A47/A11 Thickthorn Junction

Scheme Number: TR010037

Volume 6
6.1 Environmental Statement
Chapter 10 – Materials Assets and Waste

APFP Regulation 5(2)(a)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

March 2021

Infrastructure Planning

Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

The A47/A11 Thickthorn Junction Development Consent Order 202[x]

ENVIRONMENTAL STATEMENT CHAPTER 10 MATERIALS ASSETS AND WASTE

Regulation Number:	Regulation 5(2)(a)
Planning Inspectorate Scheme Reference	TR010037
Application Document Reference	TR010037/APP/6.1
BIM Document Reference	HE551492-GTY-EMA-000-RP-LX-30001
Author:	A47/A11 Thickthorn Junction Project Team, Highways England

Version	Date	Status of Version
Rev 0	March 2021	Application Issue

Table of contents

Tables

Figures (TR010037/APP/6.2)

Appendices (TR010037/APP/6.3)

10. Material assets and waste

10.1. Introduction

10.1.1. Highways England (the Applicant) has submitted an application for an order to grant a development consent order (DCO) for the A47/A11 Thickthorn Junction (hereafter referred to as 'the Proposed Scheme'). The Proposed Scheme will create one new connector road between the A11 and A47 and provide a new link road between Cantley Lane South and the B1172 Norwich Road for continued access to the Thickthorn Interchange. Two new underpasses and two new overbridges will also be constructed along with improvements to the existing Thickthorn interchange. The Proposed Scheme will reroute traffic away from the existing Thickthorn Junction, which currently experiences delays and high levels of congestion during peak hours.

10.1.2. Under the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (EIA Regulations 2017), the Proposed Scheme is an Environmental Impact Assessment (EIA) development and as such requires submission of an Environmental Statement presenting the likely significant environmental effects of the Proposed Scheme.

10.1.3. As part of the EIA process, this Environmental Statement (ES) chapter identifies, describes and assesses the potential impacts resulting from material assets and waste associated with the construction and operation of the Proposed Scheme. This chapter summarises the regulatory and policy framework related to material assets and waste and details the methodology followed for the assessment in the context of the environment in the area surrounding the Proposed Scheme. Following this, the design and mitigation (including the identification of proportionate enhancement measures) and residual effects of the Proposed Scheme are presented.

10.1.4. The approach to this assessment follows the Scoping Report (February 2018) **(TR010037/APP/6.5)** and subsequent agreed Scoping Opinion (March 2018) **(TR010037/APP/6.6)** for the Proposed Scheme, in combination with the most up to date requirements set out in the Design Manual for Roads and Bridges (DMRB), LA 110 (version 0) Material assets and waste (DMRB LA 110).

10.1.5. In accordance with DMRB LA 110, the assessment of material assets and waste considers:

- consumption of materials and products (from primary, recycled or secondary and renewable sources), the use of materials offering sustainable benefits, and the use of excavated soils and other arisings that fall within the scope of waste exemption criteria; and

- production and disposal of waste

10.1.6. An overview of the Proposed Scheme has been included in ES Chapter 2, The proposed scheme **(TR010037/APP/6.1)** which also provides preliminary construction information used in the assessment.

10.1.7. This assessment is supported by preliminary ground investigation completed in 2018 along the route of the Proposed Scheme.

10.1.8. This chapter should be read in conjunction with ES Chapter 9, Geology and soils **(TR010037/APP/6.1)** which considers the potential significant effects on the geology and soils as a result of the Proposed Scheme.

10.2. Competent expert evidence

10.2.1. The competent expert for this assessment is a materials and waste specialist (BSc, MSc, Chartered Environmentalist, Contaminated Land: Application in Real Environments (CL:AIRE) Qualified Person) with over 17 years' experience in environmental consultancy including waste and materials management, geo-environmental risk assessment and EIA. Their specialism relates to sustainable materials management in line with the current waste regulatory framework. They have used their EIA knowledge, experience with road infrastructure projects and professional judgement in identifying the likely significant impacts associated with the Proposed Scheme and providing technical guidance through the assessment process.

10.3. Legislative and policy framework

Legislation

10.3.1. The assessment has taken account of the key European and national legislation (listed in Appendix 10.1 **(TR0100437/APP/6.3)**) relevant to this chapter.

10.3.2. The European Union (EU) Waste Framework Directive 2008/98/EC (published November 2008) sets out the basic concepts and definitions in relation to waste management. Article 4 of the directive sets out five steps for dealing with waste, ranked according to environmental impact, the 'waste hierarchy'.

10.3.3. Prevention, which offers the best outcomes for the environment, is at the top of the priority order, followed by preparing for re-use, recycling, other recovery and disposal, in descending order of environmental preference. These principles have been considered during the design.

Planning policy

10.3.4. The primary basis for deciding whether or not to grant a Development Consent Order (DCO) is the National Policy Statement for National Networks (NPS NN)

(published December 2014) which sets out policies to guide how DCO applications will be decided and how the impacts of national networks infrastructure should be considered.

10.3.5. The NPS NN (published December 2014) policies relevant to material assets and waste assessment (and where in this ES chapter information is provided to address these policy requirements) are detailed with Appendix 10.1 **(TR010037/APP/6.3)**.

10.3.6. The Resource and Waste Strategy for England (published December 2018) sets out how the country will preserve material resources by minimising waste; promoting resource efficiency and moving towards a circular economy in line with the government's 25 year Environmental Plan (published January 2018).

10.3.7. Norfolk County Council identifies proposed sand and gravel extraction sites within the South Norfolk District suitable for allocation (as mineral sites considered acceptable in principle) within the Norfolk Minerals and Waste Plan Preferred Options Document (published July 2019).

10.3.8. As part of the Greater Norwich Development Partnership, South Norfolk Council adopted the Joint Core Strategy for Broadland, Norwich and South Norfolk in March 2011 (amended 2014). Policy 1 of this strategy (addressing climate change and protecting environmental assets cites the need to protect mineral and other natural resources identified through the Norfolk Minerals and Waste Development Framework.

10.3.9. Other relevant national and local policies have been considered as part of the material assets and waste assessment. They have been considered where these have informed the identification of receptors, resources and their sensitivity, the assessment methodology, the potential for significant environmental effects and required mitigation and enhancement measures These policies are detailed with Appendix 10.1 **(TR010037/APP/6.3)**.

10.4. Assessment methodology

Update to standard and scope of assessment

10.4.1. This chapter uses the assessment methodology set out in DMRB LA 110 (published August 2019). The methodology within DMRB LA 110 differs from those detailed in the Scoping Report of the Proposed Scheme (February 2018) **(TR010037/APP/6.6)**.

10.4.2. Following a review of the slight changes to guidance contained within DMRB LA 110, the methodology of the assessment has been updated from that offered within the Scoping Report of the Proposed Scheme (February 2018) **(TR010037/APP/6.5)**.

10.4.3. Table 10-1, in accordance with DMRB LA 110, sets out the proposed scope for further assessment in the ES. Where the response to one or more of the scoping assessment questions was 'yes', further assessment was undertaken in the ES.

Table 10-1: Summary of proposed scope

Scoping question	Response	Scope in?
Is the Proposed Scheme likely to recover or re-use little onsite material thereby requiring materials to be imported to Proposed Scheme?	The Proposed Scheme will generate construction and demolition waste (CDW) during site preparation and demolition stages. On a conservative basis, it is possible that a proportion of these CDW wastes will not be recovered or re-used.	Yes
Is the Proposed Scheme likely to use little or no recycled or secondary materials thereby requiring the majority of materials used on the Proposed Scheme to comprise primary materials?	The schedule of quantities states a requirement to import materials for use in construction. On a conservative basis, it is likely that a proportion of these imported materials will be of a primary source.	Yes
Is the Proposed Scheme likely to sterilise (substantially constrain or prevent existing and potential future use of) mineral sites?	The Proposed Scheme intersects part of a known sand and gravel reserve (mineral safeguarding area) as shown in Norfolk County Council's mineral safeguarding area mapping.	Yes
Is the Proposed Scheme likely to sterilise (substantially constrain or prevent existing and potential future use of) peat resources?	Norfolk Core Strategy and Minerals and Waste Development Management Plan 2010-2026 (September 2011) notes that peat is either so extensive in Norfolk or demand for it is so low (relatively) that safeguarding such deposits is not considered necessary. Peat was not recorded in the Proposed Scheme footprint during the Geotechnics Ltd 2018 ground investigation.	No
Would the Proposed Scheme generate large quantities of waste relative to regional landfill capacity?	There is a potential for the Proposed Scheme to generate significant volumes of waste. On a conservative basis, the requirement to dispose of this waste to landfill may result in a reduction in the capacity of waste infrastructure within the east of England region. On a worst-case basis the waste may require disposal to landfill outside of the region.	Yes
Would the Proposed Scheme have an effect on the ability of waste infrastructure within the region to continue to accommodate waste from other sources?		Yes

Consultation

10.4.4. Environment Agency (14 August 2020): As part of overarching consultation for the A47 Schemes with regards to the summary of the proposed scope within Table 10-1, the Norfolk waste team notes that the answers to the waste questions mean further assessments on the quantities likely to be produced are

required. The team further note this is what would be expected on a scheme of this scale. No further comments were made.

