within them. In order to mitigate against potential adverse effects on water quality resulting from leachates entering the dykes, all embankment fill material and granular material used for construction of the farm access tracks shall consist of inert material. This material could be quartz or clay for the embankments or sands and gravels for the tracks. In addition all such material together with sub base material to be used for the construction of the road, would comply with leachate quality thresholds to be agreed with the Environment Agency.

2.3.26 Long term maintenance of the roadside ditches would be the responsibility of the Highways Agency for both options and would involve periodic clearance of ditch vegetation and silt as well as regular removal of rubbish. As a minimum the standard of maintenance would be the same as that currently implemented with the existing road but additional measures may also be implemented if it is considered that they would improve the biodiversity value of the ditches.

2.4 Construction of the Scheme

2.4.1 The actual construction width would be the same as the design width for both Options 1 and 1A so that the disturbed area would be restricted to the footprint of any new embankment, ditch or access track. Preliminary investigations have indicated that there would generally be insufficient width when considering minimum running lane widths, safe working space and necessary construction widths. The proposed traffic management for Option 1 would involve one-way contra flow arrangements, with the possibility of work progressing simultaneously on a number of fronts. However Option 1 is likely to incur significant traffic delays associated with widening online with one-way contra flow traffic management or limited diversion route provision.

2.4.2 Option 1A is similar to option 1, but the farm access tracks would be adapted with the surface temporarily sealed and temporary access and egress points added at the ends of each length of track. to enable local diversion routes to be implemented. This would enable eastbound traffic to be diverted onto the tracks, allowing one lane of traffic to be maintained in each direction for much of the route.. This option reduces the impact of construction on passing traffic as the diversion tracks allow for construction of the majority of the scheme to be carried out without the need to close one lane – traffic would be diverted onto the track prior to widening the existing carriageway. However, there are lengths where diversion tracks are not proposed and construction of these stretches of widening would be carried out with one lane closed.

2.4.3 Construction of any new (locally widened) embankment would be subject to consolidation settlement loading and testing which it is estimated would take 6 – 9 months. This surcharge construction method would require removal and disposal of surplus material before carriageway construction. The estimated construction period (excluding advance habitat creation works), for Option 1 would be 18 months and 12 months for Option 1A.

2.4.4 There would be no night time working on Option 1A although night time working is envisaged for Option 1. Access to farmland and all public rights of way would be maintained throughout the construction period.

2.4.5 All replacement dykes required as part of the proposals would be created before the existing dykes are disturbed. These new dykes would be constructed up to 3 years in advance of the destruction of existing dyke habitat in order to facilitate habitat creation which is likely to involve the establishment of plant and animal species translocated from the dykes to be removed.

2.4.6 In order to minimise adverse environmental effects during the construction phase there would be a contractual requirement for any additional compounds and storage areas, to be located outside the area administered

by the Broads Authority. This restriction would also apply to any temporary access routes to such storage areas and compounds.

2.4.7 An environmental manager (EM) shall be appointed who shall be based on the site full time throughout the construction period. The EM shall be a qualified Member of the Landscape Institute, an ecologist who is a member of the Institute of Ecology and Environmental Management or an Environmental Manager who is a member of the Chartered Institute of Water and Environmental Management and have a minimum of 10 years site based, post qualification experience. The EM shall be supported by site based environmental clerks of works and other environmental specialists who shall visit the site on an as needed basis. The EM shall be responsible for producing an Environmental Management Plan (EMP) in advance of commencement of works, which shall identify standard environmental management procedures (induction of site personnel, meeting all relevant environmental legislation, etc.). It shall also indicate measures to be taken throughout the construction period in relation to all pertinent environmental issues identified in the Environmental Statement. Full records of the progress of environmental works shall be maintained which shall be held on site in a form suitable for review by the EM, such records and review shall form part of the EMP.

2.5 Traffic Issues

2.5.1 The Acle Straight suffers congestion from Monday to Friday throughout the year during both morning and evening peak traffic periods. Over the summer months, traffic flows in off-peak hours during the working week and on Saturdays and Sundays are swelled by trips made by holiday makers.

2.5.2 Traffic flows on the Acle Straight in 2000 were in the order of 8,800 vehicles per day eastbound, and 7,800 vehicles per day westbound. During the morning peak hour, the traffic flows were approximately 900 vehicles per hour eastbound, and 630 vehicles per hour westbound. By the year 2020, if the existing route is maintained at current standard, it is forecast that traffic flows on the Acle Straight would be between 11,300 and 13,500 vehicles/day eastbound, and between 10,900 and 12,700 vehicles/day westbound. Where the traffic falls in this range depends on whether low or high traffic growth is experienced in the area. During the morning peak, it would be expected that traffic flows travelling east would be between 1,000 and 1,200 vehicles/hr, and traffic flows travelling west would be between 900 and 1,000 vehicles/hr. By 2020, congestion at the Vauxhall Roundabout and slow speeds on the route would be expected to provide a real disincentive to use the Acle Straight, and some motorists would divert to routes to the north and the south.

2.5.3 If Option 1 or 1A is implemented, by 2020 traffic flows using the Acle Straight would be expected to be between 13,600 and 17,200 veh/day eastbound, and between 12,400 and 14,300 veh/day westbound. Again, this range indicates the spread of traffic flows that could be expected

depending on whether low or high traffic growth is experienced in the area overall. During the morning peak, traffic flows travelling east are forecast to be between 1,200 and 1,600 veh/hr. Traffic flows travelling west are forecast to be between 1,100 and 1,200 veh/hr. Again, although the capacity of the Acle Straight would be improved, congestion and slow traffic would provide a disincentive to use the Acle Straight, and some motorists would divert to routes to the north and south.

2.6 Land Requirements

2.6.1 The existing road was constructed in the 19th century and it cuts across a pattern of drainage dykes which have been developed over the centuries and most of the roadside ditches were probably constructed at the same time as the road. However the current ownership of land occupied by the roadside ditches is complex with the Highways Agency (HA) owning some but not all of them. It is assumed that if Option 1, 1A or 1B were constructed the HA would acquire all of the land occupied by both existing and new roadside ditches. However the measurements below do not include existing roadside ditches requiring acquisition. Most of Options 1, 1A and 1B would be constructed within the existing highway boundary, however localised widening for Halvergate Junction, the farm access track junctions and lay-bys together with associated ditch diversions, would require approximately 12.9 Ha of predominantly agricultural land. Of this total approximately 6.5 Ha would be required for the proposed access tracks which would run parallel to the road but would lie outside the highway boundary and following construction they would be handed back to the local landowners.

HIGHWAYS AGENCY

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Environmental Assessment Report

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A47 Acle Single Carriageway

10 Cultural Heritage

10.1 Introduction

10.1.1 This chapter assesses the potential effects on cultural heritage within the study area resulting from the implementation of three single carriageway options referred to as Options 1, 1A and 1B. Cultural heritage includes both archaeology and built heritage. Archaeology is defined as the remains of cultural heritage within or excavated from the soil strata and for the purpose of this assessment includes sites of historical association where only documentary evidence of a relict feature survives. Built heritage can be defined as extant structures of historic or architectural importance.

10.1.2 The assessment identifies and describes the archaeology and built heritage within the study area in terms of its survival and potential significance. Areas of unknown archaeological potential are also identified. Reference is also made to the history of the study area's landscape. The assessment then identifies the potential effects of the scheme on both the integrity and the setting of archaeological and built heritage sites in the study area. Potential effects on the landscape are addressed in Chapter 8.

10.2 Methodology

10.2.1 The methodology followed in this assessment has been carried out in accordance with the requirements of the DMRB[1] as supplemented by the significance criteria used in Guidance on the Methodology for Multi-Modal Studies[2] and the standards published by the Institute of Field Archaeologists[3].

10.2.2 The archaeological study area comprises a 500m corridor on either side of the road and is indicated on Figure 10.1. The study area for built heritage comprises the scheme's visual envelope which is extensive due to the flat open nature of the landscape (figure 8.1).

10.2.3 The information sources used for this assessment include:

- Norfolk Sites and Monuments Records (SMR);
- The National Monuments Record (NMR);
- A Report of an evaluation at A47 Acle Straight by Norfolk Archaeological Unit, 1993;

[1] Design Manual for Roads and Bridges, Volume 11, Section 3, Part 2 Highways Agency, August 1994.
[2] Guidance on the Methodology for Multi-Modal Studies. DETR, 2000.
[3] The Standard and Guidance for the Preparation of Archaeological Desk-Based Assessments, Institute of Field Archaeologists, 1994.

- A47 Multi-Modal Transport Study: Report on an Archaeological Desk Top Survey,Norfolk Archaeological Unit, 2000;
- Information on Heritage from Broadland District Council;
- Information on Heritage from the Broads Authority;
- The Norfolk Broads. A Landscape History, Tom Williamson, 1997.
- Unpublished historic landscape assessment work prepared for the Broads Authority.

A full list of documents consulted is given in Appendix 10.1.

10.2.4 English Heritage and the County Archaeologist in Norfolk were consulted to confirm the presence of archaeological sites/finds of interest within the study area, the impact of the proposed scheme on any archaeological remains and any mitigation measures that could be required.

10.2.5 The archaeology and built heritage within the study area has been appraised on the following features:

- form – a factual description of the site;
- survival – the completeness of the site;
- condition – the current management and stability of the site;
- complexity – the diversity of the heritage resource within the site;
- context – the quality of the site's setting and its sense of place within its surroundings;
- rarity – the representational value of the heritage resource at the site.

10.2.6 An assessment of cultural heritage importance of each heritage site was made according to a scale of 'national', 'regional' or 'local' importance, as follows:

- Buildings or structures designated as Grade I listed or Scheduled Ancient Monuments can be categorised as being of 'national' importance. Grade I listed buildings are of exceptional interest and nationally comprise approximately 1.4% of listed buildings. Sites on the World Heritage List are of international and therefore national importance. Some Conservation Areas may also be of national importance if associated with past events of national significance or if they are historic landscapes of national importance.
- Buildings or structures designated as Grade II* can be categorised as being of 'regional' importance. Grade II* denotes buildings of more than special interest and nationally comprise of approximately 4% of the listed structures. Some Grade II listed buildings can also be considered to be of regional importance if contributing to and located within a Conservation Area of national or regional importance.

