

# **Norwich Western Link**

## **Environmental Statement**

### **Chapter 5: Approach to EIA**

#### **Appendix 5.3: Environmental Impact Assessment Scoping Addendum 2022 Part 2 of 2**

Author: WSP

Document Reference: 3.05.02

Version Number: 00

Date: March 2024

## **Contents**

1	Introduction .....	3
---	--------------------	---

## 1 Introduction

- 1.1.1 The purpose of this Addendum report is to confirm how the Scheme has developed since the adoption of the Scoping Opinion, including a change to the route alignment, the confirmation of delivery of Biodiversity Net Gain as a Scheme Objective and further information about offsite ecological mitigation and compensation areas. This Addendum Report considers whether and how these changes should impact on the scope of the Environmental Statement (ES).
- 1.1.2 Section 2 of this Report outlines how there has been an alignment refinement in a discrete section at the northern part of the Scheme. Whilst this has slightly changed the study area considered in the assessment it does not change the potential for likely significant effects as a result of the Scheme. Following the alignment refinement, the baseline will be updated accordingly. The scope of the assessments reported in the ES will not change and the Scoping Report and Scoping Opinion remain valid.
- 1.1.3 Section 3 of this Report outlines how the off-site habitat creation areas will be assessed in the ES. Given the nature of the habitat creation works, they have a lower potential for significant effects compared to the main engineering work (highways, viaduct).
- 1.1.4 No new likely significant effects have been identified. A small additional area of assessment will be included in the climate greenhouse gas assessment under operational land use change. In addition, the potential increase/loss in carbon sequestration from habitat creation opportunities and cleared woodland will be assessed using the Woodland Carbon Code tool and reported in the ES. The ES will also consider the issue of nutrient neutrality.
- 1.1.5 Section 4 outlines that the Transport Assessment (TA) will undergo its own scoping exercise. The TA and traffic model will form the basis of several ES assessment chapters (such as noise and air quality). This scoping

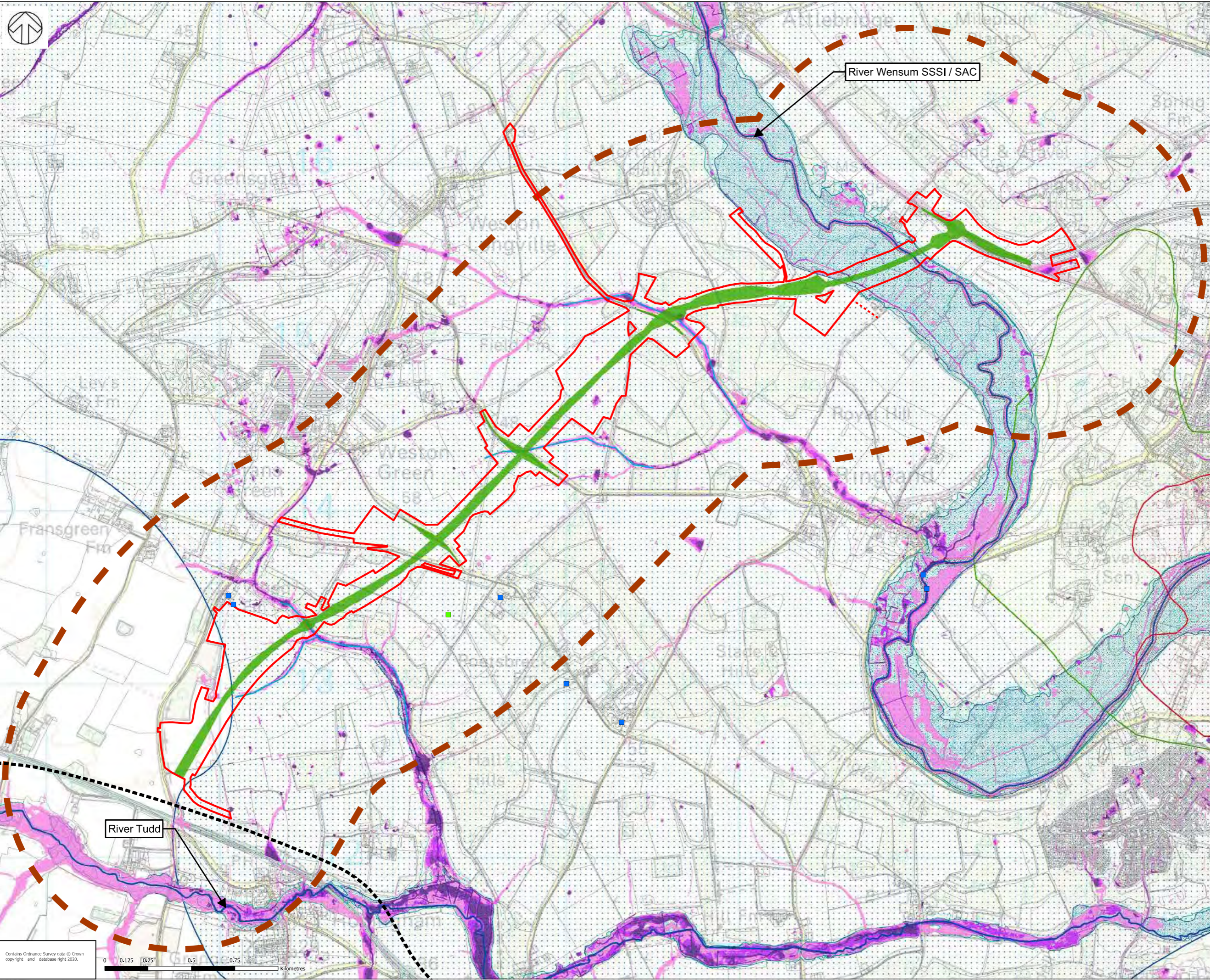
assessment for the TA will ensure a robust basis for elements of the ES linked to transport and traffic assumptions.

- 1.1.6 Section 5 summarises this report and concludes that there is no significant change in the scope of the assessments to be reported in the ES and the Scoping Report and Scoping Opinion remain valid.
- 1.1.7 We have included a summary of key information shown in this document in an accessible format. However, some users may not be able to access all technical details. If you require this document in a more accessible format please contact [norwichwesternlink@norfolk.gov.uk](mailto:norwichwesternlink@norfolk.gov.uk).

# Appendix B-2

## **WATER ENVIRONMENTAL CONSTRAINTS PLAN**





DO NOT SCALE

### Key

- Proposed Scheme
  - Site Extents Boundary
  - 1km Water Constraints Study Area
  - A47 Preferred Route Alignment
- Rivers**
- Main Rivers
  - Ordinary Watercourses
- Flood Zones**
- Flood Zone 3
  - Flood Zone 2
- Risk of Flooding from Surface Water**
- High (probability of occurrence 1 in 30 years)
  - Medium (probability of occurrence between 1 in 30 years and 1 in 100 years)
  - Low (probability of occurrence between 1 in 100 years and 1 in 1,000 years)
- Groundwater Source Protection Zones**
- Zone I - Inner Protection Zone
  - Zone II - Outer Protection Zone
  - Zone III - Total Catchment
- Protected Areas**
- Special Area of Conservation
  - Site of Special Scientific Interest
- Abstractions and Discharges**
- Abstraction
  - Discharge

DRAWING STATUS: P01 for EIA Scoping Report

**wsp**

62-64 Hills Road  
CB2 1LA Cambridge  
Tel: +44 (0)20 7314 5000  
Website: www.wsp.com

CLIENT: NORFOLK COUNTY COUNCIL

ARCHITECT: N/A

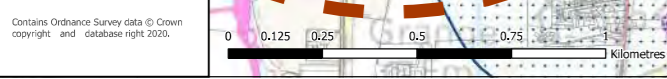
PROJECT: NORWICH WESTERN LINK

TITLE: WATER ENVIRONMENT CONSTRAINTS PLAN

SCALE @ A1: 1:10,000	CHECKED: UKAZS001	APPROVED: N/A	
CAD FILE: N/A	DESIGN/DRAWN: UKECF002	DATE: 22/05/2020	

PROJECT No: 70041922	DRAWING No: FIGURE 10-1	REV: B
----------------------	-------------------------	--------

© WSP Global Inc



Contains Ordnance Survey data © Crown copyright and database right 2020.