10.4.5. Norfolk County Council (24 July 2020): The Minerals and Waste Policy (Planning Services) team confirms, in their capacity as the mineral and waste Planning Authority, that the approach set out for the preparation of a minerals impact assessment (MIA) is considered appropriate.

Approach to assessment

10.4.6. The assessment of materials assets and waste in this chapter is in accordance with DMRB LA 104 (Environmental assessment and monitoring) and recently updated Highways England requirements in DMRB LA 110 which notes that the assessment shall report on the construction phase and first year of operational activities (opening year).

10.4.7. For the construction phase, and in accordance with the revised scoping process summarised in Table 10-1, the material assets and waste assessment includes an assessment of the following elements for the Proposed Scheme's permanent development:

- material assets use during the construction phase including site remediation, preparation and earthworks, demolition and construction (for example consideration of main construction material assets such as concrete, aggregate, asphalt and steel)
- the potential sterilisation of mineral sites
- waste generation during the construction phase including site remediation, preparation and earthworks, demolition and construction

10.4.8. In line with the EIA Scoping Opinion (February 2018*)* **(TR010037/APP/6.6)***,* the assessment of material assets and waste during the first year of operational activities (opening year) is not included and has been scoped out. Significant environmental effects from the use of material assets and generation of waste during this period are not predicted due to limited material use and waste generation from infrequent maintenance activities.

10.4.9. As detailed in ES Chapter 9 (Geology and soils) **(TR010037/APP/6.1)**, estimates of earthworks quantities and suitability of material excavated onsite during construction have been used, together with other key materials quantities collated, to determine the likely percentage of material available for re-use within the Proposed Scheme and any modifications to the earthworks.

10.4.10. As detailed in Appendix 10.2 **(TR010037/APP/6.3)**, data from the 2018 ground investigation has been reviewed in line with the current waste regulatory framework to assess the potential disposal options for excavated materials unsuitable for retention on the Proposed Scheme or surplus to requirements.

Baseline establishment

10.4.11. Publicly available information sources reviewed to establish the baseline include:

- EU Waste Framework Directive 2008/98/EC (published November 2008) and the Waste Management Plan for England (published December 2013)
- National and Regional Guidelines for Aggregates Provision in England 2005 to 2020 (published June 2009)
- The Environment Agency Waste Data Interrogator 2018 (published March 2020)
- Norfolk County Council Minerals and Waste Development Framework annual monitoring report of waste data for 2018 to 31 March 2019 (published March 2020)
- Norfolk Minerals and Waste Local Plan Aggregate Monitoring Report for 2018 (published December 2019)
- Norfolk Minerals and Waste Plan Preferred Options Document, July 2019
- Norfolk Minerals and Waste Development Framework annual waste data monitoring report for 2018 to 2019 (published March 2020)
- Northamptonshire Minerals and Waste Local Plan Minerals and Waste Monitoring Report 2017 (published November 2018)

Assessing significance

10.4.12. In accordance with Table 10-1, receptors relevant to this assessment are:

- Regional waste management infrastructure (specifically landfill capacity)
- Mineral and other finite raw material resources
- Safeguarded mineral sites

10.4.13. The capacity of landfill only is considered within this assessment and not the capacity of all waste management infrastructure as:

- Disposal to landfill and use of available landfill capacity is, overall, a permanent irreversible impact.
- Impacts on other types of waste management infrastructure (for example material recovery facilities) are temporary.
- Other types of waste management infrastructure are better placed to react to demands of the waste management market.

10.4.14. Table 10-2 details the significance categories for assessing the effects on material assets and waste from the Proposed Scheme. The significance categories are summarised from Table 3.7 from DMRB: LA 104 Environmental assessment methodology. The description of material assets and waste is summarised from Table 3.1.3 of DMRB LA 110 Material assets and waste. The

potential sterilisation of mineral sites is assessed within the Appendix 10.4 (minerals impact assessment).

Table 10-2: Significance category descriptions

Significance category	Description
Very Large	Material assets 1) No criteria: use criteria for large categories. Waste 1) Greater than 1% reduction or alteration in national capacity of landfill, as a result of accommodating waste from the Proposed Scheme. 2) Construction of a new (permanent) waste infrastructure is required to accommodate waste from the Proposed Scheme.
Large	Material assets 1) The Proposed Scheme achieve less than 70% overall material recovery and or recycling (by weight) of non-hazardous CDW# to substitute use of primary materials. 2) Aggregates required to be imported to the Proposed Scheme comprise less than 1% re-used and or recycled content. 3) Project sterilises greater than or equal to one mineral safeguarding site. Waste 1) Greater than 1% reduction in the regional capacity of landfill as a result of accommodating waste from the Proposed Scheme. 2) Greater than 50% of Proposed Scheme waste requires disposal outside of the region.
Moderate	Material assets 1) The Proposed Scheme achieves less than 70% overall material recovery and or recycling (by weight) of non-hazardous CDW to substitute use of primary materials. 2) Aggregates required to be imported to the Proposed Scheme comprise re-used and or recycled content below east of England regional percentage target of 31%. Waste 1) Greater than 1% reduction or alteration in the regional capacity of landfill as a result of accommodating waste from the Proposed Scheme. 2) 1% to 50% of Proposed Scheme waste requires disposal outside of the region.
Slight	Material assets: 1) The Proposed Scheme achieves 70% to 99% overall material recovery and or recycling (by weight) of non-hazardous CDW to substitute use of primary materials. 2) Aggregates required to be imported to the Proposed Scheme comprise re-used and or recycled content in line with the east of England regional percentage target of 31%. Waste 1) Less than or equal to 1% reduction or alteration in the regional capacity of landfill. 2) Waste infrastructure has sufficient capacity to accommodate waste from the Proposed Scheme, without compromising integrity of the receiving infrastructure (design life or capacity) within the region.
Neutral	Material assets: 1) The Proposed Scheme achieves greater than 99% overall material recovery and or recycling (by weight) of non-hazardous CDW to substitute use of primary materials. 2) Aggregates required to be imported to the Proposed Scheme compromise more than 99% re-used and or recycled content. Waste 1) No reduction or alteration in the capacity of waste infrastructure within the region.
Note: # Whilst excavated soil materials will be generated during construction, where chemically and geotechnically suitable, the material will be re-used on or off the Proposed Scheme. Consequently, excavated soil materials are not considered to comprise CDW and the government's recovery target of 70% does not include excavated material (uncontaminated excavated soil and stones (List of Waste 17 05 04)). This approach is consistent with the waste hierarchy and the objectives of minimising waste generation and reusing materials.	

10.4.15. The significance of effects on material assets are reported in accordance with the following significance criteria provided in Table 3.14 of DMRB LA 110:

- **Significant (one or more criteria met):** category description met for a moderate or large effect
- **Not significant:** category description met for a neutral or slight effect

10.4.16. The significance of effects on landfill capacity are reported in accordance with the following significance criteria provided in Table 3.14 of DMRB LA 110:

- **Significant (one or more criteria met):** category description met for a moderate, large or very large effect
- **Not significant:** category description met for a neutral or slight effect

10.5. Assessment assumptions and limitations

10.5.1. Estimates of earthwork quantities and the suitability of excavated materials for retention on the Proposed Scheme have been considered. This has been supported by a review of available ground investigation data to determine the likely percentage of excavated materials available for retention on the Proposed Scheme.

10.5.2. Material assets and waste quantities used during this assessment were provided by the Contractor. On the assumption of no substantial changes to the overall design; subsequent changes to these quantities during the progression of the detailed design are not considered significant enough to alter the outcomes of this assessment.

10.5.3. This assessment does not consider the environmental impacts associated with the extraction of raw materials and the manufacture of products. In addition, it does not consider the impact at non-landfill facilities (as detailed in 10.4.13). Recovery or waste disposal is not significant as the impact of the Proposed Schemes would not lead to a reduction in landfill capacity over 1%. It is assumed that these impacts are subject to the applicable environmental assessment and or permitting and planning approval requirements for the relevant facilities.