- All other Grade II listed buildings and structures and those designated by local authorities as being of Special Local Interest can be categorised as being of local significance.

10.2.7 Potential impacts on sites of cultural heritage importance and on the wider historic landscape arising from construction projects include:

- direct loss or damage;
- indirect damage through drainage, vibration or subsidence;
- severance of linked features;
- visual or other positive or negative impacts on the setting of the site.

Significance Criteria

10.2.8 The effects on archaeology and the built heritage resulting from scheme implementation have been assessed using the significance criteria described in Table 10.1.

Table 10.1: Significance Criteria used in Archaeology and Built Heritage Assessment	
Score	**Comments**
Large beneficial (positive) effect	The proposals would: -provide potential, through removal, relocation or substantial mitigation of very damaging or discordant existing impacts (direct or indirect) on the heritage, for very significant or extensive restoration or enhancement of characteristic features or their setting; - remove or successfully mitigate existing visual intrusion, such that the integrity, understanding and sense of place of a highly valued area, a group of sites or features of national or regional significance is re-established.
Moderate beneficial (positive) effect	The proposals would: -provide potential, through removal, relocation or mitigation of damaging or discordant existing impacts on the heritage, for significant restoration of characteristic features or their setting; - enhance existing historic landscape/townscape character through beneficial landscaping/mitigation and good design.
Slight beneficial (positive) effect	The proposals would: -restore or enhance the form, scale, pattern or sense of place of the heritage resource through good design and mitigation; - remove or mitigate visual intrusion (or other indirect impacts) into the context of locally or regionally significant heritage features, such that appreciation and understanding of them is improved.
Neutral effect	The proposals would: -maintain existing historic character in a landscape/townscape; - have no appreciable impacts, either positive or negative, on any known or potential heritage assets; - are a combination of slight positive and negative impacts, on locally significant aspects of the heritage; - do not result in severance or loss of integrity, context or understanding within a historic landscape.
Slight adverse (negative) effect	The proposals would: - have a detrimental impact on the context of regionally or locally significant assets, such that their integrity is compromised and appreciation and understanding of them is diminished; - damage locally significant heritage features for which adequate mitigation can be specified; - not fit well with the form, scale, pattern and character of a historic landscape/townscape/area.
Moderate adverse (negative) effect	The proposals would: - be out of scale with, or at odds with the scale, pattern or form of the heritage resource; - be intrusive in the setting (context), and would adversely affect the appreciation and understanding of the characteristic heritage resource; - be damaging to nationally significant heritage assets, resulting in loss of features such that their integrity is substantially compromised, but adequate mitigation can be specified.
Large adverse (negative) effect	The proposals would: - have a major direct impact on nationally significant heritage assets such that they are lost or their integrity is severely damaged; - have a moderate direct impact on or compromise the wide setting of multiple nationally or regionally significant heritage assets, such that the cumulative impact would seriously compromise the integrity of a related group or historic landscape/townscape; - have a major direct impact on regional heritage assets, such that their integrity is lost and no adequate mitigation can be specified; - be highly intrusive and would seriously damage the setting of the heritage resource, such that its context is seriously compromised and can no longer be appreciated or understood; - be strongly at variance with the form, scale and pattern of a historic landscape/townscape.
Note: Significance criteria based on Guidance On the Methodology for Multi-Modal Studies, DETR, 2000.	

Consultations

10.2.9 Consultations have been carried out with interested parties to confirm statutory designations within the study area and to establish the existence of features with heritage and archaeological importance. The following organisations have been consulted:

- English Heritage
- Norfolk County Council
- Broads Authority
- Broadland District Council
- Great Yarmouth Borough Council

10.2.10 English Heritage and the County Archaeologist requested that an archaeological walk over survey be competed in the study area to identify any possible archaeological sites not recorded in the Norfolk Historic Environment Record together with trial trenching in one small site of archaeological potential. Results of this investigation are discussed in paragraph 10.4.3.

10.3 Legislation

10.3.1 The World Heritage List was established under terms of The Convention Concerning the Protection of the World Cultural and Natural Heritage adopted in November 1972 at the 17th General Conference of UNESCO. Within the study area there is a Conservation Area and a number of listed buildings. Such features are designated under Section 1 of the Planning (Listed Building and Conservation Areas) Act, 1990. National policy advice on Conservation Areas and Listed Buildings is given in PPG15: Planning and the Historic Environment. The principal legislation concerning archaeology is the 1979 Ancient Monuments and Archaeological Areas Act, which provides statutory protection of monuments of national importance (Scheduled Ancient Monuments). In addition PPG16: Archaeology and Planning gives advice on handling of archaeological matters in the planning process.

10.3.2 Other Sites of archaeological significance are entered onto county-based Sites and Monuments Records (SMR's) ~~under the 1990 Town and Country Planning Act~~. The National Monuments Record (NMR) is an index of the more detailed information held in the various County Sites and Monuments records.

10.3.3 Conservation Areas are identified by the Local Planning Authority as areas of special architectural or historic interest, where it is important to preserve or enhance their character or appearance. Designating a Conservation Area provides a focus for Council and private efforts to improve the environment with the following main objectives:

- control demolition of any building, whether it is listed or not;
- protect trees;
- strengthen control over new development, so that it must positively preserve or enhance the character or appearance of the area.

10.3.4 The Secretary of State for Culture, Media and Sport selects buildings for inclusion as Listed Buildings according to their special architectural or historic interest. In compiling the list he is advised by the Historic Buildings and Monuments Commission (English Heritage).

10.3.5 The expression 'Listed Building' can be applied to objects or structures not conventionally described as buildings – for example bollards, railings, war memorials, mileposts etc. Buildings can be listed for their individual importance or as part of a group and it is usually the whole of the building, together with all other structures within its boundary or 'curtilage' which is listed, not just its most important features. Once the building has been listed, the owner has to obtain Listed Building Consent from the ~~Council~~ before carrying out any demolition, alteration or extension.

10.3.6 Policies relating to archaeology and built heritage which are significant to implementation of this scheme are discussed in Chapter 3, Planning.

10.4 Baseline Situation

Built Heritage in the Study Area

10.4.1 No area of the Broads appears on the World Heritage List however it is an objective of the Broads Authority to submit a bid for this status to be applied to the whole of the area covered by the Broads Authority. Much of the study area lies within the Halvergate Marshes Conservation Area designated in 1995 by the Broads Authority because of the areas special historical and architectural interest. The area is historically interesting because it represents the largest area of grazing marsh left in Eastern England. It has been developed by humans over many centuries to form a flat landscape dissected by embanked rivers and a complex arrangement of dykes. The architectural interest is provided by the largest concentration of drainage mills (or wind-pumps) in the Broads Area. These features form major landmarks in the open landscape and an important part of the industrial archaeology of the Broads.

10.4.1 Numerous World War II features have been identified at the Acle Town end of the study area. Individually these might comprise locally important heritage features, collectively however within the region they constitute a system of national importance. In addition, two World War I pillboxes are located on either side of the existing A47 carriageway toward the Great Yarmouth end of the scheme. These are currently being reviewed for

scheduling as Scheduled Ancient Monuments (SAMs) by English Heritage. Only twelve such structures remain in Norfolk (NAU, 1993).

10.4.2 Built Heritage features are listed in table 10.3. Those features within the Halvergate Marshes Conservation Area are denoted by an asterisk. All of the sites have been allocated a number and their locations marked on Figure 10.1.

Archaeology finds in the Study Area

10.4.3 An archaeological walkover survey revealed some previously unrecorded earthworks in close proximity to the A47 Acle Straight. A linear feature was identified adjacent to a relict channel and interpreted as being a levee. The levee would have been exposed as the area became dry during the Saxon period. Three sub-rectangular earthworks were superimposed on the levee and were interpreted as being remains of structures (site A45 on table 10.4.2). Lack of artifactual evidence means that they can not be dated with certainty at this time.

10.4.4 A suspected saltern, adjacent to the A47 was to be evaluated by trial trenching. However, this feature was absent when site was visited. Anecdotal evidence obtained from local landowners suggested that the feature was not of archaeological interest and had been removed some years earlier. The site (A10) is listed in table 10.2 for completeness.

Prehistoric Period (pre –AD 43)

10.4.5 A number of flint axe heads and arrowheads were found in the study area such as find spot sites A1 and A27. All three of these finds were in the vicinity of Acle town. A gold coin of the same period was also found south of Acle but the exact location is unknown.

Roman Period (AD 43-410)

10.4.6 The find for this period consisted of items such as coins, rings, pottery, pendants and tiles. Most of the items were found in and around Acle town but there were also finds on the outskirts of Great Yarmouth e.g. site A23.

Saxon (AD 410-1066)

10.4.7 Earthworks identified during the archaeological walkover survey (A45) can not be firmly dated or characterised without further archaeological excavation. However, it is possible that these features are of Saxon origin.

Medieval Period (AD1066-1540)

10.4.8 A number of salt mounds from this period have been found in the study area, e.g. A16 and A17.

10.4.9 Pottery, sherds and tiles dating to the medieval period were found during construction along the Bacton to Great Yarmouth pipeline at sites A19, A20, A21 and A24.

Post Medieval Period (from AD1540)

10.4.10 A former drainage windmill (A8) and a lime kiln (A9), both of which have been demolished, a workhouse (site A2), a brickworks (A4) and former Hermitage Inn (A7) date from this period.

Modern
Industrial (mid AD1800 onwards)

10.4.11 The dismantled Midland and Great Northern Railway Line was constructed in 1879 and in addition a number of World War I and II relicts including, tank traps (A22) and pill boxes (B17) have been identified from this period.