# Appendix C

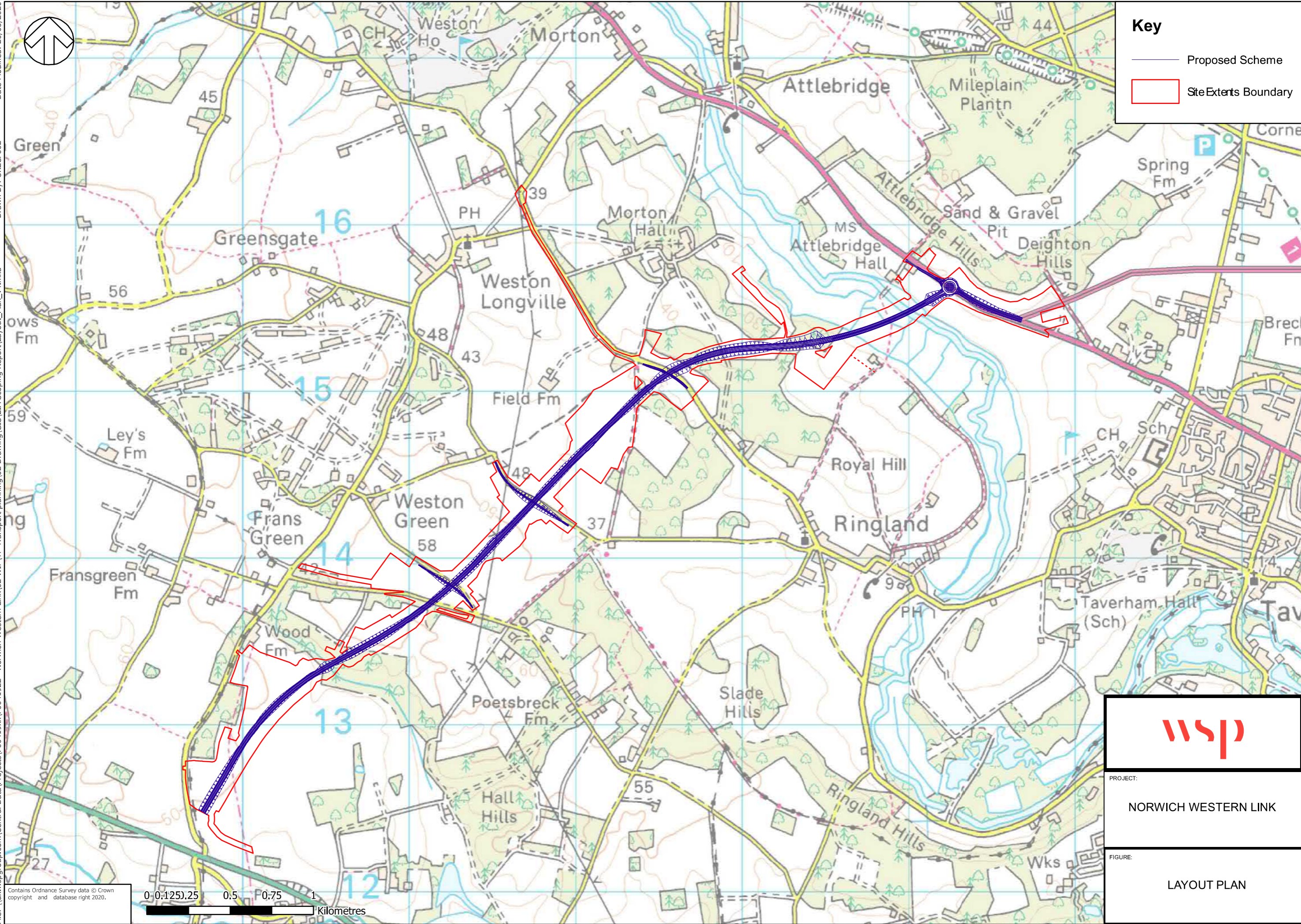
## PROJECT LAYOUT PLAN





**Key**

- Proposed Scheme
- Site Extents Boundary



Contains Ordnance Survey data © Crown copyright and database right 2020.



PROJECT:  
NORWICH WESTERN LINK

FIGURE:  
LAYOUT PLAN



# Appendix D-1

## **AIR QUALITY - ADDITIONAL INFORMATION**



## AIR QUALITY - ADDITIONAL INFORMATION

- 1.1.1 **Table A5-1** below shows the results from WSP's on-going roadside NO<sub>2</sub> diffusion tube survey, which is being conducted at 10 locations. The location of these sites is shown in **Figure 5-2 (Appendix D-3)**. The first 4 months of monitoring data (September-December 2019) from the 6 month survey are presented in **Table A5-1** below.
- 1.1.2 The measurements have been annualised using 2018 data from two Defra Automated Urban and Rural Network (AURN) continuous monitoring stations within 50 miles of the Scheme (Norwich Lakenfields and Wicken Fen) in accordance with LAQM.TG(16).
- 1.1.3 An annualisation factor of 0.74 was used for tubes NWL\_2, NWL\_3, NWL\_8 and NWL\_9 whereas a factor of 0.80 was used for tubes NWL\_5 to NWL\_7. The annualised mean results were then adjusted using a factor of 0.89 derived from Defra's bias adjustment spreadsheet<sup>1</sup> for diffusion tubes prepared by Gradko using 50% triethanolamine (TEA) in acetone.
- 1.1.4 The highest measured annual mean concentration was 27.9µg/m<sup>3</sup> which was measured at NWL\_7 (Tomsfield Hatfield) which is located adjacent to the A47 westbound layby, 2.6m from the road. Concentrations at all sites are below the annual mean NO<sub>2</sub> objective of 40µg/m<sup>3</sup>.

**Table A5-1 - WSP Roadside NO<sub>2</sub> Diffusion Tube Monitoring Data (September - December 2019)**

Site ID	Site Name	Co-ordinates (Based on OS Grid Reference, m)		Annualised NO <sub>2</sub> Concentration (µg/m <sup>3</sup> )
		X	Y	
NWL_1*	Swanland Road	623203	308616	Insufficient data due to tubes missing on changeover
NWL_2	Tollgate Road	616984	314157	20.9
NWL_3	Dixons Hill Close	617039	314101	23.0
NWL_4	Not used	-	-	-
NWL_5	Bullen's Green Lane	612822	316727	20.3
NWL_6	Tudor Close	610205	318259	19.6
NWL_7	Tomsfield Hatfield	610271	311986	27.9
NWL_8	Crossbrook	612784	310988	11.2
NWL_9	Meadow Croft	616934	310350	25.5
NWL_10	Bishops Close	619069	309691	Insufficient data due to tubes missing on changeover
<u>Notes:</u>				

<sup>1</sup> Defra (2019). Diffusion Tube Bias Adjustment Factors Spreadsheet for September 2019. Available at: <https://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html>

Site ID	Site Name	Co-ordinates (Based on OS Grid Reference, m)		Annualised NO <sub>2</sub> Concentration (µg/m <sup>3</sup> )
		X	Y	
*The diffusion tube at site NWL_1 is co-located with the NCC Castle Meadow (CM1) continuous automatic monitoring station.				
Values shown in <b><i>bold, italics</i></b> exceed the annual mean NO <sub>2</sub> air quality objective of 40µg/m <sup>3</sup> .				

1.1.5 **Table A5-2** below shows the site information for the local authority continuous air quality monitoring station and roadside NO<sub>2</sub> diffusion tube monitoring sites within the provisional study area. **Table A5-3** shows the 2014-18 annual mean NO<sub>2</sub> concentrations for the locations given in **Table A5-2**.

**Table A5-2 - Local Authority Monitoring Site Information**

Monitoring Type	Site ID	Site Name	Site Type	Co-ordinates (Based on OS Grid Reference, m)	
				X	Y
<b>Norwich City Council<sup>2</sup></b>					
Continuous Automatic Monitoring Station	CM2	Lakenfields AURN	Urban Background	623638	306944
Diffusion Tube	DT1	256 King Street	Roadside	623863	307679
	DT2	Queens Road Travelodge	Roadside	622917	307974
	DT5	Chalk Hill Road	Roadside	623907	308597
	DT6	130 Magdalen Street	Roadside	623161	309550
	DT13	Castle Meadow	Roadside	623141	308607
	DT14	Castle Meadow 2	Roadside	623250	308590
	DT16	Zipfel House	Roadside	623186	309650
	DT17	68 Bull Close Road	Roadside	623305	309544
	DT19	Cattlemarket Street	Roadside	623321	308431
	DT21	Rotary House King Street	Roadside	623880	307659
	DT22	Carrow Bridge House	Roadside	623901	307710
	DT23	62 Magpie Road	Roadside	622971	309652
DT24	26 Bull Close Road	Roadside	623229	309625	

<sup>2</sup> Norwich City Council (2019). 2019 Air Quality Annual Status Report (ASR). Available at: [https://www.norwich.gov.uk/download/downloads/id/5582/2019\\_air\\_quality\\_annual\\_status\\_report.pdf](https://www.norwich.gov.uk/download/downloads/id/5582/2019_air_quality_annual_status_report.pdf)

Monitoring Type	Site ID	Site Name	Site Type	Co-ordinates (Based on OS Grid Reference, m)	
				X	Y
	DT25	24 Bargate Court	Roadside	623422	309388
	DT26	3 Riverside Road	Roadside	623870	308516
	DT28	71 Dukes Court	Roadside	622431	308663
<b>Broadland District Council<sup>3</sup></b>					
Diffusion Tube	BN17	School Road, Drayton	Roadside	617794	314204
	BN21	Thorpe End	Roadside	627741	310902
	BN22	Wroxham Road/Ring Road, Sprowston	Roadside	624060	311166
<b>South Norfolk District Council</b>					
Diffusion Tube	DT17	84 West End, Costessey	Roadside	616652	311650
	DT26	Newmarket Road, Cringleford	Roadside	619801	305869
	DT27	Lord Nelson Drive, Costessey	Roadside	616348	310585