10.5.4. There are limitations associated with the use of baseline information from the Environment Agency Waste Data Interrogator 2018. Although updated in September 2020, landfill data contained within may not have been updated between 2018 and 2020. Previous updates to the files have related to the usability of the information files and error correction rather than updates to its content. In addition, the Environment Agency state that details of operators who have claimed commercial confidentiality are not provided.

10.5.5. There is the potential during construction that a proportion of the site won excavation arisings deemed suitable for retention on the Proposed Scheme in this assessment are not chemically or geotechnically suitable and require disposal off the Proposed Scheme.

10.5.6. There is the potential for encountering previously unencountered ground conditions across the site. Specifically, a review of the most recent layout of the Proposed Scheme against the available ground investigation information has identified three data gaps where insufficient information is available for a comprehensive waste assessment to be made. These data gaps relate to the Cantley Lane landfill, the infilled gravel pit on the south east of the Proposed Scheme, and general coverage across areas of the Proposed Scheme which were included in the design after the 2018 ground investigation. A supplementary ground investigation for the Proposed Scheme is planned for Spring 2021 and has been scoped to include for the investigation of these data gaps.

10.5.7. Based on the known ground conditions, it is assumed that current design solutions will reduce excavation volumes at the Cantley Lane landfill and the infilled gravel pit to the west of the current A47.

10.6. Study area

10.6.1. In accordance with paragraph 3.5 of DMRB LA 110, the assessment has established two geographically different study areas to examine the use of material assets and management of waste

First study area

10.6.2. In accordance with paragraph 3.6 of DMRB LA 110, the first study area covers land within the Proposed Scheme DCO boundary. This includes areas where site clearance, earthworks and construction are proposed and materials will be consumed (used, re-used and recycled) and waste generated.

10.6.3. As well as including the footprint of the Proposed Scheme, in accordance with paragraph 3.6 of DMRB LA 110, the first study area includes any temporary land requirements during the construction phase such as temporary offices, compounds and storage.

Second study area

10.6.4. In accordance with paragraphs 3.7 and 3.10 of DMRB LA 110, the second study area covers:

- Feasible sources and availability of construction materials required to construct the main elements of the Proposed Scheme.
- Suitable landfill infrastructure that could accept arisings and or waste generated by the Proposed Scheme.

10.6.5. The study area for the source of material assets is the east of England region.

10.6.6. The study area for the management of inert and non-hazardous wastes comprises the wider east of England region, with landfills licenced to accept these wastes

located within this region. The east of England region comprises the ceremonial counties of Norfolk, Bedfordshire, Cambridgeshire, Essex, Hertfordshire and Suffolk.

10.6.7. There are no hazardous waste landfill sites within the east of England region. In accordance with paragraph 2.4 of DMRB LA 110, using the proximity principle, the study area for the management of hazardous wastes is the adjacent east midlands region. The closest hazardous waste landfill is in Northamptonshire (in the district of East Northamptonshire).

10.6.8. The study area for considering mineral safeguarded site sterilisation is defined by the Proposed Scheme DCO boundary.

10.7. Baseline conditions

Waste generation: First study area

10.7.1. In the Do Nothing scenario, waste generated and disposed of from the operation of the existing A47 and A11 is considered to be limited and associated with infrequent maintenance activities.

10.7.2. A waste assessment using the available ground investigation data was undertaken to establish the likely classification of waste (inert, non-hazardous or hazardous). This information was then used to assess the effects on landfill capacities where disposal of materials is required. The waste disposal assessment is provided within Appendix 10.2 (**TR010037/APP/6.3**) and summarised as follows:

- Potential wastes tested and assessed to date have been classed as non-hazardous waste, with a portion of these materials suitable for disposal to an inert landfill.
- As detailed in Section 10.5.4, data gaps have been identified where insufficient information is available for a comprehensive waste assessment however, it is possible for previously unidentified hazardous waste to be present across the Proposed Scheme. These data gaps relate to the Cantley Lane landfill (including potential domestic waste at depth), the infilled gravel pit to the south east of the Proposed Scheme, and general coverage across areas of the Proposed Scheme.

Landfill infrastructure: second study area

10.7.3. Baseline information comprises the current landfill capacity in the waste disposal authority (Norfolk), and in the wider east of England region as defined in paragraph 10.6.7.

10.7.4. Environment Agency Waste Data Interrogator 2018 includes information about remaining landfill capacity in Norfolk and the wider east of England region.

Statistics on remaining landfill capacities for Norfolk (against those in the east of England and east midlands region) are summarised in Table 10-3.

10.7.5. In lieu of hazardous waste landfill sites within the east of England, using the proximity principle within LA 110 (paragraph 2.4), the data interrogator was used to assess remaining hazardous landfill capacity for the adjacent east midlands' region.

10.7.6. Regional statistics indicate that the east of England region has a total landfill capacity of approximately 51,145,000m^3 compared to an average of 46,565,000m^3 across other regions in England.

Table 10-3 Remaining landfill capacity summary (2018-2019)

Landfill type	Norfolk sub-region remaining capacity [A]	East of England remaining capacity [B]
Hazardous	No hazardous waste landfill sites within Norfolk.	No hazardous waste landfill sites within east of England. The closest hazardous waste landfill is East Northants Resource Management Facility (Permit Ref: EPR/TP3430GW) located in East Northamptonshire approximately 138km from the Proposed Scheme. Remaining capacity (2018) just under 1,050,000m^3.
Stable non-reactive hazardous waste (SNRHW) cell# within non-hazardous landfill	No SNRHW cells within Norfolk.	5,711,000m^3
Non-hazardous	The volume of permitted landfill capacity for non-hazardous landfill is estimated by Norfolk County Council to be 4,536,330m^3. Norfolk's non-hazardous landfill capacity is calculated to last until 2037/38 based on the forecasts. (See note A)	25,092,000m^3
Inert (including quarry restoration sites)	Volume of permitted airspace estimated by Norfolk County Council to be 1,021,250m^3. It was calculated that inert landfill and quarry restoration sites will last until early 2025 (See note A). If the predicted 40% increase in construction and demolition waste (to 2026) occurs, inert landfill and quarry restoration sites may only last until 2022 (See note A).	20,342,000m^3

Note

Some non-hazardous sites can accept some SNRHW into a dedicated cell, but this is usually permitted as a small part of the overall capacity of the site.

Data Source

A) Norfolk County Council Minerals and Waste Development Framework annual monitoring report of waste data for 2018 to 31 March 2019 (published March 2020). The monitoring report is subject to information being provided by

Landfill type	Norfolk sub-region remaining capacity [A]	East of England remaining capacity [B]

the landfills. Where capacity information is not provided, the remaining capacity was calculated by the council using the quantity of waste received at the site.

B) Environment Agency Waste Data Interrogator 2018.

10.7.7. Norfolk County Council Minerals and Waste Development Framework annual monitoring report of waste data for 2018 to 31 March 2019 (published March 2020) includes details of increased waste management capacity within Norfolk between 1 April 2018 and 31 March 2019, including those outlined in Table 10-4.

Table 10-4: Additional waste management capacity approved between April 2018 and March 2019

Location	Applicant	Type of facility	Anticipated throughput (tonnes per annum)	Type of waste
Land east of Punch Farm Quarry, Litcham Road, Beeston with Bittering	EAS Plant Hire Ltd	Inert quarry restoration	240,000m^3 void space	Inert
Costessey Quarry, Longwater Industrial Estate, Costessey, Norwich	CEMEX Materials Ltd.	Inert quarry restoration	Additional 101,700m^3 void space	Inert
Costessey Quarry, Alex Moorhouse Way, Longwater Industrial Estate, Costessey	CEMEX UK Materials Ltd.	Inert quarry restoration	Additional 16,300m^3 void space	Inert
Carbrooke Quarry, Summer Lane, Carbrooke	Frimstone Ltd	Inert Quarry restoration	200,000 tonnes additional waste void space	Inert

Use of material assets: first study area

10.7.8. In the absence of the Proposed Scheme, the use of material assets from the operation of the existing A47 is considered to be limited and associated with infrequent maintenance activities.

Baseline target for recovery of construction and demolition waste

10.7.9. The baseline target for recovery of CDW is 70% by weight, as set out in the EU Waste Framework Directive 2008/98/EC (published November 2008) and the Waste Plan for England (published January 2021). Uncontaminated excavated soil and stones (List of Waste (LoW) Code 17 05 04) are specifically excluded from this target.