10.4.12 Archaeological features are listed below in table 10.2 and built heritage features in Table 10.3.

Table 10.2: Archaeological Sites in the Study Area

Site	Form	Survival	Condition	Complexity	Context	Period	Scale it Matters	Significance	Rarity
A1. Find spot	Flint axe-head, 7" long	Axe-head chipped and partly polished	Not known	N/A	Found in field near marshes at Rose Farm	Neolithic 4000BC to 2351 BC	Local	Recorded on SMR no. 10368	Common
A2. A workhouse	A house of industry	Destroyed by fire in 1834	Not known	N/A	Located in Acle town	1788	Local	Recorded on SMR, no. 12198	Common
A3. Midland and Great Northern Joint Railway	Railway line	Demolished	Railway line does not remain	Part used for A149 road and long-distance footpath the Weavers Way	On outskirts of Great Yarmouth	1879	Local	Recorded on SMR, no. 13581	Common

Site	Form	Survival	Condition	Complexity	Context	Period	Scale it Matters	Significance	Rarity
A4. Brickworks	A brick kiln and yard	Demolished	Built over	Below ground	Acle town and old peoples bungalow on the site	1540 AD to 1900 AD.Marked on 1830 map	Local	Recorded on SMR no. 14224	Common
A5. Find spot	Reused masonry with former doorway.	Stray find	Not known	Items could have come from Weybridge Priory or Manor.	East of Calthorpe Cottages	1066 AD to 1900 AD	Local	Recorded on SMR, no. 14707	Common
A7. Hermitage	Hermitage Inn	Demolished	A brick cottage occupies the site	N/A	Located at edge of town	Early 18th Century	Local	Recorded on SMR no. 15130	Common

Site	Form	Survival	Condition	Complexity	Context	Period	Scale it Matters	Significance	Rarity
A8. Wind pump	Site of a drainage wind mill	Demolished	Not known	N/A	Located on south bank of River Bure	1540 AD to 1900 AD	Local	Recorded on SMR no. 15639	Common
A9. Lime kiln	Lime kiln	Demolished	Not known	N/A	Located at North Quay, Gt Yarmouth	1540 AD to 1900 AD	Local	Recorded on SMR, no. 15667	Common
A10.Mound	Low mound, (1m high, 25m across), crowned by corrugated iron cowshed	Not present on site.	Removed.	Possible saltern site	In field south of Stracey Arms P.H	N/A	Local	Recorded on SMR no. 21295	Common
A11. Find spot	Lead/ pewter seal	Stray find	Not known	N/A	Located alongside Acle Dyke,	13th Century	Local	Recorded on SMR no. 21717	Common

Hyder Consulting

Location

Site	Form	Survival	Condition	Complexity	Context	Period	Scale it Matters	Significance	Rarity
A12. Find spot	Bronze finger ring, gilt bronze mount, book clasp fragment	Stray find	Not known	N/A	Found in Acle Marshes	Roman, Medieval and Post Medieval	Local	Recorded on SMR no. 22355	Common
A13. Find spot	Bronze harness, pendant and silver halfpenny	Stray find	Not known	N/A	Found in Acle town	Roman, Medieval and Post Medieval	Local	Recorded on SMR no. 23167	Common
A14. Find spot	Coins, rings, pottery, harness pendant	Stray find	Not known	N/A	Found in Acle town	Roman, Medieval and Post Medieval	Local	Recorded on SMR no. 24118	Common
A15. Find spot	Coins, sherds, metalwork	Stray find	Not known	N/A	Found in Acle town	Roman, Medieval, Post Medieval	Local	Recorded on SMR no. 25023	Common

Site	Form	Survival	Condition	Complexity	Context	Period	Scale it Matters	Significance	Rarity
A16. A salt working mound	Salt mound, approx. 60 metres long, up to 1.75m high, SE end cut by present dyke.	Partly cut by dykes	Not known	Resembles a mill mound but no record of a drainage mill here	On Acle Marshes	1066 AD to 1539 AD	Local	Recorded on SMR no. 25151	Rare
A17. Salt works	Salt pans	Covered by 2 inches of topsoil	Not known	N/A	Areas of creeks outskirts of Great Yarmouth	1066 AD to 1539 AD	Local	Recorded on SMR no. 28930	Common
A18. Icehouse	A former icehouse	Demolished	Not known	Burnt 1853 and rebuilt, converted to coal store by 1884.	Beside railway on outskirts of Great Yarmouth	Before 1851	Local	Recorded on SMR no. 28939	Common
A19. & A19.1 Find spot	Pottery	Stray find	Not known	N/A	Found along Bacton to Gt Yarmouth pipeline	12th-13th Century	Local	Recorded on SMR no. 34042	Common

Site	Form	Survival	Condition	Complexity	Context	Period	Scale it Matters	Significance	Rarity
A20. & A20.1 Find spot	Pottery	Stray find	Not known	N/A	Found along Bacton to Gt Yarmouth pipeline.	12th-13th Century	Local	Recorded on SMR no. 34043	Common
A21. & A21.1 Find spot	Tiles and sherds	Stray find	Not known	N/A	Found along Bacton to Gt Yarmouth pipeline.	Medieval and Post Medieval	Local	Recorded on SMR no. 34044	Common
A22. Tank Trap	Three World War 2 Tank traps, concrete cubes	Below ground	Not known	Covered over	In road in centre of Acle.	1939 to 1945 World War Two	Local	Recorded on SMR no. 37597	Common

Site	Form	Survival	Condition	Complexity	Context	Period	Scale it Matters	Significance	Rarity
A23. Cemetery Cremation	Bronze coins and fragments of cinerary urns	Stray find	Not known	Could have been a cremation cemetery	Outskirts of Gt Yarmouth	43 AD to 650 AD	Local	Recorded on SMR no. 4291	Common
A24. Ashtree Farm	A mound 60m x 40m and 1-2m high which contained pottery	Not known, suspected fair/poor	Not known, suspected fair/poor	Probably related to salt workings. A WWII pillbox is situated on top.	Near junction of the two rail lines	11th to 13th Century	Local	Recorded on SMR no. 4322	Common
A25. Wind pump and Mound	A mound about 5ft high, animal bones, oyster shells, flints and pottery.	Was bulldozed in 1964	Poor condition	Possibly a pumping mill site or salt working site.	Located on outskirts of Gt Yarmouth	14th to 18th Century	Local	Recorded on SMR no. 4323	Common
A26. Find spot	Black flint axe, polished, butt broken	Covered by housing estate	Not known	N/A	Located in Acle town	4000 BC to 2351 BC	Local	Recorded on SMR no. 8593	Common

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Site	Form	Survival	Condition	Complexity	Context	Period	Scale it Matters	Significance	Rarity
A27. Find spot	Barbed and tangled flint ~~arrow~~head	Covered by houses	Not known	N/A	Located in Acle town	2350 BC to 701 BC	Local	Recorded on SMR no. 8595	Common
A28. Find spot	Short cross penny	Stray find	Not known	N/A	Located in Acle town	1150 to 1189	Local	Recorded on SMR no. 8598	Common
A29. Manor House	Site of Manor House	Stray finds	Below ground	N/A	East of church, in Acle town. Part is built over.	Marked on 1836 OS maps	Local	Recorded on SMR no. 8608	Common
A30. Find spot. (not shown on plan)	Gold Icenian Coin	Stray find	Not known	N/A	South of Acle, exact location unknown	800 BC to 42 AD	Local	Recorded on SMR no. 8596	Common

Site	Form	Survival	Condition	Complexity	Context	Period	Scale it Matters	Significance	Rarity
A31. Find spot. (not shown on plan)	Silver coin of Antoninus Pius	Stray find	Not known	N/A	South of Acle, exact location unknown	43 AD to 409 AD	Local	Recorded on SMR no. 8597	Common
A32. Find spot. (not shown on plan)	Ladle or pipkin handle	Stray find	Not known	Imported from Rhineland	South of Acle, exact location unknown	1066 AD to 1539 AD	Local	Recorded on SMR no. 8599	Common
A33. Findspot. (not shown on plan)	Coin	Stray find	Not known	N/A	Exact site unknown, somewhere in Acle	43 AD to 409 AD	Local	Recorded on SMR no. 17262	Common

Site	Form	Survival	Condition	Complexity	Context	Period	Scale it Matters	Significance	Rarity
A36. Acle Marsh House	Marsh Farm	Not known	N/A	N/A	Located on Tunstall Marshes beside 'Northern Rond'	18th Century	Local	No SMR no.	Common
A40. Pillbox	Site of a Pillbox	Not known	N/A	N/A	Located on northside banks of Acle Dyke	1939 to 1945 World War Two	Local	Recorded on SMR, no. 16802	Common
A41. Pillbox	Site of a type 22 Pillbox	Demolished in 1991	N/A	N/A	Locatedin Acle town	1939 to 1945 World War Two	Local	Recorded on SMR, no. 32637	Common

Site	Form	Survival	Condition	Complexity	Context	Period	Scale it Matters	Significance	Rarity
A42. Spigot, Mortar, Emplacement	Site of a spigot, mortar, emplacement structure.	Demolished	N/A	N/A	Located in Acle town	1939 to 1945 World War Two	Local	Recorded on SMR, no. 36769	Common
A43. Site of Palmers Mill	Site of hollow post drainage mill	Not known	N/A	Mill removed to Upton for restoration in 1976	South of New Road in the marshes	18th Century	Local	Recorded on SMR, no. 15119	Common
A44. Site of 7 Mile House	Site of Marsh farm	Not known	Not Known	N/A	Located beside the A47	Cited on Faden 1797 survey	Local	No SMR no.	Common
A45. Earthworks	Three sub-rectangular structures	Poor	Not known	Not Known	Probably located on levee of relict channel	Possible Saxon	Local	Not known	Not known

Table 10.3: Built Heritage in Study Area

Site	Form	Survival	Condition	Complexity	Context	Period	Scale it Matters	Significance	Rarity
Halvergate Marshes Conservation Area	Historic landscape. Flat, open, man made, pastoral landscape drained by pumps via a complex system of ditches or dykes.	Good	ESA designated to encourage traditional grazing on permanent pasture.	Complex landscape reclaimed from salt marshes over the centuries	Open rural landscape .situated at sea level.	Mediaeval and post mediaeval .	National	Forms significant part of nationally important landscape administered by the Broads Authority.	Rare
B1. St. Edmunds Church	Parish Church, round tower. Norman origins.	Good, restoration in the 1860's.	Well maintained	Has undergone a number of additions over the centuries	Located in Acle town	12th, 13th, 14th and 19th Century	National	Recorded on SMR, no. 8600 Grade I Listed Building	Rare