**Table A5-3 - Local Authority Annual Mean NO<sub>2</sub> Concentrations (2014-18)**

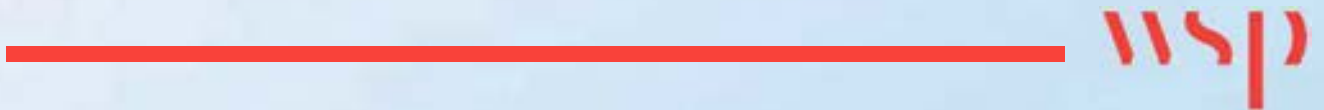
Site ID	Annual Mean NO <sub>2</sub> Concentration (µg/m <sup>3</sup> )				
	2014	2015	2016	2017	2018
<b>Norwich City Council</b>					
CM2	14.0	12.0	14.2	13.0	12.0
DT1	<b>41.5</b>	36.2	37.7	36.3	33.3
DT2	33.6	30.9	33.2	29.7	No Data
DT5	32.9	29.2	29.9	31.3	29.2
DT6	30.9	28.4	29.6	31.2	27.1
DT13	<b>56.3</b>	<b>56.4</b>	<b>45.9</b>	<b>48.5</b>	<b>44.9</b>
DT14	<b>50.5</b>	<b>48.1</b>	<b>41.1</b>	<b>45.4</b>	No Data
DT16	39.0	34.8	38.6	39.9	33.4
DT17	29.0	26.9	26.9	29.1	No Data

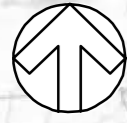
<sup>3</sup> Broadland District Council and South Norfolk District Council (2019). 2019 Air Quality Annual Status Report (ASR). Available at: [https://www.south-norfolk.gov.uk/sites/default/files/downloads/asr\\_template\\_england\\_2019\\_0.pdf](https://www.south-norfolk.gov.uk/sites/default/files/downloads/asr_template_england_2019_0.pdf)

Site ID	Annual Mean NO <sub>2</sub> Concentration (µg/m <sup>3</sup> )				
	2014	2015	2016	2017	2018
DT19	<b>46.0</b>	37.9	39.1	37.7	36.1
DT21	36.6	34.3	32.9	32.5	29.1
DT22	24.7	21.6	23.3	25.3	31.1
DT23	32.1	29.6	29.4	29.6	No Data
DT24	31.5	30.0	30.2	29.9	No Data
DT25	35.1	34.2	35.0	32.7	29.6
DT26	<b>51.2</b>	<b>47.2</b>	<b>46.7</b>	<b>44.2</b>	39.3
DT28	25.8	23.8	25.3	25.9	No Data
<b>Broadland District Council<sup>3</sup></b>					
BN17	-	-	-	19.5	14
BN21	No Data	No Data	No Data	No Data	18.7
BN22	No Data	No Data	No Data	No Data	31.7
<b>South Norfolk District Council<sup>3</sup></b>					
DT17	13.1	10.8	19.4	20.5	19.1
DT26	24.4	21.4	25.5	24.1	22.4
DT27	28.3	23.1	28.4	25.4	23.6
<u>Notes:</u>					
<b><i>Bold italics</i></b> indicate exceedance of the annual mean NO <sub>2</sub> air quality objective of 40µg/m <sup>3</sup> .					


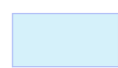


# Appendix D-2

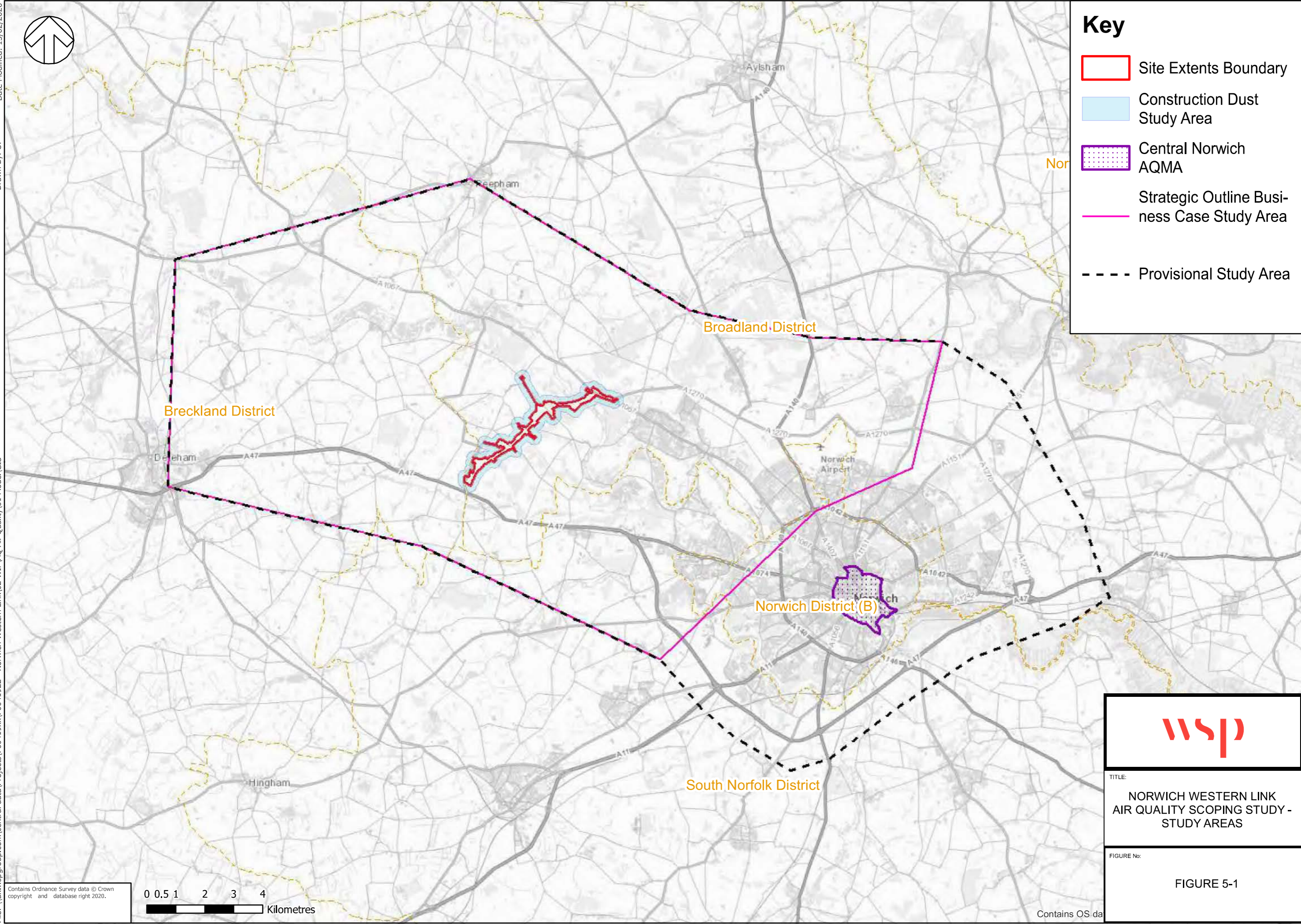
## **AIR QUALITY - SCOPING STUDY AREAS**





**Key**

-  Site Extents Boundary
-  Construction Dust Study Area
-  Central Norwich AQMA
-  Strategic Outline Business Case Study Area
-  Provisional Study Area