10.7.10. Alternative aggregates comprise both secondary aggregates, which are by-products from industrial and mining operations, and recycled aggregates, which are produced from construction waste. Baseline targets for these alternative aggregates are set out in the National and Regional Guidelines for Aggregates Provision in England 2005 to 2020 (published June 2009). As detailed in table E/1.2 (recycled aggregate targets for England 2005-2020 (National and regional

guidelines) of DMRB LA 110, the target for the Proposed Scheme is the 31% guideline set for the east of England region in 2018.

Source of material assets: second study area

10.7.11. In the absence of the Proposed Scheme, the availability of material assets from the operation of the existing A47 is unlikely to be affected by the use of materials associated with infrequent maintenance activities.

Primary (virgin materials)

10.7.12. Norfolk Minerals and Waste Local Plan Aggregate Monitoring Report for 2018 (published December 2019) confirms sand and gravel are the main aggregate worked in Norfolk. Of the total 1,341,000 tonnes of land-won sand and gravel consumed in Norfolk, 80% to 90% came from quarries located within the county.

10.7.13. The monitoring report states that Norfolk had, as of December 2018, permitted reserves of sand and gravel of 13,310,696 tonnes (land bank of just under ten years).

10.7.14. The 2018 monitoring report identified 25 active sand and gravel extraction sites within the county of Norfolk. Five of these sites are in the district of South Norfolk. These are reported as active between the anticipated construction period 2020 and 2036 (extensions to planning permissions may extend operations further beyond listed date).

10.7.15. Norfolk County Council's currently unpublished Norfolk Minerals and Waste Plan Preferred Options Document, July 2019, increases this number of allocated gravel and extraction sites to six, with an estimated resource volume of approximately 8,900,000 tonnes. A total of 19 proposed sand and gravel extraction sites have been identified within the county of Norfolk with an estimated resource volume of approximately 20,400,000 tonnes.

Alternative (secondary and recycled) aggregates

10.7.16. Norfolk Minerals and Waste Local Plan aggregate monitoring report for 2018 (published December 2019) reports:

- over 494,000 tonnes of inert waste and CDW received at transfer stations and recycling centres was recovered for re-use
- the ten-year average figure for inert waste and CDW waste recovery of 412,100 tonnes per annum
- there are 22 sites that deal with inert waste and alternative (secondary and recycled) aggregates, five of which are located within the South Norfolk District

10.7.17. Numerous regional concrete batching and coating plants, with several local to the Proposed Scheme.

Safeguarded mineral site sterilisation: second study area

10.7.18. Norfolk County Council have several core strategy policies regarding minerals and wastes under the Norfolk Minerals and Waste Development Framework.

10.7.19. Policy CS16 concerns the safeguarding of mineral sites and mineral resources. Minerals are a finite natural resource and safeguarding mineral sites protects sources for future use. As part of the framework, deposits of sand and gravel, silica sand and carstone deposits within the county are safeguarded.

10.7.20. Safeguarding mineral sites does not necessarily prevent other forms of development being undertaken but ensures that issues of compatibility across the different forms of development are considered within the planning process.

10.7.21. The DCO boundary of the Proposed Scheme intersects sand deposits attributed to the Happisburgh Glacigenic Formation (HGF) as shown on Figure 10.1, Superficial deposits **(TR010037/APP/6.2)**. These sand deposits form part of the council's safeguarded mineral resources (sands and gravels).

Future baseline

10.7.22. To identify the effects of the Proposed Scheme on environmental receptors, it is necessary to understand the baseline at both the year of construction commencement up to the year it will become operational. Baseline conditions between these years may be different to current conditions. Changes in conditions could potentially alter sensitivities of existing identified environmental receptors and introduce new sensitive receptors.

10.7.23. In the absence of the Proposed Scheme, material use on, and waste generation and disposal from the operation of the existing A47 is considered to be limited and associated with infrequent maintenance activities.

10.7.24. The Norfolk Minerals and Waste Development Framework annual waste data monitoring report for 2018 to 2019 was published in March 2020. Norfolk's Non-Hazardous landfill capacity is calculated to last until 2037/2038 based on the forecasts of waste arisings in the Minerals and Waste Core Strategy. The landbank for inert landfill and quarry restoration sites stands at just under six years. This indicates there will still be adequate landfill capacity at the time of the anticipated construction period of 2020 to 2024.

10.7.25. The Northamptonshire Minerals and Waste Local Plan Minerals and Waste Monitoring Report 2017 (published November 2018) indicates that there is sufficient hazardous waste landfill capacity up to 2026. This is relevant to the

assessment as the closest hazardous waste landfill site to the Proposed Scheme is located within Northamptonshire.

10.7.26. Norfolk Minerals and Waste Local Plan Aggregate Monitoring Report for 2018 (published December 2019) states that Norfolk has, as of December 2018, permitted reserves of sand and gravel of 13,310,696 tonnes. This equates to a landbank of just under ten years, indicating availability of these materials at the time of the anticipated construction period of 2020 to 2024.

10.7.27. The same 2018 monitoring report identifies 25 active sand and gravel extraction sites within the county of Norfolk. Five of these sites are in the district of South Norfolk and are reported as active between the anticipated construction period of 2020 to 2036.

10.8. Potential impacts

10.8.1. The likely potential impacts are:

- Depletion of natural resources through the predominant use of primary aggregates and the use of recycled and or secondary aggregates below the 31% east of England regional target.
- Depletion of natural resources through recycling and or recovery of CDW below the 70% recovery target.
- Sterilisation of one or more mineral safeguarding site.
- Reduction in the capacity of regional inert and non-hazardous landfill facilities through generation of surplus excavation materials, generation and disposal of CDW from the demolition of any existing buildings or structures and generation of packaging materials and construction material wastage through damage and overordering.
- Generation of hazardous waste requiring disposal to hazardous waste landfill outside of the region.

10.9. Design, mitigation and enhancement measures

Embedded mitigation

10.9.1. The Proposed Scheme is designed to avoid and minimise the environmental impacts of material assets and waste (as far as reasonably practicable) through the process of the assessment of alternatives and ‘embedded mitigation’ as defined in paragraph 3.24 of DMRB 104 (Environmental assessment and monitoring).

10.9.2. Design measures integrated into the Proposed Scheme for the purpose of minimising environmental effects are reported in ES Chapter 2, The proposed scheme **(TR010037/APP/6.1)**.

Essential mitigation

10.9.3. This section reports on essential mitigation required in addition to embedded mitigation to reduce and offset likely significant adverse environmental effects as a result of material assets and waste. In accordance with the table of terms and definitions on page 8 of LA 104 (Environmental assessment and monitoring), essential mitigation is defined as *'Mitigation critical for the delivery of a project which can be acquired through statutory powers'.*

10.9.4. Through the design, mitigation and enhancement measures detailed in this section (10.9) the Proposed Scheme aims to prioritise waste prevention, followed by preparing for re-use, recycling and recovery and lastly disposal to landfill in accordance with the EU Waste Framework Directive 2008/98/EC (Published November 2008) 'waste hierarchy'.

Figure 10-1 Waste hierarchy

Source: http://ec.europa.eu/environment/waste/framework/

10.9.5. The following mitigation measures with respect to material assets and waste include:

- Design for re-use and recovery by identifying, securing and using materials that already exist on the Proposed Scheme, or can be sourced from other projects. A CDW recovery and or recycling rate of 70% will be set in the environmental management plan (EMP) **(TR010037/APP/7.4)**.
- Early engagement with contractors to identify appropriate project key performance indicators (KPI) and metrics, possible enhancement and monitoring measures (for example, waste exemption licenses), and to identify opportunities to reduce waste through collaboration and regional synergies.
- Design for materials optimisation by simplifying layout and form to minimise material use. Using standard design parameters, maximising the use of renewable materials and materials with recycled content in line with the 31% target (to be set in the EMP) for the east of England region as provided in the

National and Regional Guidelines for Aggregates Provision in England 2005 and 2020.

- Design for off-site construction by maximising the use of prefabricated structures and components, encouraging a process assembly rather than construction on the site.
- Design for the future by considering extent to which key materials can be demounted and recycled.
- Design for waste efficient procurement.
- Engineering plan configurations and layouts that show how the most effective use of materials assets (including site-won arisings) can be achieved.
- As part of their construction assessment, the Principal Contractor will include the option of using local waste management facilities for waste management, in line with the proximity principle, which is to manage waste as close to the point of generation as possible, so as to reduce the carbon footprint of managing waste from the Proposed Scheme.