Site	Form	Survival	Condition	Complexity	Context	Period	Scale it Matters	Significance	Rarity
B2. Tunstall Dyke Drainage Mill *	A drainage mill, formerly wind pump. Tapering tarred tower, 4 storeys, windows with segmental brick arches to ground 1st and 2nd floor.	Poor	The site is derelict	N/A	Located on flat open land on Tunstall Marshes. Traditional Broadland landmark feature	19th Century	Regional	Recorded on SMR, no. 10384 Grade II Listed Building	Locally common but part of rare historic landscape
B3. Tunstall Dyke Smock Mill *	A wind pump of smock type, with octagonal weather-boarded trestle, truncated to 2 storeys. Door opening and remains of sluice gates.	Largely demolished, cut down to a stump 4 metres high	The site is derelict	It drove a turbine and drained 100 hectares, was replaced by a steam engine	Located on flat open land on Tunstall Marshes. Traditional Broadland landmark feature	Late 18th Century	Regional	Recorded on SMR, no. 10385 Grade II Listed Building	Rare, only surviving drainage smock mill in Norfolk

Site	Form	Survival	Condition	Complexity	Context	Period	Scale it Matters	Significance	Rarity
B4. Stracey Arms Drainage Mill (also known as Arnups Mill) *	Windpump with red brick, tapering , circular tower of 3 storeys. Machinery, sails and scoopwheel intact. ,	Good, has been fully restored in 1961 by Norfolk Windmills Trust	Well maintained	Site of a pillbox, wind pump and pumping station. It was converted to a pill box during World War II.	Located on south banks of the River Bure.Traditional Broadland landmark feature	Dated 1883	Regional	Recorded on SMR, no. 10387 Grade II* Listed Building Recorded on NMR	Locally common but Grade II* indicates a rarer quality. Also part of rare historic landscape

Site	Form	Survival	Condition	Complexity	Context	Period	Scale it Matters	Significance	Rarity
B5. Keys Mill on Black Mill (also known as Kerrisons Level Drainage Mill) *	Windpump, tarred brick tower. Cap frame with sheers, tail beam, sprattle beam, headstock and weatherbeam.	Good, has been restored in 2000.	Well maintained	There was a previous mill on the site probably 1795 to 1816	Located on South Walsham Marshes south of railway. Traditional Broadland landmark feature	19th Century	Regional	Recorded on SMR, no. 10407 Grade II Listed Building	Locally common but part of rare historic landscape
B6. Bridewell	House, flint, limestone and brick, 3-storey south-east gable.	Good	N/A	Divided into 3 cottages at one stage. Cellar said to be former prison.	Located in the centre of Acle town.	Dated 1633 on west wall. Part may predate this.	Local/Regional	Recorded on SMR, no. 12197 Grade II Listed Building	Common

Site	Form	Survival	Condition	Complexity	Context	Period	Scale it Matters	Significance	Rarity
B7. Mitre House formerly Old White House	House, timber framed jettied street block, rear wing of brick with moulded beams.	N/A	N/A	House with cellar, timber frame dates to 16th century and brick rear wing to 17th century.	Located in the centre of Acle town.	1540 AD to 1900 AD	Local/Regional	Recorded on SMR, no. 12199 Grade II Listed Building	Common

Site	Form	Survival	Condition	Complexity	Context	Period	Scale it Matters	Significance	Rarity
B8. The Old Bakery/ Calthorpe Cottages/ Vine	Row of three cottages and modern shop. Two storey with attic.	N/A	N/A	N/A	Located in the centre of Acle town.	18th Century but could have 16th and 17th century joints.	Local/Regional	Recorded on SMR, no. 12899 Grade II Listed Building	Common

Site	Form	Survival	Condition	Complexity	Context	Period	Scale it Matters	Significance	Rarity
B9. Norfolk Railway (Norwich to Gt Yarmouth Railway Line *	Railway line	Good, still in use	Managed	Part of Norwich and Yarmouth Railway	Travels into Great Yarmouth, from the south	Opened 1844	Local	Recorded on SMR, no. 13571 Recorded on NMR No. Linear 1097	Common
B10. Norfolk Railway Acle Diversion Norwich to Gt Yarmouth Railway Line *	Railway line and Acle Station. The station has a house on the platform with embossed brick letters 'GER 1883'. Small signal cabin on platform.	Line is good, still in use. Station building is largely disused and part converted to boat building.	Managed	Acle and Breydon Junctions are along the line.	Travels alongside the existing A47 and south of Acle town	Opened 1883	Local	Recorded on SMR, no. 13572 Recorded on NMR No. Linear 1098	Common
B11. The Manor House	House, red brick 3 bays, 2 storeys, attic, Georgian	Poor	To be restored the pill-box is	East gable contains a World War II pill-box	Located in centre of Acle	Late 17th Century	Local/ Regional	Recorded on SMR, no. 14219	Common

Site	Form	Survival	Condition	Complexity	Context	Period	Scale it Matters	Significance	Rarity
	classical doorcase, chimney against south-east gable. Brick vaulted cellar.		disguised as a shed	pill-box				Grade II Listed Building	

Site	Form	Survival	Condition	Complexity	Context	Period	Scale it Matters	Significance	Rarity
B12. The Limes	Fine Georgian House and offices, 3 bays, 2 storeys, large, red brick with blue pantile roof, central classical doorway, venetian windows.	Good	Well maintained	South of the house has a red brick boundary wall with half-round copings and stone gate piers.	Located in centre of Acle	18th Century	Local/ Regional	Recorded on SMR, no. 14220. Grade II Listed Building	Common
B13. Memorial and Milestone	Victoria Jubilee memorial and milestone. Gothic canopies surmounted by stone block supporting lamp-post.	Moderate	N/A	N/A	Located in centre of Acle	1887	Local/ Regional	Recorded on SMR, no. 14221. Grade II Listed Building	Common
B14. Red Lion Cottage/ Clematis	House incorporating a wall of an older timber framed	No known	N/A	N/A	Located in centre of Acle	1716	Local	Recorded on SMR, no. 14223	Common

Site	Form	Survival	Condition	Complexity	Context	Period	Scale it Matters	Significance	Rarity
Cottage	building.								
B15. Pillbox	A type 22 Pillbox	No known	N/A	N/A	Located in centre of Acle	1939 to 1945 World War Two	Local	Recorded on SMR, no. 16801	Common (but part of rare system of defences)
B16. Pillbox *	A Pillbox, polygonal and concrete. Situated on a saltern 60m x 40m and 1-2m high which contained pottery..	No known	N/A	20th century structure located on top of a medieval saltern.	Roadside defence west of Gt Yarmouth. Situated near to northern side of the existing A47 road.	1914 to 1918 World War One	National	Recorded on SMR, no. 18493. English Heritage have indicated intention to designate as Scheduled Ancient Monument	Rare

Site	Form	Survival	Condition	Complexity	Context	Period	Scale it Matters	Significance	Rarity
B17. Pillbox *	A Pillbox, polygonal and concrete. Part of camouflage mound remains on top.	No known	N/A	N/A	Roadside defence west of Gt Yarmouth. Located on southern side immediately adjacent to existing A47 road.	1914 to 1918 World War One	National	Recorded on SMR, no. 18494. English Heritage have indicated intention to designate as Scheduled Ancient Monument	Rare

Site	Form	Survival	Condition	Complexity	Context	Period	Scale it Matters	Significance	Rarity
B18. Barn at Oakely or Oakleigh House	A former stable, red brick with thatched roof, single storey. Limestone plaque 1758.	Good	N/A	It was a former stable	Located south of Acle town and the railway	1758	Local/Regional	Recorded on SMR, no. 30615 Grade II Listed Building	Common

Site	Form	Survival	Condition	Complexity	Context	Period	Scale it Matters	Significance	Rarity
B19. Vauxhall Bridges	A wrought iron rail/tram bridge with rusticated stone abutments.	Good	Maintained	A bridge originally for rail and tram, footpath section added.	A bridge over the River Bure.	Listed 1850 but NIAS date it to 1848	Local/Regional	Recorded on SMR, no. 34557 Grade II Listed Building	Rare
B20. Pillbox *	A type 22 Pillbox	Not known	N/A	N/A	Located adjacent to railway on northside near to Acle town.	1939 to 1945 World War Two	Local	Recorded on SMR, no. 36661	Common (but part of rare system of defences)

Site	Form	Survival	Condition	Complexity	Context	Period	Scale it Matters	Significance	Rarity
B21. Spigot, Mortar, Emplacement	A spigot, mortar, emplacement structure.	Not known	N/A	N/A	Located in rear garden in Acle town	1939 to 1945 World War Two	Local	Recorded on SMR, no. 36771	Locally Common but part of rare system of defences
B22. Ashtree Farm Mill *	A windpump, 4.6 metres diameter, and 8.5 metres to the top, battered tower, circular plan, three storeys. Cap frame with sheers, tailbeam, sprattlebeam, headstock, cast iron weatherbeam.	Restoration work has been carried out on the building.	Managed. Work by the Windmill Trust has recently started to restore the windmill to working condition.	Largely rebuilt in 1912 on older foundations, it has been stated that this was the last mill to be built in Norfolk	Located on banks of River Bure. Traditional Broadland landmark feature	1912	Regional	Recorded on SMR, no. 4331 Grade II Listed Building	Locally common but part of rare historic landscape
B23. Great Yarmouth Town Wall	Wall foundations of an octagonal projecting bastion type	Good restored in 1960s	Managed	A wreck town, defences town, signal	Located in Great Yarmouth adjoining	Erected around 1344	National	Recorded on SMR, no. 4294	Rare

Site	Form	Survival	Condition	Complexity	Context	Period	Scale it Matters	Significance	Rarity
and defences (not on map)	tower. 30ft high tower, flint and red brick with a conical tile roof.			station and tower wall. East mount added 1588 and later an outer moat and other alterations.	the River Bure			Scheduled Ancient Monument Recorded on NMR	
B24. Halvergate Six Mile House Drainage Mill *	Windpump with tarred brick tower, remains of cap, tapering circular tower of 3 storeys, two stocks and four sails, cap frame and machinery.	Poor	Derelict	N/A	Beside the River Bure. Traditional Broadland landmark feature	mid 19th Century	Regional	Recorded on SMR, no. 10408 Grade II Listed Building	Locally Common but part of rare historic landscape

Site	Form	Survival	Condition	Complexity	Context	Period	Scale it Matters	Significance	Rarity
B25. Five Mile House *	A marsh farm	Not known	N/A	N/A	Located on the River Bure	19th Century	Local	Mentioned in Broads Authority historic landscape character assessment.	Common
B26. The Old White House	Dwelling. Two storeys, T-shaped plan. colourwashed brick, roof steeply pitched, two shallow bays on ground floor.	Good	Restored and renewed	N/A	Located in centre of Acle town	Late 16th Century/ early 17th Century	Local/Regional	Grade II Listed Building	Common
B27. Ivy House and attached out buildings	House, colourwashed brick, thatched roof, two storeys and attics, L-shaped plan, range of attached brick and pantile	Good	Managed	N/A	Located in centre of Acle town	18th Century	Local/Regional	Grade II Listed Building	Common

Site	Form	Survival	Condition	Complexity	Context	Period	Scale it Matters	Significance	Rarity
	outbuildings.								