TITLE:  
**NORWICH WESTERN LINK  
 AIR QUALITY SCOPING STUDY -  
 STUDY AREAS**

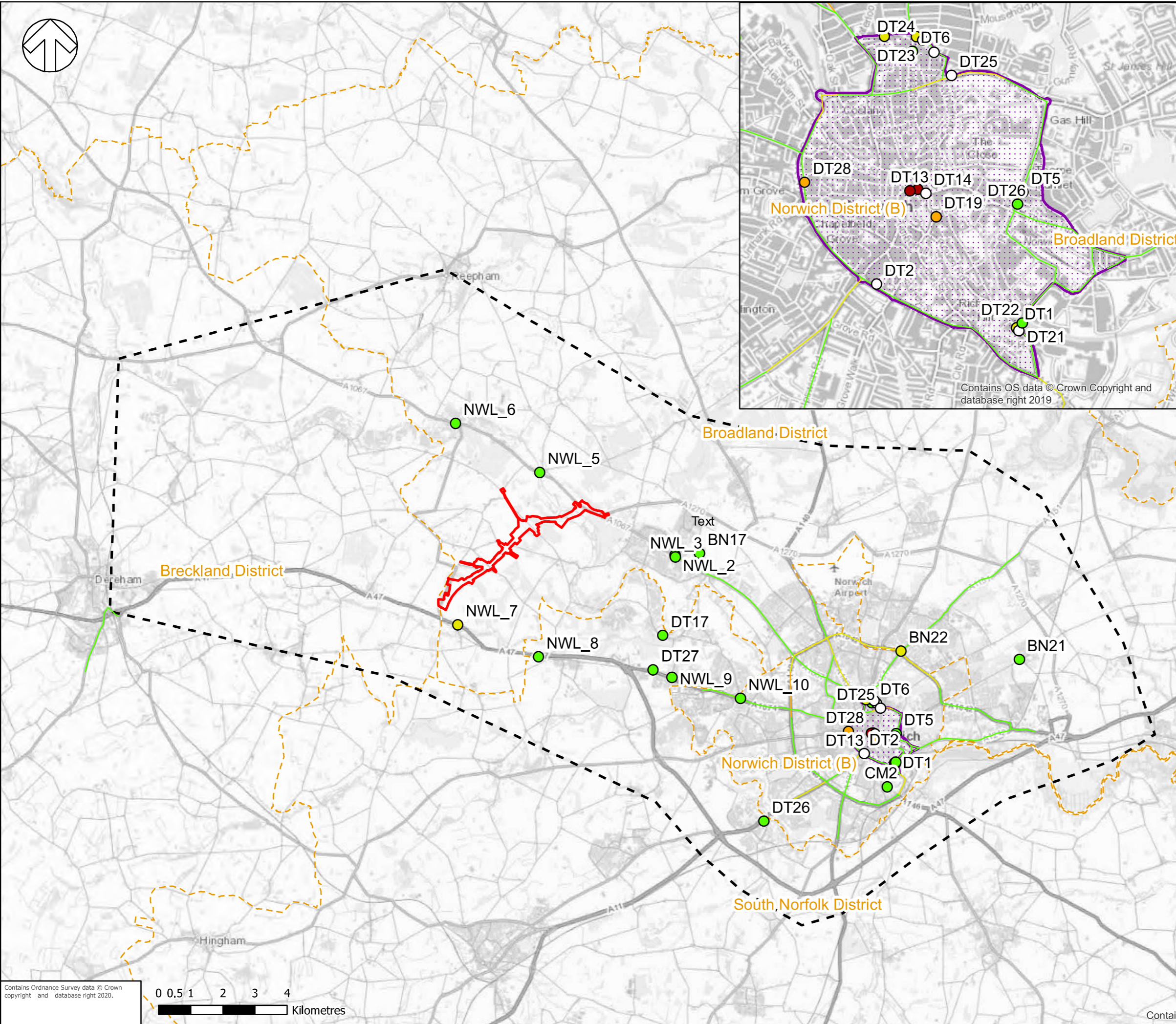
FIGURE No:  
**FIGURE 5-1**

# Appendix D-3

## **AIR QUALITY - BASELINE CONDITIONS**







**Key**

- Site Extents Boundary
- Central Norwich AQMA
- - - - Provisional Study Area

**2018 Annual Mean NO<sub>2</sub> Concentration (µg/m<sup>3</sup>)**

At Monitoring and Roadside Locations

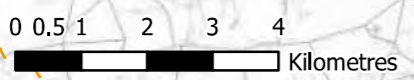
- >40
- 35-40
- 30-35
- <30
- No Data



TITLE:  
**NORWICH WESTERN LINK  
 AIR QUALITY SCOPING STUDY -  
 BASELINE CONDITIONS**

FIGURE No:  
**FIGURE 5-2**

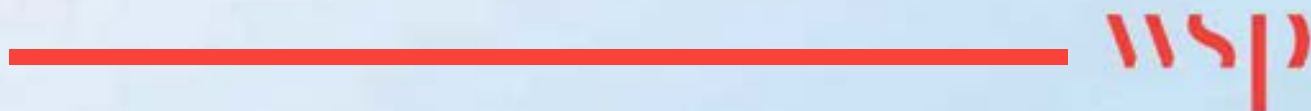
Contains Ordnance Survey data © Crown copyright and database right 2020.

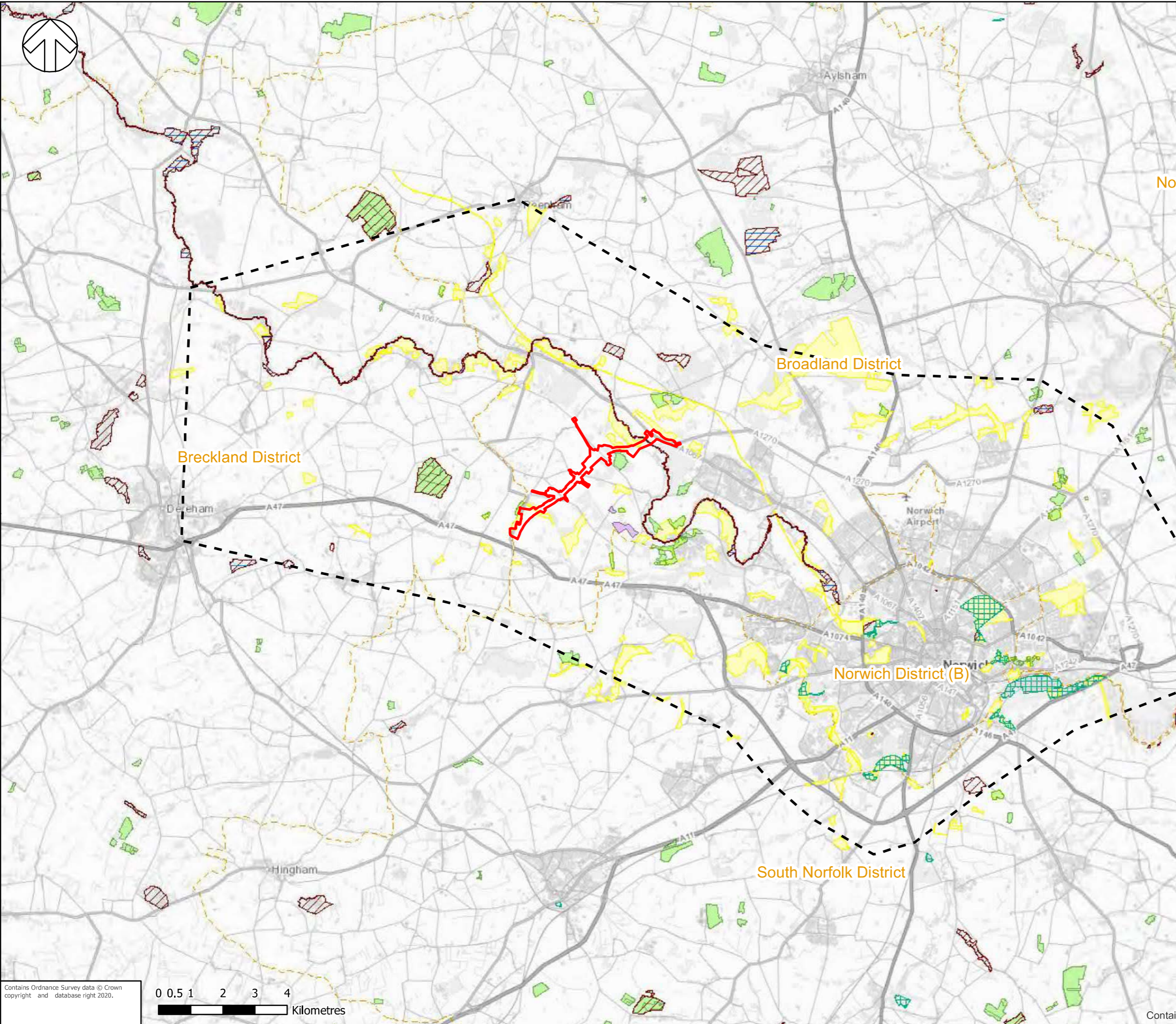


Contains OS da

# Appendix D-4

**AIR QUALITY - DESIGNATED SITES**





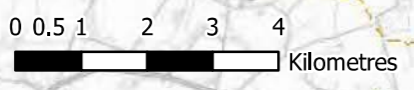
### Key

-  Site Extents Boundary
-  Provisional Study Area
-  LNR
-  SSSI
-  SAC
-  SPA
-  Ramsar
-  Ancient Woodland
-  County Wildlife Site
-  Local Wildlife Site



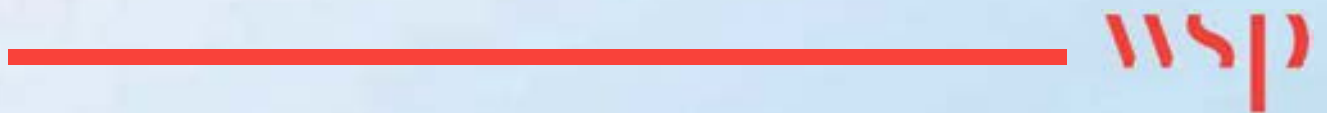
TITLE:  
**NORWICH WESTERN LINK  
 AIR QUALITY SCOPING STUDY -  
 DESIGNATED SITES**

FIGURE No:  
**FIGURE 5-3**



# Appendix E

## MA&D LEGISLATION AND GUIDANCE



# MAJOR ACCIDENTS AND DISASTERS LEGISLATION AND GUIDANCE

---

## 1.1 LEGISLATIVE FRAMEWORK

Legislation	Overview Description	Relevance to the EIA
<p>Town and Country Planning (Environmental Impact Assessment) Regulations 2017</p> <p>Schedule 4 Paragraph 8</p>	<p>The objective of these Regulations is to provide a high level of protection of the environment and to help integrate environmental considerations into the preparation of proposals for development to reduce their impact on the environment. The Regulations prohibit the granting of consent for development which is likely to have a significant effect on the environment unless an EIA has been carried out.</p>	<p>The Regulations require:</p> <ul style="list-style-type: none"> <li>• The assessment of the expected significant adverse effects of the Scheme on the environment arising from the vulnerability of the Scheme to risks of major accidents or disasters that are relevant to the project concerned.</li> <li>• A description of the measures envisaged to prevent or mitigate the significant adverse effects of major accidents and/or disasters on the environment and details of the preparedness for and proposed response to such emergencies.</li> </ul>
<p>Health and Safety at Work etc. Act 1974 (c. 37)</p>	<p>The Act provides the framework for the regulation of workplace health and safety in the UK. It places general duties on employers, people in control of premises, manufacturers and employees. The overriding principle is that foreseeable risks to persons will be reduced so far as is reasonably practicable and that adequate evidence will be produced to demonstrate that this has been done.</p>	<p>Provides a legal framework for the provision of safe plant and equipment and prevention of harm to people from occupation hazards present in a workplace, including emergencies which may affect those offsite, or visiting the site.</p>