Enhancement measures

10.9.6. In accordance with paragraph 3.20 of DMRB LA 110, the following enhancement opportunities have been identified and implemented within the environmental impact assessment:

- Potential opportunities include the re-use of suitable surplus excavated materials on local developments concurrent to the construction phase of the Proposed Scheme, including the provision of materials for quarry restoration schemes (see section 10.7.6 and 10.7.7).

10.9.7. More generic opportunities for environmental enhancement which could be included by the contractor include:

- Potential opportunities to re-use suitable surplus excavated material outside of the Proposed Scheme DCO boundary to improve environmental outcomes for a wide range of receptors. Opportunities include, for example, construction of noise and landscape bunding within other sections of the A47 where improvements are planned, and the need has been previously identified (where land availability allows).
- Use of surplus recycled or recovered materials in community projects. For example, utilising recycled mulch from tree felling on any adjacent community facilities.

10.9.8. Further enhancement measures relating to material assets and waste will be considered and implemented where applicable during subsequent stages of the Proposed Scheme.

Environmental management plan

10.9.9. In accordance with DMRB, LA 120 (Environmental Management Plan), an EMP (first iteration) has been prepared in parallel to the development of the Proposed Scheme design and construction methodologies.

10.9.10. Measures and procedures within the EMP **(TR010037/APP/7.4)** include design, construction and operational mitigation, which have been developed in-line with the requirements arising from the ES.

10.9.11. The Principal Contractor will further develop the EMP (second iteration) prior to commencement of works based on the current EMP. It will include the implementation of industry standard practice and control measures for environmental impacts. Specifically, the EMP shall require that waste management measures and strategies are implemented in order to minimise the likelihood of any localised impacts of waste on the surrounding environment through the minimisation of waste generation and the increase in materials re-use and recycling.

10.9.12. The EMP (first iteration) **(TR010037/APP/7.4)** shall include a site waste management plan (SWMP). Use of a SWMP is regarded as best practice. The focus of the SWMP will be provide an auditable record of the management of wastes on the Proposed Scheme during the construction phase. It will monitor the quantities and types of waste generated, as well as the duty of care information for the contractors transferring the waste and the sites the waste is taken to for management. The SWMP will also include procedures for monitoring the overall construction waste recovery rate. An outline SWMP for the Proposed Scheme is provided within Appendix 10.3 **(TR010037/APP/6.3)**.

10.9.13. The EMP and SWMP require the Principal Contractor to adopt best practice in the management of construction waste to reduce waste generation and subsequent landfill disposal. Mitigation measures in the EMP shall include:

- Consideration, in accordance with the waste hierarchy, to the re-use of waste generated onsite before it is transported off-site for re-use or disposal.
- Use of construction, demolition and excavation waste (with treatment) within the Proposed Scheme DCO boundary that meets the appropriate Waste and Resources Action Programme (WRAP) Quality Protocols.
- Use of site won recycled material assets within the Proposed Scheme DCO boundary without the need for treatment, and without the need for waste exemption (https://www.gov.uk/government/collections/waste-exemptions-using-waste), or the application of the CL:AIRE Definition of Waste Code of Practice (DoW CoP), Version 2 (published March 2011)

- Re-use of site won excavated materials within the Proposed Scheme DCO boundary without the need for treatment, and by meeting waste exemption, or CL:AIRE DoW CoP criteria.
- The adoption of the good practice in construction waste management in accordance with the principles outlined in WRAP guidance document Achieving good practice Waste Minimisation and Management, Guidance for construction clients, design teams and contractors.
- Re-use and recycling of materials offsite where re-use within the Proposed Scheme DCO boundary is not possible.
- Use of material logistics planning to manage procurement, storage and use of material assets and minimise damage, over ordering and wastage.
- Measures to encourage local and responsible resourcing of material assets (for example through adoption of Buildings Research Establishment (BRE) developed BES (BRE Environmental and Sustainability standard) 6001 Responsible Sourcing of Construction Products and efficiencies by minimal ordering of materials.
- A requirement for waste to be appropriately segregated and stored or stockpiled onsite by waste type, to ensure waste remains in a suitable condition to be re-used.
- A requirement for wastes that cannot be reused or recycled on site to be transported only to appropriately permitted recycling or disposal sites.

10.9.14. The re-use of excavated materials (on or off the site) during the Proposed Scheme construction shall be governed by a materials management plan (MMP) which will form part of the EMP (**TR010037/APP/7.4**). The MMP shall be developed in accordance with the findings of this assessment and mitigation recommended but also in accordance with CL:AIRE DoW CoP, Version 2, 2011. This approach offers the most effective method of ensuring materials can be re-used on or off the Proposed Scheme. Suitability for re-use requires chemical and geotechnical assessment to demonstrate that surplus materials do not constitute waste. The MMP will detail the procedures and measures to be implemented to classify, track, store, re-use and dispose of all excavated materials encountered during the construction phase.

10.10. Assessment of likely significant effects

Quantities

10.10.1. The estimated main types and quantities of material assets anticipated to be used during construction are shown in Table 10-5.

10.10.2. The estimated recycled content for each material in Table 10-5 is based on the ‘good practice’ recycled content rates from WRAP’s Designing Out Waste Tool for Civil Engineering and Net Waste Tool. The total recycled content is calculated as a percentage by weight. The actual recycled content achieved

during construction will depend on the availability of material containing recycled content and technical suitability.

10.10.3. Data on the bulk density of materials has been used to convert quantities between volume (m3) and weight (tonnes). Information on the typical bulk density of materials was sourced from WRAP's Designing Out Waste Tool for Civil Engineering and Building Services Research and Information Association (BSRIA) guide Embodied Carbon: The Inventory of Carbon and Energy (ICE) (October 2011).

Table 10-5: Estimated main categories and quantities of materials to be used during construction

Activity	Material category	Material density (tonnes/m^3)	Quantity required to be imported to site		Recycled content (% by weight)
			m^3	tonnes	
Site preparation, earthworks and construction	Timber post and four rail fence	0.5	127.2	63.6	0
	Timber post and strained wire fence - Post	0.5	116.7	58.3	0
	Timber post and strained wire fence - Wire	7.85	0.43	3.35	15
	Total recycled HDPE plastic panels or polypropylene panel fencing of 1.2m high (appropriate for water vole proofing)	0.97	15.7	15.2	10
	Wooden posts	0.5	18.3	9.1	0
	Performance Class N2 working width W4, W3 and W2 (Single sided) steel safety barrier	7.85	38.8	304.2	15
	Plastic pipework	0.97	69.6	67.6	10
	Filter drain	0.97	19.6	19.0	10
	Concrete drainage structures	2.4	288.9	693.4	22
	Pavements - sub-base type 1 unbound mixture (150mm deep)	1.9	8,854	16,822	50
	Pavements - capping (300mm deep)	2.4	7,865	18,876	90
	Pavements - AC32 dense base (265mm deep)	2.4	5,779	13,870	90

Activity	Material category	Material density (tonnes/m^3)	Quantity required to be imported to site		Recycled content (% by weight)
			m^3	tonnes	
	Pavements - AC20 dense binder (60mm deep)	2.4	1,986	4,766	90
	Pavements - Surface course (TSCS 10mm agg, 65PSV (50mm deep))	2.4	2,003	4,806	90
	Cold milling (50mm)	2.4	592.2	1,421.2	90
	Bond coat	2.4	11,780	28,272	90
	Rigid pavement - bound foundation (CBGM (300mm deep))	2.4	642.3	1,541.5	22
	Rigid pavement - concrete pavement (290mm deep)	2.4	620.9	1,490.1	22
	Pavements - PQC	2.4	184.8	443.52	22
	Asphalt paving	2.4	748.9	1,797.4	90
	Footways and Paved Areas - Grasscrete or similar	2.4	5.8	13.9	22
	Kerb - bullnose	2.4	143.7	344.8	22
	Tactile paving slabs	2.4	1.1	2.64	22
	Lighting column	2.8	1.09	3.05	15
	Total traffic signs and posts	7.85	10.5	82.4	15
	100 mm diameter orange plastic ducting	0.94	1.68	1.6	10
	In situ concrete reference C40/50	2.4	17,250	41,400	22
	Structural steel (including piles)	7.85	747.6	5,868.7	15
	Bitumen waterproofing	1	65,213.3	65,213.3	90
	Concrete piles	2.4	4,056.7	9,736.2	22
	High yield steel deformed Type 2 bar reinforcement	7.85	130.96	1,028	15

Activity	Material category	Material density (tonnes/m³)	Quantity required to be imported to site		Recycled content (% by weight)
			m³	tonnes	
	uPVC pipe	0.94	12.075	11.35	10
		Total	129,325	219,045	34.6% (75,790 tonnes)
		Total (aggregate containing materials)	62,801	146,297	51.6% (75,489 tonnes)

10.10.4. The estimated main categories and quantities of CDW waste generated during construction are shown in Table 10.6. A 5% wastage rate has been applied to the main construction materials. The estimated recovery rates are based on the 'good practice quick win' recovery rates set out in the in the WRAP guidance document Achieving good practice waste minimisation and management, Guidance for construction clients, design teams and contractors (undated). The overall recovery rate is calculated by tonnage.