Site	Form	Survival	Condition	Complexity	Context	Period	Scale it Matters	Significance	Rarity
B28. Childwall House and Bedlam	Dwelling. Colourwashed with reed-thatched roof, two storeys and attic, internal gable chimney stacks	Good, altered and remodelled	Managed	Sub-divided into two dwellings, Japonica cottage is attached to south gable	Located in centre of Acle town, on Reedham Road	17th Century	Local/Regional	Grade II Listed Building	Common
B29. Hillside	House, colourwashed brick with steep reed-thatched roof, central axial chimney stack.	Good	Managed	N/A	Located in centre of Acle town, Damgate Lane	Mid 17th Century	Local/Regional	Grade II Listed Building	Common

Site	Form	Survival	Condition	Complexity	Context	Period	Scale it Matters	Significance	Rarity
B30. Rudham Swim Drainage Mill *	Tower mill, medium sized, three storey, tarred red brick, seven metres high to top of brickwork,	Not known	N/A	A mill was established here between 1795 and 1816	Located beside the River Bure. Traditional Broadland landmark feature	Late 19th Century	Regional	Recorded on SMR, no. 10409 Grade II listed building	Locally Common but part of rare historic landscape
B31. Six Mile House *	House which stands on low mound which has been incorporated into the southern wall of the River Bure. Unglazed grey pottery found.	Good	Managed	Much of the house was rebuilt in the 19th Century. Salt making may have occurred on the site and also sheep ranching.	Located beside the six mile house drainage mill on the River Bure	19th Century	Local	Recorded on SMR, no. 21103	Common

Site	Form	Survival	Condition	Complexity	Context	Period	Scale it Matters	Significance	Rarity
B32. Ashtree Farm *	House	Not known	N/A	It is marked on Faden's 1797 county map as 'Three Mile House'	Located on the River Bure	Possible Medieval origin	Local	Mentioned in Broads Authority historic landscape character assessment.	Common
B33. Walpoles Farm *	Building	Not known	N/A	The building is marked as 'Marsh Cottage' on the on the modern OS map	Located on Halvergate Fleet	18th Century	Local	Recorded on SMR, no. 31878	Common
B34. Hewitts Farm *	House	Not known	N/A	N/A	Located on Halvergate Fleet	Medieval origin	Local	Mentioned in Broads Authority historic landscape character assessment.	Common
B35. Marsh	Mill cottage but now represented	Demolished in 1990	N/A	Associated with the	Located on Halvergate	Medieval origin	Local	Recorded on SMR, no.	Common

Site	Form	Survival	Condition	Complexity	Context	Period	Scale it Matters	Significance	Rarity
Farm *	as a pile of bricks and earth	d in 1990		drainage windmill to north west	Fleet	origin		35369	

Site	Form	Survival	Condition	Complexity	Context	Period	Scale it Matters	Significance	Rarity
B36. Five Mile House Drainage Mill Runham *	Tarred tower mill of 4 storeys, red brick, temporary aluminium cap, external scoop wheel	Not known	N/A	This was not the first mill on this site, a mill is shown on Faden's map	Located beside the River Bure.Traditional Broadland landmark feature	1849	Regional	Recorded on SMR, no. 10411 Grade II Listed Building	Locally Common but part of rare historic landscape
B37. Highs Drainage Mill *	Tarred tower mill, remains of scoop wheel, cap frame under aluminium cap with wooden curb and track	Not known	N/A	Some refitting, especially in 1890s	Located close to Halvergate Fleet. Traditional Broadland landmark feature	18th Century	Regional	Recorded on SMR, no. 10403 Grade II Listed Building	Locally Common but part of rare historic landscape

Site	Form	Survival	Condition	Complexity	Context	Period	Scale it Matters	Significance	Rarity
B38. Howards Drainage Mill *	Red brick tower, 9.5m high, 3 storeys, 4 white framed windows at upper two storeys.	Good, partially restored	Managed	The mill had a refit by Smithdales.	Located beside the Halvergate Fleet. Traditional Broadland landmark feature	mid 19th Century	Regional	Recorded on SMR, no. 10404 Grade II Listed Building	Locally Common but part of rare historic landscape
B39. Lockgate Mill *	Tarred tower mill, red brick, 4 floors, 13.5m high. Two opposed doors, 4 windows.	Not known	Derelict	A mill is shown on the 1816 OS maps	Located beside north wall of Breydon Water.Traditional Broadland landmark feature	Mid to late 19th Century	Regional/ Local	Historic built landmark feature in Conservation Area	Locally Common but part of rare historic landscape

Site	Form	Survival	Condition	Complexity	Context	Period	Scale it Matters	Significance	Rarity
B40 Charlie Waters Mill	Red brick tower mill, two storeys, flat roof, opposed doors, drove scoop wheel	N/A	N/A	N/A	Located beside the River Bure. Traditional Broadland landmark feature	Erected beween c.1795 & c.1826	Local	Recorded on SMR, no. 8609	Locally Common but part of rare historic landscape
B41 Windmill	A tall brick tower windmill, spur wheel of timber, wooden bridgetrees, two pairs under-driven French burr stones	N/A	N/A	An auxiliary steam was added 1886, last used 1916 and now has a Nissen hut on top.	Located north of Acle. Traditional Broadland landmark feature	1826	Local	Recorded on SMR, no. 8614	Locally Common but part of rare historic landscape
B42 Breydon Water Navigable Waterway *	River	Good	Managed	Improvements were made in the 19th Century	Breydon Water lies outside Great Yarmouth	River	Local	NMR No. Linear797, Unique Identifier 1342427	Locally Common but part of rare historic landscape
B43	Terminal Station	Unknown	N/A	N/A	Situated in	Opened	Local	NMR No.	Common

Site	Form	Survival	Condition	Complexity	Context	Period	Scale it Matters	Significance	Rarity
Yarmouth Vauxhall Station	of Yarmouth and Norwich Railway				Great Yarmouth	in 1844		TG50 NW611	
B44 Church of St. Andrew, Stokesby	Flint and thatched church	Unknown	N/A	N/A	Situated in Stokesby. Rural views.	Unknown	Regional/ Local	Grade II listed building	Common
B45 Stokesby Hall and two barns	2 storey brick detached house & 2 barns.	Unknown	N/A	N/A	Views of Acle Straight to south west. Rural views	Unknown	Regional/ Local	All Grade II listed buildings	Common
B46 Saithe House, Stokesby	2 storey, brick detached house	Unknown	N/A	N/A		Unknown	Regional/ Local	Grade II listed building	Common
B47 Barn North east of Ferry Inn	Barn building	Unknown	N/A	N/A	In grounds of pub garden. Rural open views	Unknown	Regional/ Local	Grade II listed building	Common

Site	Form	Survival	Condition	Complexity	Context	Period	Scale it Matters	Significance	Rarity
B48 Glebe Farm & Barn, Stokesby	2 storey, brick thatched, detached house and barn	Unknown	N/A	N/A	Rural views	Unknown	Regional/ Local	Grade II listed building	Common
B49 Mautby Windmill or Mautby Marsh drainage Mill *	Brick wind pump and white rendered one and half storey extension.	Restored	Unknown	Unknown	Rural views	Unknown	Regional	Grade II listed building	Locally common but part of rare historic landscape
B50 Runham Drainage Mill *	Black painted brick winp pump, timber elements in place- no sails	Unknown	Unknown	Unknown	Expansive rural views over River Bure an Marsh	Unknown	Regional	Grade II listed building	Locally common but part of rare historic landscape
B51 Old Hall Drainage Mill *	Unknown	Unknown	Unknown	Unknown	Traditional Broadland landmark feature	1540 AD to 1900 AD	Regional	Recorded on SMR, no. 10386	Locally common but part of rare historic landscape

Site	Form	Survival	Condition	Complexity	Context	Period	Scale it Matters	Significance	Rarity
B52 Commissi on Drainage Mill	Unknown	Unknown	Unknown	Unknown		Unknown	Local	Unknown	Locally common
A17. Salt works	Salt pans	Covered by 2 inches of topsoil	Not known	N/A	Areas of creeks outskirts of Great Yarmouth	1066 AD to 1539 AD	Local	Recorded on SMR no. 28930	Common

Development of the Landscape

10.4.13 The present A47 road travels from Acle to Great Yarmouth across pasture/ salt marsh that is drained by dykes into the River Bure to the north and the River Yare and Breydon Water to the south. The road was constructed in the 1830s and was originally known as the Norwich – Acle Turnpike. It crosses an area of landscape referred to as the Halvergate 'triangle', which roughly comprises today's Halvergate Marshes Conservation Area. This landscape has an ancient and complex origin.

10.4.14 During the Roman period the area of Halvergate was an estuary but became drier during middle Saxon times. To protect the marshes from further flooding inhabitants of the area embanked the rivers with clay. The present surface of Halvergate is covered in a complex pattern of relict watercourses and dry depressions, which mark the earlier times when it was covered with mud flats and salt marsh. During Saxon times the marshes were probably crossed by a number of tidal creeks. Domesday (1086) records a number of salt pans in the area.

10.4.15 It is believed that the beginnings of a salt industry coincided with the Saxon period. There are a number of salt working sites and mills in the area which indicate the marshy or flooded landscape that previously existed. Salt working became an important industry in Norfolk although it was confined to two areas, east Norfolk around Great Yarmouth and the north western corner of Norfolk. Its production depended either on inland brim springs or coastal pans. Salt pans consisted of trenches which would fill with salt water during high tides and then dry out leaving the salt as the water evaporated. Mounds resulting from the digging of these pans and from the residue of silt left from the salt-making process show the extent of former workings.