Legislation	Overview Description	Relevance to the EIA
<p>Construction (Design and Management) Regulations 2015 (SI 2015 No. 51)</p>	<p>These regulations place legal duties on almost all parties involved in construction work. The regulations place specific duties on clients, designers and contractors, so that health and safety is taken into account throughout the life of a construction project from its inception to its subsequent final demolition and removal. Under the CDM regulations, designers have to avoid foreseeable risks so far as is reasonably practicable by: eliminating hazards from the construction, cleaning, maintenance, and proposed use and demolition of a structure, reducing risks from any remaining hazard, and giving collective safety measures priority over individual measures.</p>	<p>The Client, Designers and Contractors have to avoid foreseeable risks so far as is reasonably practicable by: eliminating hazards associated with the design, construction, operation and maintenance aspects of the Scheme.</p> <p>Therefore, the regulations ensure that mechanisms are in place to continually identify, evaluate and manage safety risks throughout the design, construction and operation phases of the Scheme. Many of the risks identified and managed out at the design phase also serve to eliminate or reduce the risk of a major accident (and therefore environmental consequence) occurring during the construction, operational and maintenance phases.</p>
<p>Control of Major Accident Hazards Regulations 2015 (SI 2015 No. 483)</p>	<p>The purpose of the COMAH Regulations is to prevent major accidents involving dangerous substances and limit the consequences to people and the environment of any accidents which do occur.</p> <p>The COMAH Regulations 2015 implement the majority of the Seveso III Directive (2012/18/EU) in Great Britain.</p>	<p>There are a number of COMAH sites close to the Scheme whose risk profile could be impacted by the Scheme and/or the Scheme falling within the Public Information Zone (PIZ) of a site.</p> <p>Those areas of the Scheme which fall within the PIZ of a COMAH site will need to ensure the onward communication of emergency information relating the MAH to relevant person, this will be particularly relevant during the construction phase when the transient workforce may spend significant time within a designated COMAH zone.</p>

Legislation	Overview Description	Relevance to the EIA
<p>Health and Safety at Work Act, etc. 1974</p>	<p>The Act sets down the core principles for managing H&amp;S and goal setting duties for employers, employees, the self-employed and those controlling workplaces; including:</p> <ul style="list-style-type: none"> <li>- securing the health, safety, and welfare of persons at work;</li> <li>- protecting persons other than persons at work against risks to health or safety arising out of or in connection with the activities of persons at work;</li> <li>- controlling the keeping and use of explosive or highly flammable or otherwise dangerous substances, and generally preventing the unlawful acquisition, possession and use of such substances; and</li> </ul>	<p>Highways England, Contractors and sub-contractors have to avoid foreseeable risks so far as is reasonably practicable by: eliminating hazards associated with all work related activities related with the Scheme throughout its lifecycle both to their employees and others arising out of or in connection with the activities of persons at work.</p> <p>This is particularly relevant during the construction and maintenance phases.</p>
<p>Management of Health &amp; Safety At Work Regulations 1999 (SI 1999 No. 3242)</p>	<p>The Regulations reinforce employer's duties to manage health and safety and apply to all work activities. The principal of risk based assessment provides the cornerstone for management of H&amp;S and all employers are required to undertake risk assessments.</p>	<p>The regulations require the assessment and management of H&amp;S risks and where required procedures for dealing with emergencies, which would include major accidents.</p> <p>Many of the risks identified and managed will serve to eliminate or reduce the risk of a major accident (and therefore environmental consequence) occurring during the construction, operational and maintenance phases of the Scheme.</p>

Legislation	Overview Description	Relevance to the EIA
Occupier's Liability Act 1984 (c.3)	This Act amends the law of England and Wales as to the liability of persons as occupiers of premises for injury suffered by persons other than their visitors.	<p>Provides a legal framework for the prevention of harm to people from occupational safety and health hazards present on premises under the control of the Occupier, including to those visiting the premises.</p> <p>The Scheme includes areas of land designated for marshalling of construction resources which attract visitors who could be impacted by MA&amp;Ds whilst on/crossing those Drax controlled premises.</p>
The Planning (Hazardous Substances) Regulations 2015 (SI 2015 No. 627)	These regulations transpose the land-use planning requirements of the European Seveso III Directive and relate to the way hazardous substances consents operate, and the way in which the planning system reduces the likelihood and impact of major accidents.	<p>Hazardous Substance Consents (HSC) focus on ensuring the safety of the public around the consented site from potential major accident hazards.</p> <p>The Scheme might be impacted by a Major Accident at a HSC site and/or increase the risk profile of the HSC site.</p>



Legislation	Overview Description	Relevance to the EIA
<p>Pipeline Safety Regulations 1996 (SI 1996 No. 825)</p>	<p>The purpose of these Regulations is to ensure that pipelines are designed, constructed and operated properly to ensure their integrity and reduce environmental risks.</p> <p>The Regulations require the preparation of a Safety Report which demonstrates that the risks associated with the Gas Pipeline passing under the Proposed Development and which is to be modified are ALARP and prevent/minimise a potential major accident prior to construction and operation.</p> <p>Many of the risks identified and managed out at the design, pre-construction phases also serve to eliminate or reduce the risk of a major accident (and therefore environmental consequence) occurring during the construction, operational and maintenance phases of the Scheme.</p>	<p>The Scheme crosses within the consultation zones of a major high pressure natural gas pipeline.</p>

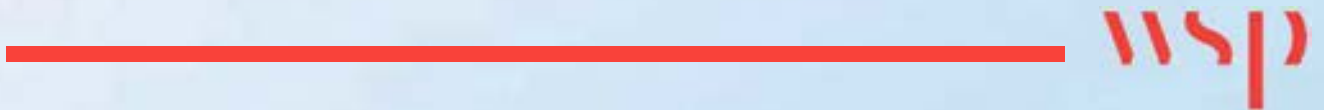
## 1.2 GUIDANCE

Guidance	Description
<p>Defra (2011) 'Green Leaves III' Guidelines for Environmental Risk Assessment and Management</p>	<p>These guidelines provide generic guidance for the assessment and management of environmental risks. A cyclical framework for risk management is provided which identifies four main components of risk assessment:</p> <ol style="list-style-type: none"> <li>1. formulating the problem;</li> <li>2. carrying out an assessment of the risk;</li> <li>3. identifying and appraising the management options available; and</li> <li>4. addressing the risk with a risk management strategy.</li> </ol> <p>A source-pathway-receptor model is suggested as a tool to assist in risk screening and an example is provided of applying the following filters to prioritise significant hazards for further investigation:</p> <ul style="list-style-type: none"> <li>▪ the plausibility of linkages between the source of a hazard and a receptor;</li> <li>▪ the relative potency of a hazard, availability of a pathway, or vulnerability of a receptor;</li> <li>▪ the likelihood of an event, on the basis of historic occurrence or of changed circumstances; or</li> <li>▪ a view on the performance of current risk management measures that, if they were to fail, may increase the potential for future harm.</li> </ul>

Guidance	Description
<p>Chemical and Downstream Oil Industries Forum, (2013), Guideline – Environmental Risk Tolerability for COMAH Establishments</p>	<p>These guidelines provide a common screening methodology for carrying out an environmental risk assessment under the COMAH Regulations. Amongst other things, the guidance:</p> <ul style="list-style-type: none"> <li>▪ defines the types of harm that should be considered in an environmental risk assessment, and how the harm should be characterised for the assessment;</li> <li>▪ defines the risk criteria to be used in assessing tolerability of the environmental risk from an establishment, and where appropriate, individual scenarios; and</li> <li>▪ explains how risks may be evaluated.</li> </ul> <p>The guidelines present a series of thresholds that can be used to ‘screen’ the potential for a Major Accident to the Environment (MATTE) to relevant environmental receptors. The thresholds have been developed based on the criteria for reporting a major accident to the European Commission defined in the Seveso III Directive and COMAH Regulations, and to guidance on MATTE issued by the then Department of the Environment, Transport and the Regions in 1999235. The thresholds are presented in two dimensions, namely (i) extent and severity and (ii) duration of harm; and thresholds for both dimensions must be exceeded for the scenario to be considered a potential MATTE.</p>
<p>The International Standards Organization’s ISO 31000: 2009 Risk Management – principles and guidelines</p>	<p>This guideline identifies a number of principles that need to be satisfied to make risk management effective. If the standards are adopted and applied the management of any risk should help minimise losses, improve resilience, improve controls and improve the identification of opportunities and threats.</p> <p>The ISO standard states that when defining risk criteria the following factors should be considered:</p> <ul style="list-style-type: none"> <li>▪ the nature and types of causes and consequences that can occur and how they will be measured;</li> <li>▪ how likelihood will be defined;</li> <li>▪ the timeframe(s) of the likelihood and/or consequence(s);</li> <li>▪ how the level of risk is to be determined;</li> <li>▪ the views of stakeholders;</li> <li>▪ the level at which risk becomes acceptable or tolerable; and</li> <li>▪ whether combinations of multiple risks should be taken into account and, if so, how and which combinations should be considered.</li> </ul>