Table 10-6: Estimated main types and quantities of CDW generated during construction

Activity	Waste type	Waste density (tonnes/m³)	Quantity		Potential management route(s)	Potential recovery rate (% by weight)
			m³	Tonnes		
Site preparation and earthworks	Vegetation and wood	1.25	Unquantified		Off-site composting or recovery	90%
	Concrete	2.4	284.2	682.0	Off-site recycling	95%
	Rebar	7.85	7.6	59.7	Off-site recycling	100%
	Asphalt	2.4	31.5	75.6	Off-site recycling	95%
	Aluminium parapet	2.8	15.4	43.1	Off-site recycling	95%
	Steel handrail	7.85	1	7.9	Off-site recycling	95%
	Full depth pavement removal - Asphalt	2.4	816.2	1,959	Off-site recycling	95%
	Full depth pavement removal - unbound aggregates	1.9	1,700.5	3231.0	Off-site recycling	95%

Activity	Waste type	Waste density (tonnes/m^3)	Quantity		Potential management route(s)	Potential recovery rate (% by weight)
			m^3	Tonnes		
	Surface course cold milling (Planings)	2.4	1,494.5	3,586.8	Off-site recycling	95%
	Full depth footway removal - asphalt	2.4	135.4	324.9	Off-site recycling	95%
	Full depth footway removal - unbound aggregates	1.9	282	535.8	Off-site recycling	95%
	Safety barriers - all types	7.85	9.5	74.4	Off-site recycling	100%
	Fencing - all types	0.5	41.64	20.82	Off-site recycling	90%
	Lighting column	7.85	0.06	0.48	Off-site recycling	100%
	Chamber covers and frames	7.85	0.5	3.5	Off-site recycling	95%
	Precast concrete kerbs - all types	2.4	51.10	122.6	Off-site recycling	95%
	Linear drainage systems	0.97	13.6	13.2	Off-site recycling	80%
	Gully grating and frame	7.85	0.3	2.1	Off-site recycling	95%
Site construction	Timber post and rail and four rail fence	0.5	6.4	3.2	Off-site recycling	90%
	Timber post and strained wire fence - post	0.5	5.8	2.9	Off-site recycling	90%

Activity	Waste type	Waste density (tonnes/m^3)	Quantity		Potential management route(s)	Potential recovery rate (% by weight)
			m^3	Tonnes		
	Timber post and strained wire fence - wire	7.85	0.02	0.17	Off-site recycling	100%
	Total recycled HDPE Plastic Panel Fencing	0.97	0.8	0.8	Off-site recycling	100%
	Wooden posts	0.5	0.9	0.5	Off-site recycling	100%
	Performance Class N2 working width W4, W3 and W2 (Single sided) steel safety barrier	7.85	1.9	15.2	Off-site recycling	100%
	Plastic pipework	0.97	3.5	3.4	Off-site recycling	80%
	Filter drain	0.97	1.0	0.9	Off-site recycling	80%
	Concrete drainage structures	2.4	14.4	34.7	Off-site recycling	95%
	Pavements - sub-base type 1 unbound mixture (150mm deep)	1.9	442.7	841.1	Off-site recycling	95%
	Pavements - capping (300mm deep)	2.4	393.2	943.8	Off-site recycling	95%
	Pavements - base - AC32 dense base (265mm deep)	2.4	289	693.5	Off-site recycling	95%
	Pavements - binder -	2.4	99.3	238.3	Off-site recycling	95%

Activity	Waste type	Waste density (tonnes/m^3)	Quantity		Potential management route(s)	Potential recovery rate (% by weight)
			m^3	Tonnes		
	dense Binder (60mm deep)					
	Pavements - surface course - (50mm deep)	2.4	100.1	240.3	Off-site recycling	95%
	Cold milling (50mm)	2.4	29.6	71.1	Off-site recycling	95%
	Bond coat	2.4	589	1,413.6	Off-site recycling	95%
	Rigid pavement - bound foundation, CBGM (300mm deep)	2.4	32.1	77.1	Off-site recycling	95%
	Rigid pavement - concrete pavement (290mm deep)	2.4	31.0	74.5	Off-site recycling	95%
	Pavements – PQC	2.4	9.24	22.18	Off-site recycling	95%
	Footways and paved areas - asphalt paving	2.4	37.45	89.87	Off-site recycling	95%
	Footways and paved areas - grasscrete or similar	2.4	0.29	0.69	Off-site recycling	95%
	Kerb - bullnose	2.4	7.18	17.24	Off-site recycling	95%
	Tactile paving slabs	2.4	0.06	0.13	Off-site recycling	95%
	Lighting column	2.8	0.05	0.15	Off-site recycling	100%

Activity	Waste type	Waste density (tonnes/m^3)	Quantity		Potential management route(s)	Potential recovery rate (% by weight)
			m^3	Tonnes		
	Total traffic signs and posts	7.85	0.53	4.12	Off-site recycling	100%
	100 mm diameter orange plastic ducting	0.94	0.08	0.08	Off-site recycling	80%
	In situ concrete reference C40/50	2.4	862.5	2,070	Off-site recycling	95%
	Structural steel (including piles)	7.85	37.4	293.4	Off-site recycling	100%
	Bitumen waterproofing	1	3,260.7	3,260.7	Off-site recycling	95%
	Concrete piles	2.4	202.8	486.8	Off-site recycling	95%
	High yield steel deformed Type 2 bar reinforcement	7.85	6.5	51.4	Off-site recycling	100%
	uPVC pipe	0.94	0.6	0.6	Off-site recycling	80%
		Total	11,351	21,695	**Total recovery rate**	94% (20,393 tonnes)

10.10.5. Construction works are anticipated to generate approximately 126,744m^3 (253,488 tonnes assuming an average density of 2 tonnes per m^3 for general soils and stones) of excavation arisings which are unsuitable for retention on the Proposed Scheme or surplus to requirements. These excavated materials are not included in Table 10-6 or the calculations for waste recovery as the governments's recovery target of 70% does not include uncontaminanted, excavated soils and stones. These materials impact on landfill capacities and are assessed separately in Table 10-7.

Assessment of significant effects

10.10.6. Potential impacts have been assessed prior to mitigation) and the residual effects then evaluated taking account of committed design, mitigation and enhancement measures (see section 10.9). The predicted effects are presented in Table 10-7.

10.10.7. Based on the information provided in Table 10.7 the likely impacts are assessed as being slight adverse and not signficant.

Table 10-7: Predicted residual effects

Predicted impact	Predicted impacts category	Committed mitigation	Significance Category	Predicted residual effects and significance
Depletion of natural resources through the predominant use of primary aggregates and the use of recycled and or secondary aggregates below the 31% east of England regional target.	Moderate	Design for re-use and recovery of existing materials on the Proposed Scheme or those that can be sourced from other projects. Maximising the use of renewable materials and materials with recycled content. Use of construction, demolition and excavation waste (with treatment) that meets the appropriate Waste and Resources Action Programme (WRAP) Quality Protocols. Re-use of site won excavated materials within the Proposed Scheme DCO boundary without the need for treatment, and by meeting waste exemption, or CL:AIRE DoW CoP criteria.	Slight adverse	The regional guideline target of 31% for the east of England relating to the use of secondary and recycled aggregates will be adopted (as set in the EMP), where it is technically appropriate and economically feasible. Given the local availability of secondary and recycled aggregates it is possible to achieve this target in practice. **In accordance with DMRB LA 110 and ensuring the committed mitigation measures are followed , the effects are assessed as being slight adverse and not significant.**
Depletion of natural resources through recycling and or recovery of CDW below the 70% recovery target.	Large	Design for re-use and recovery of existing materials on the Proposed Scheme or those that can be sourced from other projects. Use of construction, demolition and excavation waste (with treatment) that meets the appropriate Waste and Resources Action Programme (WRAP) Quality Protocols. Re-use of site won excavated materials within the Proposed Scheme DCO boundary without the need for treatment, and by meeting waste exemption, or CL:AIRE DoW CoP criteria.	Slight adverse	Achieving 'good practice' during construction, it is anticipated that an overall CDW recovery rate of 94% can be achieved. This exceeds the Government's 70% target for recovery of construction waste. **In accordance with DMRB LA 110 and ensuring the committed mitigation measures are followed, the effects are assessed as being slight adverse and not significant.**
Sterilisation of one or more mineral safeguarding site.	Large	Re-use of site won excavated materials within the Proposed Scheme DCO	Slight adverse	The DCO boundary of the Proposed Scheme intersects sand deposits attributed to HGF. These sand deposits form part of the council's safeguarded mineral resources (sands and gravels).