10.4.16 By the late Saxon period it is believed that farmstead settlements began to be established in the marshes. Evidence inferred from local place names suggests that by the 11th or 12th century the Halvergate marshes were a valuable resource divided into discrete areas. In the 12th and 13th centuries landlords grazed vast numbers of sheep on the marshes and sheep continued to dominate the marsh until the 16th century when evidence indicates that cattle became the most important stock kept by farmers.

10.4.17 The grazing and the production of salt resulted in continued establishment of farms and cottages. In early medieval times the marsh farms were built on low mounds to reduce vulnerability to flooding. A number of mounds remain on the present day landscape one of which (Ashtree Farm, site A24), was found to contain pottery dating from the 11th to 13th century when excavated. The extent of early settlement within the marsh is difficult to ascertain as many medieval sites are hidden beneath existing marsh farms and most of the marsh has not been systematically fieldwalked.

10.4.18 Sources indicate that there was remarkably little change in the economy of Halvergate from the 17th to 20th centuries where cattle were fattened up on the marshes. During the course of the 20th century the number of marsh houses declined gradually but the characteristic lifestyle of the inhabitants (marshmen) survived into the 1950s and 1960s. There ~~are~~ is still a small number of houses on the marshes today.

10.4.19 Rising sea levels and an increase in waterlogging led to widespread construction of drainage mills through the course of the 18th century. Although it is thought that windpumps were first introduced to the Broads in the 16th century, most of those on the Halvergate Marshes are 18th and 19th century structures. The drainage mills, or wind pumps were used to pump water from the marshes and dykes to the rivers. During the nineteenth century some windmills were replaced by steam pumps. In the 20th century diesel pumps were introduced and the process of change continues with all pumps now driven by electricity.

The Dyke System

10.4.20 The complex variety in the pattern of the dykes is born from the land use and settlement on the marsh. The dyke pattern on the 1830s/1840s Tithe Award Maps is generally very similar to that which exists in the non-arable areas of the marsh today. The dyke pattern on Halvergate has developed gradually over the centuries with numerous piecemeal additions and alterations.

10.4.21 The marsh dykes can be categorised according to their form into a number of distinct groups but some dykes do not fall into any clear category. There are the long dykes that cross the marsh in straight lines or smooth curves and terminate at a drainage mill situated beside a major watercourse. The most common type are straight dykes created in the 17th to the early 19th centuries. Additionally, there are serpentine dykes the curvilinear watercourses that represent adaptations of the old, natural pattern of drainage. These are survivors from a denser pattern of natural watercourses which now exists as a network of shallow indentations in the marsh turf. The survivors from the original pattern have an interesting characteristic as the majority form parish boundaries and boundaries of embanked areas. These dykes were less easily altered and thus retained their irregular form. The Halvergate Fleet is an example of this (clause 10.4.22).

Relict Watercourses

10.4.22 The transition from open water to dry land has left its mark on the landscape in the form of relict water courses of varying sizes ranging from small dry depressions approximately a metre wide to much larger meandering channels. One such example, The Northern Rond, was a recognisable feature of the landscape as late as 1840. The feature can still be depicted

on land maps (figure 10.1), with the former watercourse now utilised for field drainage.

10.4.23 Several relict watercourses, have had substantial banks built up along them and were used as trackways through the marshes. Before the construction of the Acle Straight one such track, which ran along the main routeway alongside the Halvergate Fleet (another relict creek that remains as a watercourse crossing the marsh) was the main routeway across the marshes to Great Yarmouth. The route of this track is still evident today, marked by the designated long distance path known as the Weaver's Way. There are a number of drainage mills built beside Halvergate Fleet such as High Drainage Mill (site B45) and Howards Drainage Mill (site B46) and also a large number of marsh farms e.g. site B43 (figure 10.1). Buildings were constructed here to utilise the firmer and higher land.

Communication Routes

10.4.24 When constructed, the Acle Straight became the main communication link across the Halvergate marshes. The road was originally fully lined with low pollarded willows planted to prevent it from subsiding into the ditches. Trees along the route are now much more intermittent, however, an example of this former landscape is evident along the Halvergate Branch Road which was constructed at a similar time to the Acle Straight.

10.4.25 On the outskirts of Acle town at Acle Roundabout the existing A47 meets the north-south A1064 which is called the Acle to Billockby Road. This road is more or less on the same line as that shown on William Faden's county map of 1797. The road could have been realigned slightly but it is unlikely that much has changed. It like the other routes is lined with low pollarded willows.

10.4.26 The Norfolk Railway (site B9) also known as the Norwich to Yarmouth (via Reedham) Railway Line opened in 1844 and crosses through the Halvergate marsh. The Acle branch of the Norfolk Railway (site B10) is another line that also crosses through the marsh. It was opened in 1883 and it travels parallel to the south of the A47 between the towns of Great Yarmouth and Acle.

10.4.27 The River Yare has carried traffic since Roman times but navigation was difficult due to the shallow depth of Breydon Water. In the 1840s the Yarmouth authorities dredged the Breydon channel so that sea ships could use the River Yare and travel to Norwich. This river has no locks in its navigation from Yarmouth to Norwich.

10.5 Predicted Impact

10.5.1 The tables below indicate the effects of Option 1 on archaeology and built heritage. Unless indicated to the contrary the effects are the same for Options 1A and 1B.

Archaeology

10.5.2 Table 10.4 details the impacts of the single carriageway options on archaeology within the study area.

Table 10.4: Archaeological Impacts resulting from proposed scheme

Site	Impact	Magnitude of Impact
A1. Find spot	None	Neutral effect
A2. A workhouse	None	Neutral effect
A3. Midland and Great Northern Joint Railway	None	Neutral effect
A4. Brickworks	None	Neutral effect
A5. Find spot	None	Neutral effect
A7. Hermitage	None	Neutral effect
A8. Wind pump	None	Neutral effect
A9. Lime kiln	None	Neutral effect
A10. Mound	The site would be traversed by a new bridleway. However mound no longer exists.	Neutral effect
A11. Find spot	None	Neutral effect
A12. Find spot	None	Neutral effects
A13. Find spot	None	Neutral effect
A14. Find spot	None	Neutral effect
A15. Find spot	None	Neutral effect
A16. A salt working mound	None	Neutral effect
A17. Salt works	None	Neutral effect
A18. Icehouse	None	Neutral effect
A19. Find spot	None	Neutral
A20. Find spot	None	Neutral
A21. & A21.1 Find spot	None	Neutral
A23. Cemetery Cremation	None	Neutral effect
A25. Wind pump and Mound	None	Neutral effect
A26. Find spot	None	Neutral effect
A27. Find spot	None	Neutral effect
A28. Find spot	None	Neutral effect
A29. Manor House	None	Neutral effect
A30. Find spot	None	Neutral effect

Site	Impact	Assessment of Impact
A31. Find spot	None	Neutral effect
A32. Find spot	None	Neutral effect
A33. Findspot	None	Neutral effect
A36. Acle Marsh House	None	Neutral effect
A40. Pillbox	None	Neutral effect
A41. Pillbox	None	Neutral effect
A42 Spigot, Mortar, Emplacement	None	Neutral effect
A43. Site of Palmer's Mill	None. Site already located on existing A47 Norwich to Acle carriageway	Neutral effect
A44. Site of 7 Mile House	None	Neutral effect
A45. Earthworks	None ?	Neutral effect ?

adjacent to A47

Built Heritage

10.5.3 The direct and indirect impacts on built heritage are outlined below in Table 10.5. Indirect impacts indicate the effect on the setting on features of built heritage interest.

Table 10.5 Built Heritage Impacts Resulting From Proposed Scheme

Site	Direct Impact	indirect Impact	Magnitude of Impact
Halvergate Marshes Conservation Area	Small land take from agricultural land in the Conservation Area.	Slight impact on character of historic landscape due to barely perceptible increase in traffic and effect of access tracks on setting of Stracey Mill, slight additional noise impact would further effect tranquility. Temporary adverse effects during the construction phase would be marginally greater with Option 1B due to traffic using the northern access track as a diversion with visual and noise intrusion extending further north. Reduced night time impacts due to reduced lightspill.	Slight adverse effect
B1. St. Edmunds Church	None	None	Neutral effect
B2. Tunstall	None	Negligible effect on setting due	Neutral effect

Dyke Drainage Mill		to barely perceptible increase in traffic on road.	

Site	Direct Impact	indirect Impact	Magnitude of Impact
B3.Tunstall Dyke Smock Mill	None	Negligible effect on setting due to barely perceptible increase in traffic on road.	Neutral effect
B4. Stracey Arms Drainage Mill	Small area of land –take from southern boundary of plot.	Increased scale of Halvergate Junction, small area of land-take from plot and access tracks to west and east of site would adversely effect setting of Stracey Mill. Temporary adverse effects during the construction phase would be greater with Option 1B due to the closer proximity of traffic using the northern access track as a diversion. Reduced night time impacts due to reduced lightspill.	Moderate adverse effect
B5. Keys Mill on Black Mill	None	Negligible effect on setting due to barely perceptible increase in traffic on road.	Neutral effect
B6. Bridewell	None	None	Neutral effect
B7. Mitre House formerly Old White House	None	None	Neutral effect
B8. The Old Bakery/ Calthorpe Cottages/ Vine	None	None	Neutral effect
B9. Norfolk Railway (Norwich to Yarmouth Railway Line)	None	Negligible effect on setting due to barely perceptible increase in traffic on road.	Neutral effect
B10. Norfolk Railway Acle Diversion	None	Negligible effect on setting due to barely perceptible increase in traffic on road. And increased scale of road.	Neutral effect
B11. The Manor House	None	None	Neutral effect
B12. The Limes	None	None	Neutral effect
B13. Memorial and Milestone	None	None	Neural effect