# Appendix F

## TRANSPORT ASSESSMENT SCOPING STATEMENT





Norfolk County Council

---

# NORWICH WESTERN LINK

Transport Assessment (TA) Scoping Statement





## **Norfolk County Council**

---

# **NORWICH WESTERN LINK**

## **Transport Assessment (TA) Scoping Statement**

**TYPE OF DOCUMENT (VERSION 1.0) CONFIDENTIAL**

**PROJECT NO. 70061370**

**OUR REF. NO. TASS**

**DATE: APRIL 2020**

---



## Norfolk County Council

---

# NORWICH WESTERN LINK

## Transport Assessment (TA) Scoping Statement

WSP

62-64 Hills Road

Cambridge

CB2 1LA

Phone: +44 1223 558 050



Fax: +44 1223 558 051

WSP.com

---



# QUALITY CONTROL

Issue/revision	First issue	Revision 1	Revision 2	Revision 3
Remarks	Draft	V2	V3 WSP Team comments	V4 NCC Comments
Date	29/01/20	24/02/2020	03/03/2020	08/04/2020
Prepared by	Adrian McHale	Adrian McHale	Adrian McHale	Adrian McHale
Signature				
Checked by	Paula Cuthbertson	Paula Cuthbertson	Paula Cuthbertson	Paula Cuthbertson
Signature				 I have reviewed this document 2020.05.12 12:31:12 +01'00'
Authorised by	Paula Cuthbertson	Paula Cuthbertson	Paula Cuthbertson	Paula Cuthbertson
Signature				 I am approving this document 2020.05.12 12:31:53 +01'00'
Project number	70061370	70061370	70061370	70061370
Report number	1	1	1	1
File reference	TASS	TASS	TASS	TASS



# CONTENTS

---

<b>1.1.</b>	<b>INTRODUCTION</b>	<b>1</b>
<b>1.2.</b>	<b>SCHEME PROPOSALS</b>	<b>2</b>
<b>1.3.</b>	<b>POLICY REVIEW</b>	<b>2</b>
<b>1.4.</b>	<b>EXISTING CONDITIONS</b>	<b>2</b>
	EXISTING ACCESSIBILITY REVIEW	2
	PERSONAL INJURY ACCIDENT (PIA) DATA	3
<b>1.5.</b>	<b>BASELINE CONDITIONS</b>	<b>4</b>
	NORWICH AREA TRANSPORTATION STRATEGY (NATS) TRANSPORT MODEL	4
	TRAFFIC GROWTH, COMMITTED DEVELOPMENTS AND COMMITTED INFRASTRUCTURE	5
<b>1.6.</b>	<b>TRAVEL DEMAND</b>	<b>6</b>
<b>1.7.</b>	<b>IMPACT ASSESSMENT</b>	<b>6</b>
	IMPACT ON NON-MOTORISED USERS (NMU'S)	6
	ROAD TRAFFIC IMPACT	6
	ROAD SAFETY IMPACT OF THE SCHEME	8
	MITIGATION	8
	CONSTRUCTION TRAFFIC IMPACT	8

---

## ***FIGURES***

Figure 1 - NWL Location Plan	1
Figure 2 - PIA Study Area	3
Figure 3 - Junction Impacts	7

## 1.1. INTRODUCTION

- 1.1.1. WSP has been appointed to produce a Transport Assessment (TA) on behalf of Norfolk County Council (NCC) to support the planning application for the proposed Norwich Western Link (NWL) scheme. Within this document WSP set out the proposed Scope of the Transport Assessment for the NWL.
- 1.1.2. The proposed NWL dual carriageway link has been identified as a key 'missing link' in the Major Road Network around Norwich and is regarded by NCC and as one of the top infrastructure priorities for the Council. Following a series of early stage feasibility studies, public consultation and Option Assessment, a Preferred Route Announcement (PRA) was approved by Cabinet in July 2019.
- 1.1.3. The NWL, located to the west of the City of Norwich, will connect an upgraded and dualled A47 trunk road (due March 2024) near Wood Lane, Honingham to the A1067 Fakenham Road circa 400m west of the western end of the A1270 Broadland Northway. The 400m long section of the A1067 between the NWL and the A1270 Broadland Northway will also be upgraded to a new dual carriageway. The proposed NWL dual carriageway is shown indicatively by Figure 1.
- 1.1.4. Further to this, WSP will actively share information with Highways England (HE) seeking to deliver efficiencies, working towards successful integration of the A47 and NWL schemes.

**Figure 1 - NWL Location Plan**



1.1.5. The TA will consider items under the following headings:

## **1.2. SCHEME PROPOSALS**

1.2.1. This section of the TA will outline fully the NWL scheme and its proposed construction. This chapter will include information on the proposed highway alignment, treatment of sideroads and existing PROW links crossing the scheme, construction phasing and access, and proposed works to A1067 and A47 to create new junctions with the connecting strategic and radial routes into central Norwich.

1.2.2. A summary of potential scheme benefits and the proposed mitigation package in the form of a Sustainable Transport Strategy that accompanies the scheme, seeking to encourage mode shift for shorter distance trips will also be included.

## **1.3. POLICY REVIEW**

1.3.1. An extensive review of adopted and emerging transport and development policy will be carried out – at both national and local levels, particularly bespoke to the NWL area. This would include the following documents:

- National Planning Policy Framework (NPPF) 2019;
- Planning Practice guidance (PPG), 2018;
- The DfT Circular 02/2013 -
- The Strategic Road Note (SRN) ‘Planning for the Future’ (2015);
- Connecting Norfolk, Norfolk Local Transport Plan 2011-2026;
- Norfolk Strategic Framework – Shared Spatial Objectives for a Growing County (July 2017);
- Norwich Area Transportation Strategy (October 2004);
- Norfolk Strategic Infrastructure Delivery Plan (2018-2028);
- Safe, Sustainable Development (SSD, revised November 2019);
- The Current Broadland District Council (BDC) Local Plan and sub documents;
- Norwich City Council Local Plan;
- South Norfolk District Local Plan;
- Breckland District Council Local Plan;
- The emerging Norfolk County Council Transport Plan 2020 – 2036; and
- The emerging Greater Norwich Local Plan (GNLP) 2018-2038.

## **1.4. EXISTING CONDITIONS**

1.4.1. A detailed review of the local walking, PROWs (Public Rights of Way), cycling and public transport networks and road safety in the vicinity of the NWL scheme would be undertaken in the TA.

### **EXISTING ACCESSIBILITY REVIEW**

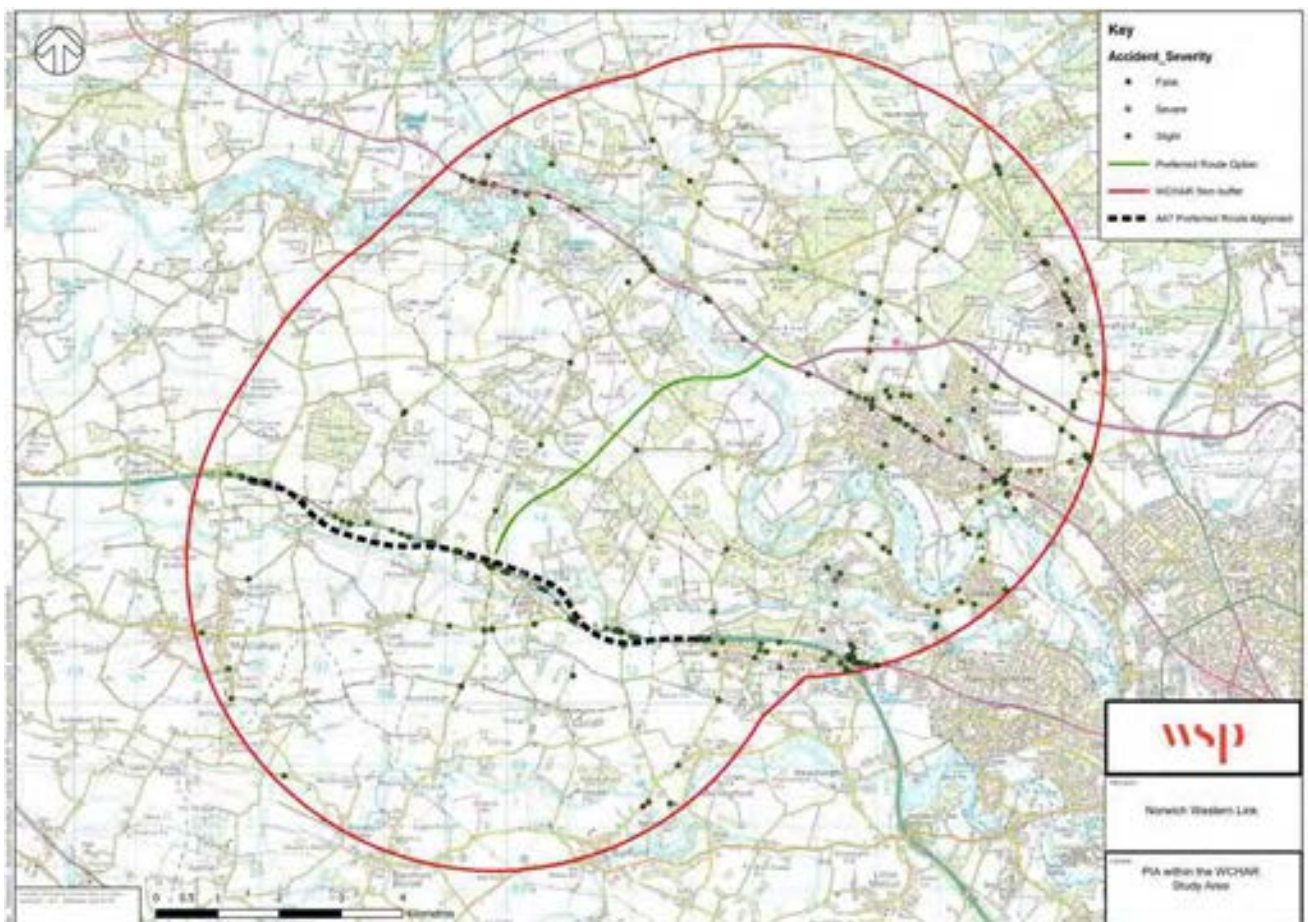
- Existing Walking, Cycling and Public Transport networks in the vicinity of the NWL scheme will be reviewed;
- Isochrone analysis will be used to assess accessibility, both with and without the proposed development, to see how accessibility will change in the vicinity of the site as a result of the proposed development and benefits that can be brought by new access routes through the site.
  - For walking, a 25-minute time catchment based on an average walking speed of 80m/minute would be assumed, with isochrones shown in 5-minute distance bands;