Predicted impact	Predicted impacts category	Committed mitigation	Significance Category	Predicted residual effects and significance
		boundary without the need for treatment, and by meeting waste exemption, or CL:AIRE DoW CoP criteria. Consider use of surplus excavated material outside of the Proposed Scheme construction boundary.		As detailed in Appendix 10.4 MIA (TR010037/APP/6.3), it is not anticipated that these mineral safeguarding sites will be sterilised. **In accordance with DMRB LA 110 and ensuring the committed mitigation measures are followed, the effects are assessed as being slight adverse and not significant.**
Reduction in the capacity of regional inert and non-hazardous landfill facilities through: • generation of surplus excavation materials • generation and disposal of CDW from the demolition of any existing buildings or structures • generation of packaging materials and construction material wastage through damage and overordering.	Very large	The adoption of best practice to promote the re-use of construction, demolition and excavation waste over transport off-site for re-use or disposal. Use of construction, demolition and excavation waste (with treatment) within the Proposed Scheme DCO boundary that meets the appropriate Waste and Resources Action Programme (WRAP) Quality Protocols. Management of waste in accordance with the Site Waste Management Plan (SWMP). A requirement for waste to be appropriately segregated and stored or stockpiled onsite by waste type, to ensure waste remains in a suitable condition to be re-used. Consider re-use of suitable surplus excavated material outside of the Proposed Scheme construction boundary. Wastes that cannot be reused or recycled on site to be transported only to appropriately permitted recycling or disposal sites.	Slight adverse	Construction is anticipated to generate approximately 126,744 m^3 (253,488 tonnes) of earthworks materials unsuitable for retention on the Proposed Scheme or surplus to requirements. An excess of approximately 11,351m^3 (21,695 tonnes) of materials is anticipated (including unacceptable, and surplus materials, and wastage from construction). The Proposed Scheme is unlikely to generate large quantities of inert and non-hazardous waste (as assessed in Appendix 10.2 (**TR010037/APP/6.3**)) relative to regional landfill capacities (regional statistics given in the Environment Agency Waste Data Interrogator 2018 reported the east of England region as having a total inert and non-hazardous waste landfill capacity of approximately 45,434,000m^3). As stated in Appendix 10.2 (**TR010037/APP/6.3**), no hazardous wastes were identified in ground investigation undertaken to date (Geotechnics Ltd 2018). Should previously unidentified hazardous waste be identified, the Northamptonshire Minerals and Waste Local Plan Minerals and Waste Monitoring Report 2017 (published November 2018) indicates that there is sufficient hazardous waste landfill capacity in this adjacent region up to 2026. Based on a worst-case assumption that all waste generated from the Proposed Scheme would be disposed of to landfill (138,095m^3), this would utilise approximately 0.3% of the regional landfill capacity. In practice a large proportion of waste from the Proposed Scheme is likely to be recovered rather than disposed of to landfill, further reducing the overall quantities of waste for disposal. The Proposed Scheme would result in less than 1% reduction or alteration in the regional capacity of waste infrastructure (specifically landfill), and there is adequate disposal capacity within the region to accommodate all the waste from the Proposed Scheme. In practice however, a high proportion of waste would be recovered rather than disposed.

Predicted impact	Predicted impacts category	Committed mitigation	Significance Category	Predicted residual effects and significance
				In accordance with DMRB LA 110 and ensuring the committed mitigation measures are followed, the effects are assessed as being slight adverse and not significant.
Generation of hazardous waste requiring disposal to hazardous waste landfill outside of the region.	Large	The adoption of best practice to promote the re-use of construction, demolition and excavation waste over transport off-site for re-use or disposal. Use of construction, demolition and excavation waste (with treatment) within the Proposed Scheme DCO boundary that meets the appropriate Waste and Resources Action Programme (WRAP) Quality Protocols. Management of waste in accordance with the Site Waste Management Plan (SWMP). A requirement for waste to be appropriately segregated and stored or stockpiled onsite by waste type, to ensure waste remains in a suitable condition to be re-used. Consider re-use of suitable surplus excavated material outside of the Proposed Scheme construction boundary. Wastes that cannot be reused or recycled on site to be transported only to appropriately permitted recycling or disposal sites.	Slight adverse	The current design solution will not generate any notable wastes at the location of the Cantley Lane landfill and gravel pit west of the existing A47. Based on current design assumptions, less than 1% of the Project Scheme's total volume of waste will require disposal to landfill outside of the region as hazardous waste. **In accordance with DMRB LA 110 and ensuring the committed mitigation measures are followed, the effects are assessed as being slight adverse and not significant.**

10.11. Monitoring

10.11.1. Monitoring of waste generation during the construction phase would be undertaken via the SWMP, which is to be included within the EMP (**TR010037/APP/7.4**), by the Principal Contractor.

10.11.2. The focus of the SWMP will be monitoring the quantities and types of waste generated, as well as the duty of care information for the contractors transferring the waste and the sites the waste is taken to for management.

10.11.3. The EMP will provide detailed information on the duty of care documents that will be needed, such as the waste transfer notes and consignment notes, as well as strategies to be implemented to minimise waste generation and increase re-use and recycle.

10.11.4. The MMP will monitor and track the movement, storage and placement of excavated materials within the Scheme or outside the Scheme in accordance with CLAIRE DoW CoP.

10.12. Summary of effects

10.12.1. The potential impacts of the Proposed Scheme from the use of material resources and generation of waste were assessed against the baseline information on material assets (materials availability) and waste (landfill capacity) generated by the relevant authorities, based on predicted regional demand projections (including consideration for other significant projects within the east of England region).

10.12.2. Significant environmental effects from the use of material assets and generation of waste during the first year of operational activities (opening year) are not predicted due to limited material use and waste generation from infrequent maintenance activities.

10.12.3. Design, mitigation and enhancement measures will be implemented during construction and controlled through the EMP. Overall, the recycled content of the materials used are predicted to be in excess of the regional target of 31% and over 70% of the waste generated will be re-used or recycled in line with the Government's target for the recovery of construction waste. Additionally, the Proposed Scheme is not likely to result in a 1% reduction or alteration in the regions landfill capacity. The residual effects during construction will be slight adverse and not significant.

10.13. References

- Highways England (2019) Design Manual for Roads and Bridges LA 110 Material Assets and Waste (published August 2019). Available online at: https://www.standardsforhighways.co.uk/ha/standards/
- EU Waste Framework Directive 2008/98/EC (published November 2008). Available online at: https://ec.europa.eu/environment/waste/framework/
- Department for Transport (2014) National Policy Statement for National Networks (NPSNN) (published December 2014). Available online at: https://www.gov.uk/government/publications/national-policy-statement-for-national-networks
- Department for Environment Food and Rural Affairs (2018) Resources and Waste Strategy for England (published December 2018). Available online at: https://www.gov.uk/government/publications/resources-and-waste-strategy-for-england
- Department for Environment Food and Rural Affairs (2018) 25 Year Environment Plan (published January 2018). Available online at: https://www.gov.uk/government/publications/25-year-environment-plan
- Norfolk County Council (2019) Draft Norfolk Minerals and Waste Plan Preferred Options Document (published July 2019). Available online at: https://www.norfolk.gov.uk/what-we-do-and-how-we-work/policy-performance-and-partnerships/policies-and-strategies/minerals-and-waste-planning-policies/norfolk-minerals-and-waste-local-plan-review
- Norfolk County Council (2016) Norfolk Minerals and Waste Development Framework (published September 2016). Available online at: https://www.norfolk.gov.uk/mineralsandwastelocalplanreview
- Norfolk County Council Mineral Safeguarding Area Mapping (Accessed August 2020). Available online at: https://norfolk.opus4.co.uk/planning/localplan/maps/norfolk-minerals#/x:599779/y:312750/z:0/b:15/o:1157,o:1165,o:1252
- Norfolk County Council (2011) Norfolk Core Strategy and Minerals and Waste Development Management Plan 2010-2026 (published September 2011). Available online at: https://www.norfolk.gov.uk/what-we-do-and-how-we-work/policy-performance-and-partnerships/policies-and-strategies/minerals-and-waste-planning-policies/adopted-policy-documents
- South Norfolk Council (2014) Joint Core Strategy for Broadland, Norwich and South Norfolk (Adopted 2011, amendments adopted in 2014). Available online at https://www.south-norfolk.gov.uk/sites/default/files/JCS_Adopted_Version_Jan_2014.pdf
- Department for Environment Food and Rural Affairs (2021) Waste Management Plan for England (published January 2021). Available online at: https://www.gov.uk/government/publications/waste-management-plan-for-england-2021