Site	Direct Impact	indirect Impact	Magnitude of Impact
B14. Red Lion Cottage/ Clematis Cottage	None	None	Neutral effect
B15. Pillbox	None	None	Neutral effect
B16. Pillbox	None	Slight impact on setting due to access track. Temporary adverse effects during the construction phase would be slightly greater with Option 1B due to the closer proximity of traffic using the northern access track as a diversion.	Slight adverse effect
B17. A Pillbox	None	Moderate impact on setting due to access tracks and associated junction. Also barely perceptible increase in traffic on road.	Moderate adverse effect
B18. Barn at Oakely or Oakleigh House	None	None	Neutral effect
B19. Vauxhall Bridges	None	None	Neutral effect
B20. Pillbox	None	Slight impact on setting due to access track, also barely perceptible increase in traffic on road.	Slight adverse effect
B21. Spigot, Mortar, Emplacement	None	None	Neutral effect
B22. Ashtree Farm Mill	None	Negligible effect on setting due to barely perceptible increase in traffic on road.	Neutral effect
B23. Great Yarmouth Town Wall and defences (not on map)	None	None	Neutral
B24. Halvergate Six Mile House Drainage Mill	None	None	Neutral effect

Site	Direct Impact	indirect Impact	Magnitude of Impact
B25. Five Mile House	None	None	Neutral effect
B26. The Old White House	None	None	Neutral effect
B27. Ivy House and attached outbuildings	None	None	Neutral effect
B28. Childwall House and Bedlam	None	None	Neutral effect
B29. Hillside	None	None	Neutral effect
B30. Rudham Swim South	None	None	Neutral effect
B31. Six Mile House	None	None	Neutral effect
B32. Ashtree Farm	None	Negligible effect on setting due to barely perceptible increase in traffic on road.	Neutral effect
B33. Walpoles Farm	None	None	Neutral effect
B34. Hewitts Farm	None	None	Neutral effect
B35. Manor Farm	None	None	Neutral effect
B36. Runham Five Mile House	None	None	Neutral effect
B37. Highs Drainage Mill	None	None	Neutral effect
B38. Howards Drainage Mill	None	None	Neutral effect
B39. Lockgate Mill	None	None	Neutral effect
B40 Charlie Waters Mill	None	None	Neutral effect
B41 Windmill	None	None	Neutral effect

Site	Direct Impact	indirect Impact	Magnitude of Impact
B42 Breydon Water Navigable Waterway	None	Reduced night time impacts due to reduced lightspill from lighting on approach to Vauxhall Roundabout.	Neutral effect Should be beneficial?
B43 Yarmouth Vauxhall Station	None	None	Neutral effect
B44 Church of St. Andrew, Stokesby	None	None	Neutral effect
B45 Stokesby Hall and Two Barns	None	None	Neutral effect
B46 Saithe house, Stokesby	None	None	Neutral effect
B47 Barn North east of Ferry Inn	None	None	Neutral effect
B48 Glebe Farm and Barn, Stokesby	None	None	Neutral effect
B49 Mautby Windmill or Mautby marsh drainage mill	None	None	Neutral effect
B50 Runham Drainage Mill	None	None	Neutral effect
B51 Old Hall Drainage Mill	None	Reduced night time impacts due to reduced lightspill from road lighting at Halvergate Junction.	Neutral effect beneficial?
B52 Commission Drainage Mill	None	None	Neutral effect

10.6 Mitigation Measures

Archaeology

10.6.1 There is potential for archaeological remains to be uncovered anywhere within the scheme where ground works are undertaken. As a consequence of this there would be an archaeological watching brief maintained during all ground works. The objective of the watching brief would be to identify and record any archaeological sites/deposits. It would be undertaken by suitably qualified archaeological personnel who would have relevant experience. All archaeological works would be undertaken ~~with the agreement of~~ in consultation with Norfolk County Archaeologist. The watching brief would be undertaken in accordance with the Institute of Field Archaeologists documents *Standard and Guidance for Archaeological Watching Briefs* (1994) and the *Code of Conduct*.

Built Heritage

10.6.2 Some limited planting is proposed on the existing embankment, however there is insufficient space to form a dense screen which would anyway be out of character with the open landscape of the marshes. Therefore any beneficial effects from planting on the Conservation Area or setting of buildings would be minimal.

10.6.3 An environmental barrier is proposed to the west of Vauxhall Roundabout in order to screen road traffic from wintering birds on Breydon Water (see Figure 8.6). This would also effectively screen the road from site B42 Breydon Water Navigable Waterway, which would alter the Neutral effect identified in Table 10.5 to Slight Beneficial.

10.6.4 The effects of the single carriageway options on the setting of Stracey Arms Drainage Mill has been assessed as moderate adverse. However this impact could be reduced to slight adverse if the A47 approach on the east side of Halvergate Junction was realigned slightly further south to enable:

- implementation of screen planting and
- construction of the access track adjacent to and outside the southern boundary of the property rather than at the western and eastern sides of it.

Any realignment of the route could result in additional impacts in terms of biodiversity and landscape and any beneficial effect for heritage would have to be weighed against other adverse effects.

10.6.5 The World War I pillbox (Site B17) would not be directly affected by the proposals however it is very close to the existing carriageway and in order to avoid any accidental damage during the construction phase a temporary

protective fence would be erected. This building would experience a moderate adverse effect on its setting due to construction of an adjacent access track and nearby access track junction. This effect could be reduced by repositioning the access track junction so that it would be further away from the building. Any resulting beneficial effects for heritage would have to be weighed against other adverse effects, which could be caused by repositioning this junction.

10.7 Summary

10.7.1 Most of the route lies in a historic landscape designated as Halvergate Marshes Conservation Area and the study area contains several sites of archaeological and built heritage interest, including a Grade I listed church in Acle town, a Grade II* listed drainage mill situated adjacent to the Acle Straight and a number of Grade II Listed Buildings scattered throughout the study area. In addition, World War II relicts near Acle contribute to a nationally important system of defensive structures, and two World War I pillboxes which flank the road near to Great Yarmouth are being considered by English Heritage for scheduling as ancient monuments. Most of the route also lies within the area administered by the Broads Authority who have an objective to apply for World Heritage status over the whole area.

10.7.2 None of the single carriageway options would impact any known sites of archaeological interest, however an archaeological watching brief would be maintained during all ground works. The overall effects on archaeology have been assessed as Neutral.

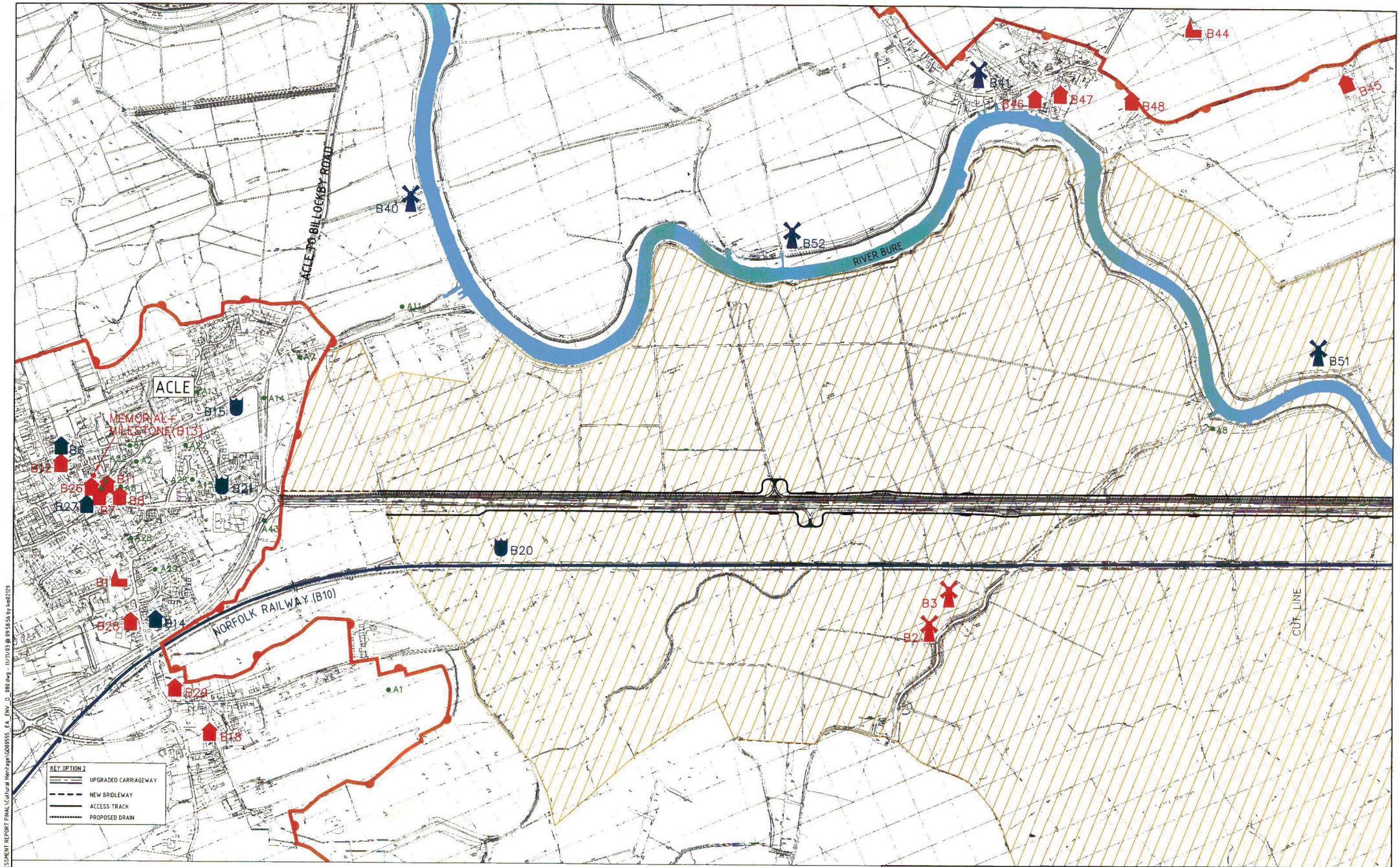
10.7.3 All single carriageway options would have a slight adverse effect on the Halvergate Marshes Conservation Area, a Moderate Adverse effect on the setting of Grade II* Stracey Drainage Mill and a Moderate Adverse effect on the setting on one of two World War I pill boxes. There would also be a Slight Adverse effect on the setting of the other World War I pill box and a World War II pillbox. The effects on the remaining 49 built features of heritage interest identified within the visual envelope has been assessed as neutral.