- For cycling, a 25-minute catchment would be considered based on average cycle speeds of 200m/minute; and
- For bus access, 400m isochrones around existing bus stops would be considered.

## PERSONAL INJURY ACCIDENT (PIA) DATA

- To assess the safety of the existing road network WSP has obtained the latest 5 years of Personal Injury Accident (PIA) data for the local area from NCC. PIAs which occurred between 01/08/2014 and 11/07/2019 have been obtained for the area shown within a 5km radius around the NWL route as shown in Figure 2 (this is consistent with the study area for the WCHAR study area).

**Figure 2 - PIA Study Area**



- From analysis of the data 'accident clusters', areas classified as a 'high risk accident area' or patterns if present will be identified.
  - An NCC 'accident cluster' being where 5 or more PIAs have occurred in a 3-year period are within a 50m radius (urban) or 100m radius (rural);
    - Where 'Urban' is defined as an area with a 40mph speed limit or less and 'rural' is an area with a speed limit of 50mph or more; and
  - A 'high risk accident route' is a route with higher than normal accident rate that NCC has identified for an 'Accident Reduction Scheme' or 'Route Safety Scheme';

## 1.5. BASELINE CONDITIONS

1.5.1. This section will detail the baseline transport conditions forecasting to the future design year of assessment (2040). Where junctions are shown to exceed 0.85 RFC or 90% Degree of Saturation (for signalised junctions) in 2040, the network conditions will also be considered in the expected opening year of the NWL (2025). The section will consider:

### NORWICH AREA TRANSPORTATION STRATEGY (NATS) TRANSPORT MODEL

- The TA will utilise an updated version of the Norwich Area Transportation Strategy (NATS) 2015 transport model which has been used in the Strategic Outline Business Case (SOBC). The update of the model to a 2019 base year is currently being undertaken based on comprehensive traffic counts across the whole of Norwich in October 2019. The current model which has a 2015 base year was developed in line with DfT's TAG guidance and is calibrated and validated within acceptable industry recognised standards. Localised enhancements to the model were made to validate minor rural road links in close proximity to the NWL route to make the model suitable for use in the NWL study.
- NATS model consists of the following sub-models:
  - Highway model
  - Public Transport (PT) model
  - Variable Demand Model (VDM).
- The forecasting includes a 'core' central growth scenario developed with district-wide demographic growth constrained to TEMPro version 7.2. TEMPro and NRTF factors have been assigned to the origin and destination totals for each base year zone and increased appropriately in accordance with TAG Unit M4: Forecasting and Uncertainty.
- Forecast models are available for 2025 (proposed NWL opening year), 2040 (Design Year) and 2050 (Horizon Year) have been produced with core growth demand matrices. These are the 'Do Minimum' (DM) scenarios for 2025, 2040 and 2050 and contain a network without NWL infrastructure but includes the proposed Highways England A47 upgrade schemes. A 'Do Something' (DS) scenario has been developed which includes the proposed NWL highway link in addition to the Do Minimum assumptions.
- The NATS 2015 base models were validated prior to the opening of the A1270 Broadland Northway (formerly known as the NDR). However, 2018 Present Year Validation (PYV) has been undertaken to determine the model's fitness for purpose after the full opening of the A1270 Broadland Northway. A set of independent 2018 counts provided by NCC served as the basis for a PYV exercise. The transport model has been run in a forecast mode for the 'present year' 2018 and 2018 transport model forecasts were compared with 2018 traffic counts. The link flow and journey time comparisons showed a reasonably close match between modelled and observed values with the majority of links and journey time routes meeting DfT's criteria. It was concluded that the PYV is acceptable and the model is satisfactory for forecasting traffic flows for the purpose of NWL optioneering and option selection stages.
- DfT have approved the 2015 NATS model as suitable for use in the NWL study for the purposes of preparing an SOBC (Strategic Outline Business Case) and Option selection. A new model with 2019 base year will be required for the OBC (Outline Business Case) stage of the study. A model specification report has been agreed with DfT setting out the model update requirements, a copy of the agreed report can be found in Appendix A.

- New traffic surveys were carried out in October 2019 and the NATS traffic model is currently being refreshed with this data and all further analysis to inform the TA will be undertaken using data from this new base year validated model. Associated updated forecast models are developed.
- Data will be extracted from the new model for each of the junctions within the agreed scope of assessment. Observed data on queues or delays will be used for calibration of individual junction models.

## **TRAFFIC GROWTH, COMMITTED DEVELOPMENTS AND COMMITTED INFRASTRUCTURE**

- 1.5.2. The assessment will consider other major developments in close proximity, as set out within the agreed Uncertainty Log for the model update.
- 1.5.3. All major developments that are certain or near certain identified within the GNPD emerging local plan to 2038 would be included in the updated NATS model baseline forecasting Core scenario for 2040. In the vicinity of the Scheme, this is expected to include a 1,400 home development at Taverham.
- 1.5.4. Other major developments that are less certain would be included in the High Growth scenario only which would provide a sensitivity test in the TA. This includes a 6,000 home new settlement at Honingham and circa 1,000 dwellings at Costessey. (It should be noted that both of these developments were included in the current 2015 NATS model baseline forecasting, therefore the model results used for scoping purposes are expected to be robust).
- 1.5.5. Two further non-residential developments to be considered within the ES chapter are as follows:
- A47 Dualling – this would double the capacity of the stretch of A47 to the south of NWL from North Tuddenham to Easton, with two new grade separated junctions – one at Blind Lane/Taverham Road junction and another at Wood Lane/Berrys Lane (which would also provide connectivity with the Scheme). This would also improve safety and efficiency of operation by removing existing at grade crossroad junctions and remove the Easton roundabout. The Scheme would lead to an increased volume of traffic on A47 to the south but would enhance journey times for strategic traffic. The scheme is fully funded and due to be submitted for DCO in late 2020. All scenarios for the Scheme are therefore to be modelled with A47 dualling in place within the baseline forecast.
  - Food Enterprise Zone (FEZ) at Easton – A Local Development Order (LDO) is in place and already under construction. The LDO would permit a substantial development of agribusinesses to the south of A47 which would take access via Blind Lane. Due to the nature of the businesses proposed, this would be likely to increase commercial vehicle traffic on the Strategic and Major Road Network around Norwich, in particular the A47. With the A47 scheme also in place, FEZ traffic is assumed to access the strategic road network via the south arm of the Highways England A47 proposed grade separated junction at Blind Lane/Taverham Road.
- 1.5.6. These nearby significant developments would be included in the baseline of the updated NATS model and assumed to be open by 2025 in the NWL opening year of assessment. It is also expected that the timescales for construction would overlap with NWL. The TA and ES chapter will consider the combined effects on all travellers of the developments outlined above being under construction simultaneously with the Scheme.

## 1.6. TRAVEL DEMAND

1.6.1. This chapter will outline the approach adopted to forecasting travel demand along the proposed NWL in addition to anticipated changes in travel patterns on the wider highway network established in the previous Baseline chapter. These forecasts are integral to the design of the scheme and form a key part of the Planning Application.

Specifically, this chapter will specifically cover:

- Modelled demand forecasts for the NWL in terms of AADT two-way flows and peak hour directional flows in the design year of 2040
- The origins and destinations of trips using the NWL identified via select link analysis
- Traffic flow changes as a result of the scheme on local and strategic roads in the west of Norwich
- Re-distributional effects of traffic in response to the availability of the NWL 'missing link'

## 1.7. IMPACT ASSESSMENT

### IMPACT ON NON-MOTORISED USERS (NMU'S)

- This section will review the existing sustainable transport provision for Non-Motorised Users (NMUs) in the NWL study area. This will include a detailed review of walking, cycling, equestrian and public transport user networks and activity within the study area and surrounding highway network derived from the WCHAR study. The aim is to identify how the provision of the NWL may impact upon these sustainable transport users and whether any facilities will be required for them.
- The impact of the proposed NWL scheme will also be considered on each of the existing Public Rights of Way (PRoW), permissive paths and cycleways which will be intersected by the NWL, and where relevant any measures to address the severance of paths will be described.
- Potential accessibility and severance effects of the proposed Non-Motorised User (NMU) strategy localised to the scheme will be evaluated using GIS isochrone mapping analysis to show the existing and proposed situation with and without the scheme.
- The chapter will also consider wider effects of the scheme in terms of access to bus services, facilities and services as well as impacts on NMUs crossing existing roads due to increases or decreases in traffic as a result of the new highway link.
- Reference will also be made to the wider WCHAR study carried out covering a 5km radius around the NWL route and the final package of sustainable transport interventions and opportunities for improvement taken forward as complementary measures to support the scheme, seeking to achieve mode shift on shorter journeys.