- Ministry of Housing, Communities and Local Government (2009) The National and Regional Guidelines for Aggregates Provision in England 2005 to 2020 (published June 2009). Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/7763/aggregatesprovision2020.pdf
- Highways England (2019) Design Manual for Roads and Bridges LA 120 (Environmental management plan) (published March 2020). Available online at: https://www.standardsforhighways.co.uk/ha/standards/
- Environment Agency (2020) Waste Data Interrogator 2018 (published March 2020). Available online at: https://data.gov.uk/dataset/312ace0a-ff0a-4f6f-a7ea-f757164cc488/waste-data-interrogator-2018
- Norfolk County Council (2020) Minerals and Waste Development Framework annual monitoring report of waste data for 2018 to 31 March 2019 (published March 2020). Available online at: https://www.norfolk.gov.uk/-/media/norfolk/downloads/what-we-do-and-how-we-work/policy-performance-and-partnerships/policies-and-strategies/minerals-and-waste-planning/annual-monitoring-report-waste-data-2018-19.pdf?la=en
- Norfolk County Council (2019) Norfolk Minerals and Waste Local Plan Aggregate Monitoring Report for 2018 (published December 2019). Available online at: https://www.norfolk.gov.uk/what-we-do-and-how-we-work/policy-performance-and-partnerships/policies-and-strategies/minerals-and-waste-planning-policies/annual-monitoring-reports
- Norfolk County Council (2020) Norfolk Minerals and Waste Development Framework annual waste data monitoring report for 2018 to 2019 (published March 2020). Available online at: https://www.norfolk.gov.uk/-/media/norfolk/downloads/what-we-do-and-how-we-work/policy-performance-and-partnerships/policies-and-strategies/minerals-and-waste-planning/annual-monitoring-report-waste-data-2018-19.pdf?la=en
- Northamptonshire County Council (2018) Northamptonshire Minerals and Waste Local Plan Minerals and Waste Monitoring Report 2017 (published November 2018). Available online at: https://www.northamptonshire.gov.uk/councilservices/environment-and-planning/planning/planning-policy/minerals-and-waste-planning-policy/Pages/minerals-and-waste-monitoring-reports-local-aggregates-assessments.aspx
- Highways England (2019) Design Manual for Roads and Bridges LA 104 (Environmental assessment and monitoring) (published August 2020). Available online at: https://www.standardsforhighways.co.uk/ha/standards/
- WRAP (undated) Achieving good practice Waste Minimisation and Management, Guidance for construction clients, design teams and contractors. Available online at: http://www.wrap.org.uk/sites/files/wrap/WMM%20guide%20Mid%20level.pdf
- BES 6001 Responsible Sourcing of Construction Products.

- CL:AIRE (2011) Definition of Waste Code of Practice, Version 2, 2011 CL:AIRE Code of Practice (published March 2011). Available online at: https://www.claire.co.uk/component/phocadownload/category/8-initiatives?download=212:definition-of-waste-development-industry-code-of-practice
- WRAP Net Waste Tool. Available online at: http://nwtool.wrap.org.uk/Home.aspx?intM=1
- WRAP Designing Out Waste Tool for Civil Engineering. Available online at: http://www.wrap.org.uk/sites/files/wrap/DoWT-CE%20User%20Guide1.pdf
- BSRIA (2011) Embodied Carbon: The Inventory of Carbon and Energy (ICE) (published October 2011). Available online at: https://greenbuildingencyclopaedia.uk/wp-content/uploads/2014/07/Full-BSRIA-ICE-guide.pdf
- The Waste (England and Wales) Regulations 2011 (as amended) (published March 2011). Available online at: https://www.legislation.gov.uk/uksi/2011/988/contents/made
- Hazardous Waste (England and Wales) Regulations 2005 (as amended) (published March 2005). Available online at: https://www.legislation.gov.uk/uksi/2005/894/contents/made
- Hazardous Waste Directive (91/689/EC) (published December 1991). Available online at: https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A31991L0689
- Hazardous Waste (Miscellaneous Amendments) Regulations 2015 (published June 2015). Available online at: https://www.legislation.gov.uk/id/uksi/2015/1360
- Environmental Permitting (England and Wales) Regulations 2016 (as amended) (published December 2016). Available online at: https://www.legislation.gov.uk/uksi/2016/1154/contents/made
- Environment Agency Standard Rules SR2015 No 39 (2016) - use of waste in a deposit for recovery operation (published February 2016). Available online at: https://www.gov.uk/government/collections/standard-rules-environmental-permitting
- Department for Communities and Local Government (2014) National Planning Policy for Waste (published October 2014). Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/364759/141015_National_Planning_Policy_for_Waste.pdf
- Department for Environment Food and Rural Affairs (2009) Construction Code of Practice for the Sustainable Use of Soils on Construction Sites, (published September 2009). Available online at: https://www.gov.uk/government/publications/code-of-practice-for-the-sustainable-use-of-soils-on-construction-sites

- Environmental Protection Act 1990 (published November 1990). Available online at: https://www.legislation.gov.uk/ukpga/1990/43/contents
- Ministry of Housing, Communities and Local Government (2019) National Planning Policy Framework (published February 2019). Available online at: https://www.gov.uk/government/publications/national-planning-policy-framework--2
- Norfolk County Council (2011) Norfolk Core Strategy and Minerals and Waste Development Management Plan 2010-2026 (published September 2011). Available online at: https://www.norfolk.gov.uk/what-we-do-and-how-we-work/policy-performance-and-partnerships/policies-and-strategies/minerals-and-waste-planning-policies/adopted-policy-documents
- Norfolk County Council (2017) Minerals Site Specific Allocations Development Plan (adopted October 2013, amended 2017). Available online at: https://www.norfolk.gov.uk/what-we-do-and-how-we-work/policy-performance-and-partnerships/policies-and-strategies/minerals-and-waste-planning-policies/adopted-policy-documents
- Norfolk County Council (2013) The Waste Site Specific Allocations Development Plan (published September 2013, adopted October 2013). Available online at: https://www.norfolk.gov.uk/what-we-do-and-how-we-work/policy-performance-and-partnerships/policies-and-strategies/minerals-and-waste-planning-policies/adopted-policy-documents
- Environment Agency (2018), Technical Guidance WM3, Waste Classification, Guidance on the Classification and Assessment of Waste Version 1.1: (Published May 2018). Available online at: https://www.gov.uk/government/publications/waste-classification-technical-guidance
- European Council Decision 2003/33/EC (published December 2002). Available online at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32003D0033
- Health and Safety Executive, Control of Substances Hazardous to Health Regulations 2002 (published October 2002). Available online at: https://www.hse.gov.uk/nanotechnology/coshh.htm
- Health and Safety Executive, Health and Safety at Work Act 1974 (as amended) (published July 1974) Available online at: https://www.hse.gov.uk/legislation/hswa.htm
- Controlled Waste (Registration of Carriers and Seizure of Vehicles) Regulations 1991 (published July 1991). https://www.legislation.gov.uk/uksi/1991/1624/contents/made

10.14. Glossary

BES: BRE Environmental and Sustainability standard

BRE: Buildings Research Establishment

BSRIA: Building Services Research and Information Association

CDW: Construction and Demolition Waste

CIRIA: Construction Industry Research and Information Association

CL:AIRE: Contaminated Land Applications in Real Environments

DEFRA: Department for Environment Food and Rural Affairs

DMRB: Design Manual for Roads and Bridges

DoW CoP: Definition of Waste Code of Practice

EMP: Environmental Management Plan

EU: European Union

ES: Environmental Statement

GIR: Ground Investigation Report

ICE: Inventory of Carbon and Energy

KPI: Key Performance Indicators

LoW: List of Waste

MMP: Materials Management Plan

NPSNN: National Policy Statement for National Networks

SNRHW: Stable Non-reactive Hazardous Waste

SWMP: Site Waste Management Plan

WAC: Waste Acceptance Criteria

WM3: Technical Guidance WM3, Waste Classification, Guidance on the Classification and Assessment of Waste

WRAP: Waste and Resources Action Programme