10.7.4 The Moderate Adverse effect on Stracey Drainage Mill and the World War I pill box could be reduced by mitigation. However this would involve realignment of parts of the proposals and would be subject to engineering constraints and weighing the benefits gained for heritage against other adverse environmental effects, which could be caused by realignment.

10.7.5 The World War I pill boxes and the Conservation Area have been identified as being of national importance and Stracey Drainage Mill as being of regional importance. The proposals would be intrusive in the setting of these features and damaging to the Conservation Area as well as being in conflict with local and regional policies for the protection of heritage (see Chapter 3). Accordingly all single carriageway options have been assessed as having a Moderate Adverse impact on the area's heritage. If the

mitigation measures outlined above were implemented this would be reduced to a Slight Adverse effect.

10.7.6 Option 1B would have very slightly greater indirect effects on the character and setting of the Conservation Area and built heritage than Option 1. This would be due to increased noise resulting from the faster speed limit. However this would be insufficient to alter the magnitude of impacts identified above. Option 1A would have a slightly greater temporary adverse effect on heritage during the construction phase but this would be insufficient to alter the overall significance of effects.



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Project
A47
ACLE STRAIGHT
DUAL CARRIAGEWAY PROPOSALS

Title
CULTURAL HERITAGE
CONSTRAINTS PLANS
SHEET 1 OF 3

Scale (A3)
1 : 10000

Datum
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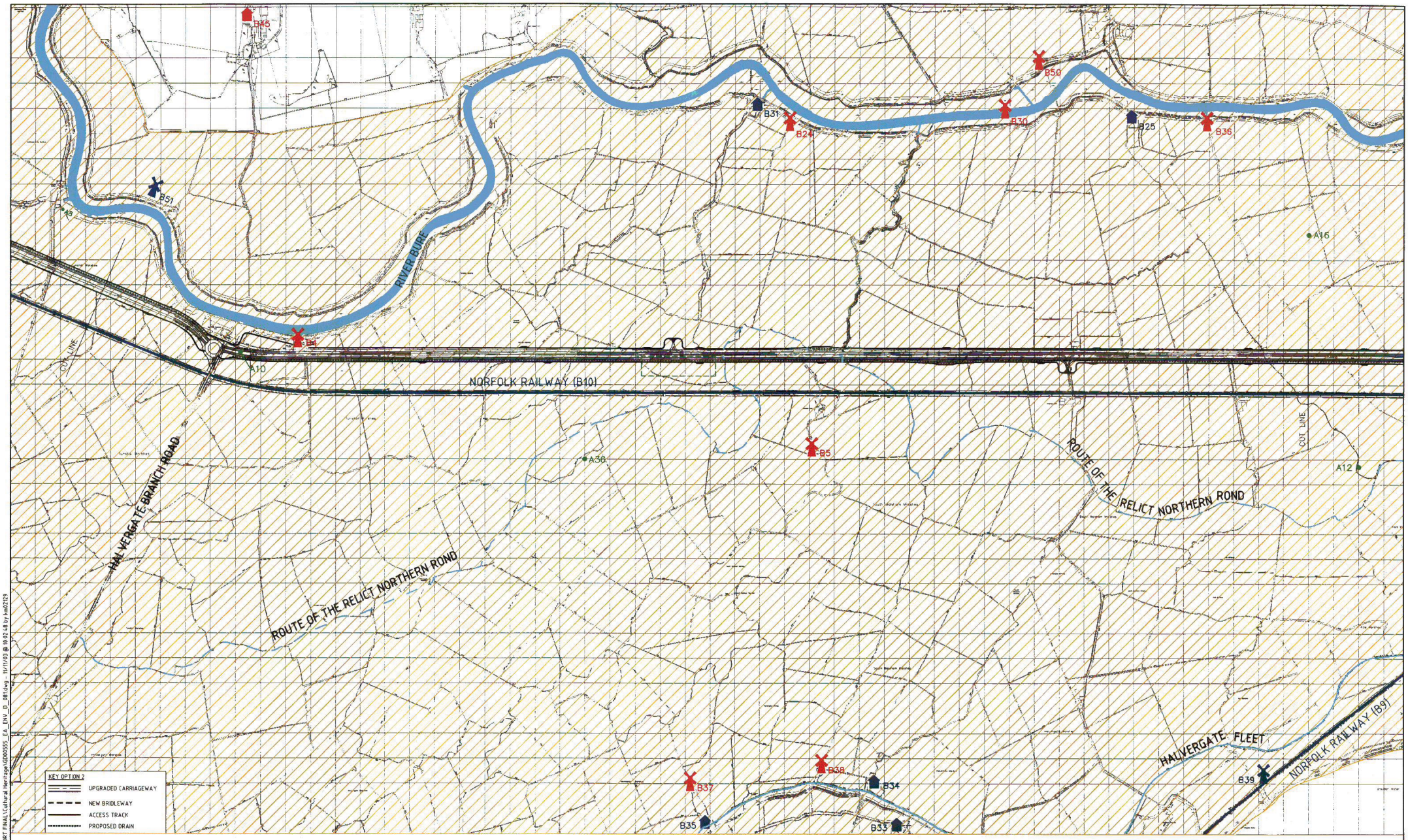
Drawing No.
FIGURE 10.1

Issue



KEY

HALVERGATE MARSHES CONSERVATION AREA

AREA ADMINISTERED BY THE BROADS AUTHORITY

WINDPUMP

WAR TIME RELICT

BUILDING

PLACE OF WORSHIP

OTHER BUILT HERITAGE FEATURE

BLUE FEATURES :

SITE LISTED IN NORFOLK SITES AND MONUMENTS RECORD OR NATIONAL MONUMENT RECORD

RED FEATURES :

LISTED BUILDING OR PROPOSED SCHEDULED ANCIENT MONUMENT

WATER BODY

RELICT WATER BODY

SITE OF EARTHWORK (A45)

ARCHAEOLOGICAL FEATURE

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DUAL CARRIAGEWAY PROPOSALS

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Scale (A3): NTS.

Datum: OS

Drawing No.: FIGURE 10.1

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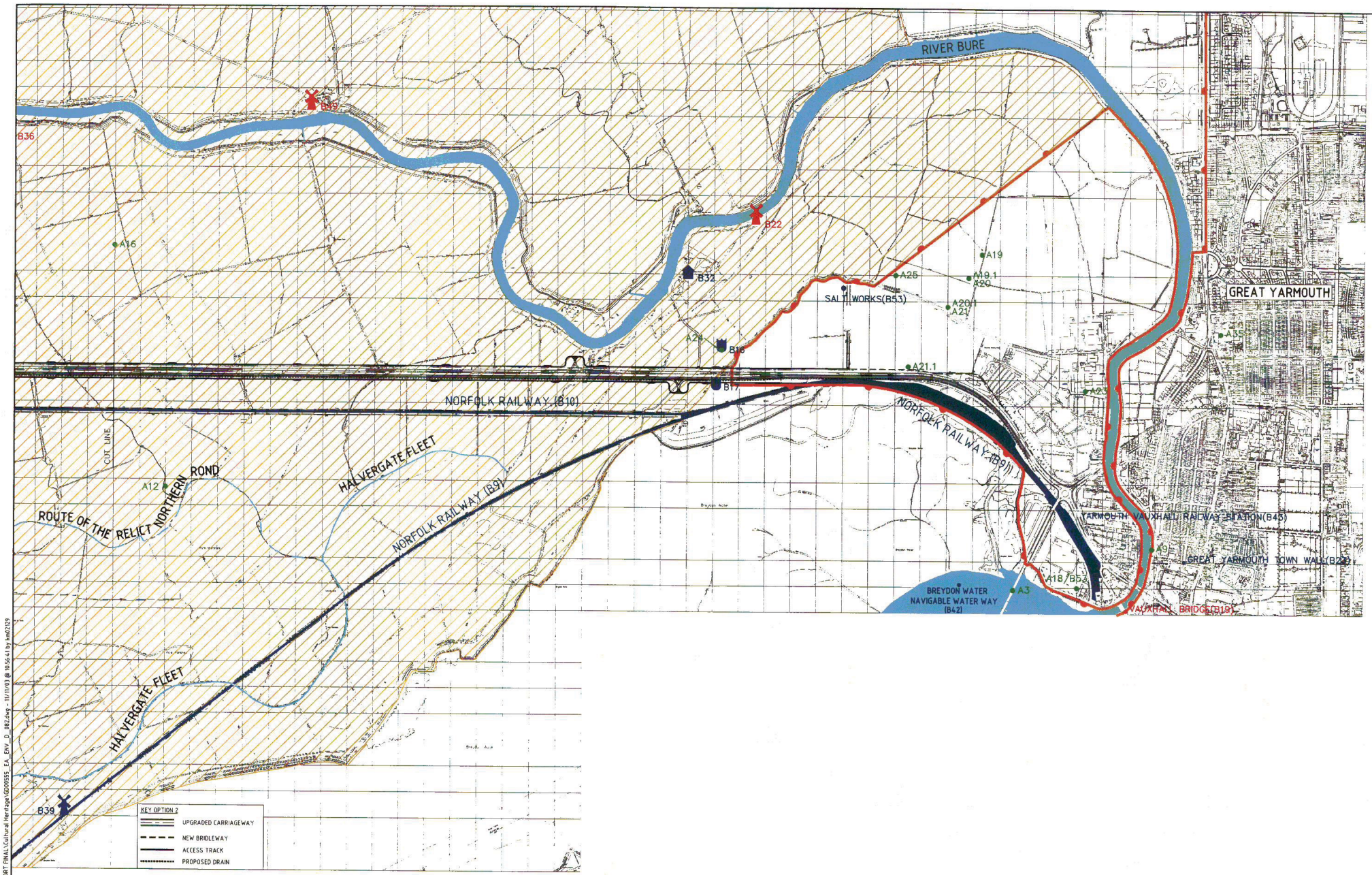

KEY

- HALVERGATE MARSHES CONSERVATION AREA
- AREA ADMINISTERED BY THE BROADS AUTHORITY
- WINDPUMP
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- BUILDING
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Drawing No: FIGURE 10.1
Issue:

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