### ROAD TRAFFIC IMPACT

- Following discussions with NCC and consideration of the NATS traffic model results presented in the OSR (Option Selection Report, dated July 2019) it has been determined that the traffic impact assessment should consider the following junctions shown in Figure 3.

**Figure 3 - Junction Impacts**



- (1) Northern NWL/ A1067 Fakenham Road roundabout;
- (2) Southern NWL/ Upgraded A47 (Honingham) roundabout;
- (3) B1535 Western Hall Road/ A1067 Fakenham Road/ Porter's Lane crossroads;
- (4) B1535 Mart Hill/ A1067 Fakenham Road 'T' junction;
- (5) B1535 Mart Hill/ B1535 Church Street/Morton Lane (Weston Longville) crossroads;
- (6) B1535 Western Hall/ B1535 Wood Lane/ B1535 Paddy's Lane 'T' junction;
- (7) Berrys lane/ Barnham Broom Road/ Mattishall Road crossroads (Honingham);
- (8) Mattishall Road/ Upgraded A47 junction;
- (9) Berrys Lane/ Wood Lane/ Upgraded A47 junction;
- (10) Mill Road/Honingham Road/ Norwich Road/ Bell Road crossroads (Barnham Broom);
- (11) B1108 Norwich Road/ Bell Road 'T' junction;
- (12) A47 Norwich Southern Bypass/ A1074 Dereham Road/ William Frost Way/ Long Lane grade separated junction;
- (13) Longwater Lane/ A1074 Dereham Road/ Bawburgh Lane signalised crossroads;
- (14) The Street/ Weston Road/ Field Road crossroads (Ringland);
- (15) A1067 Fakenham Road/ A1270 Broadland Northway roundabout;
- (16) A1067 Fakenham Road/ Fir Covert Road/ Beech Avenue staggered crossroads;
- (17) A1270 Broadland Northway/ Fir Covert Road roundabout;



- (18) A1067 Fakenham Road/ Sandy Lane/ Breck Farm Lane crossroads;
  - (19) A1270 Broadland Northway/ Reepham Road roundabout;
  - (20) A1067 Fakenham Road/ Costessey Lane/ School Road signalised junction;
  - (21) A1270 Broadland Northway/ Brewery Lane/ Drayton Lane roundabout; and
  - (22) A1270 Broadland Northway/ A140 Holt Road grade separated junction.
- Flows for the above junctions will be extracted for 2019, 2025 and 2040 from the validated 2019 NATS traffic model and analysed in detail using the appropriate local junction modelling software (Junctions 9 for priority junction or LinSIG for signalised junctions).
  - 2019 and 2040 analysis results will be presented for all of the listed junctions.
  - At priority junctions ('T junctions, crossroads and roundabouts) where The Ratio of Flow to Capacity (RFC) in 2040 exceeds 0.85 the 2025 results will also be presented.
  - Similarly, at signalised junctions where the Degree of Saturation (DOS) exceeds 90% 2025 results will also be presented.
  - In addition to the above, qualitative comparisons will be carried out for those junctions where the NWL shows a beneficial impact to demonstrate the benefits of the scheme.
  - Results will be compared with the baseline forecast results for the same modelled year to understand the impact of the scheme and need for traffic mitigation.
  - AADT Link flow changes will also be used to consider and assess requirements for traffic management measures across the wider network. Areas expected to require consideration in this respect include routes to the north of A1067 via Felthorpe and to the south of A47 between Wymondham and Honingham.

## **ROAD SAFETY IMPACT OF THE SCHEME**

- This section of the report will provide a qualitative assessment of the impact of the NWL on the road safety of all users both Non-Motorised and Motorised. It is envisaged that this impact will be mainly positive as a result of traffic relief to other routes. However, the need for additional safety improvements will be considered in locations where traffic significantly increases as a result of the NWL proposals.

## **MITIGATION**

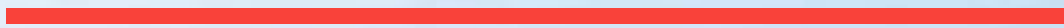
- For all junctions assessed in detail within this TA and rural link roads that show significant negative effects as a result of the NWL proposals, mitigation measures will be considered and presented as necessary. Furthermore, mitigation measures may be required for NMUs where an impact has been identified through qualitative assessment for example where severance issues reduce opportunities for crossing existing roads.
- Sustainable Transport Interventions (covering NMU enhancements in the vicinity of the proposed scheme, wider non-car interventions and traffic management measures) will be developed seeking to enhance opportunities for non-car travel in the study area west of Norwich.

## **CONSTRUCTION TRAFFIC IMPACT**

The construction programme and its phasing which will be produced for ES purposes and will be reviewed with regards to impacts on the transport network. Assumptions about site access and traffic management will be discussed with the County Council and their contractor with the aim to minimise any construction related impacts. A draft Construction Environmental Management Plan (CEMP) has been prepared and will be submitted as part of the ES.

# Appendix A

## MODEL SPECIFICATION REPORT



## Appendix to TA Scoping Statement



Norfolk County Council

---

# NORWICH WESTERN LINK

Model Specification Report





Norfolk County Council

---

# NORWICH WESTERN LINK

Model Specification Report

**TYPE OF DOCUMENT (VERSION) CONFIDENTIAL**

**PROJECT NO. 70061370**

**OUR REF. NO. 70061370-WSP-MSR**

**DATE: JANUARY 2020**

WSP

62-64 Hills Road

Cambridge

CB2 1LA

WSP.com



# QUALITY CONTROL

---

Issue/revision	First issue	Revision 1	Revision 2	Revision 3
Remarks	Draft for NCC comment	With NCC comments addressed Draft for DfT comment	With DfT Comments addressed	
Date	4 November 2019	22 November 2019	January 2020	
Prepared by	MAH	MAH	MAH	
Signature				
Checked by	NL	NL	NL	
Signature				
Authorised by	CD	CD	CD	
Signature				
Project number	70061370	70061370	70061370	
Report number	MSR_Draft1	MSR_Draft2	MSR_Draft3	
File reference	\\uk.wspgroup.com\central data\Projects\700613xx\70061370 - Norwich Western Link 2019\03 WIP\TP Transport Planning\Documents\Model Specification Report\NWL_Model Specification Report_Draft_v10.docx			



# CONTENTS

---

<b>1</b>	<b>INTRODUCTION</b>	<b>1</b>
1.1	PURPOSE OF THE REPORT	1
1.2	NORWICH WESTERN LINK	1
1.3	PROPOSED USES OF THE MODEL	2
<b>2</b>	<b>KEY FEATURES</b>	<b>4</b>
2.1	MODELLED AREA	4
2.2	ZONING SYSTEM	7
2.3	SECTORING SYSTEM	8
2.4	MODEL YEARS	9
2.5	TIME PERIODS	9
2.6	MODEL STRUCTURE AND DEMAND SEGMENTATION	10
2.7	DATA COLLECTION	11
<b>3</b>	<b>HIGHWAY ASSIGNMENT MODEL</b>	<b>13</b>
3.1	OVERVIEW	13
3.2	SOURCE MODEL	13
3.3	MODELLING SOFTWARE	13
3.4	NETWORK DEVELOPMENT	13
3.5	APPROACH TO CALIBRATION AND VALIDATION	14
3.6	NETWORK CALIBRATION	14
3.7	NETWORK VALIDATION	14
3.8	ROUTE CHOICE CALIBRATION	14
3.9	ROUTE CHOICE VALIDATION	14
3.10	TRIP MATRIX CALIBRATION	15

---



3.11	TRIP MATRIX VALIDATION	15
3.12	ASSIGNMENT CALIBRATION	16
3.13	ASSIGNMENT VALIDATION	16
3.14	VALIDATION CRITERIA AND ACCEPTABILITY GUIDELINES	17
3.15	CONVERGENCE CRITERIA AND STANDARDS	18
3.16	TRIP MATRIX CHANGES	18
<b>4</b>	<b>PUBLIC TRANSPORT MODEL</b>	<b>20</b>
4.1	OVERVIEW	20
4.2	TRIP MATRIX VALIDATION	20
4.3	NETWORK AND SERVICE VALIDATION	20
4.4	ASSIGNMENT VALIDATION CRITERIA	20
<b>5</b>	<b>TRIP MATRIX DEVELOPMENT</b>	<b>22</b>
5.1	INTRODUCTION	22
5.2	MOBILE NETWORK DATA	22
5.3	EXAMPLE DEVELOPMENT PROCESS	24
5.4	TRIP SYNTHESIS	25
5.5	MERGING MOBILE NETWORK DATA AND TRIP SYNTHESIS	25
5.6	TRIP MATRIX ESTIMATION	26
5.7	TRIP MATRIX CALIBRATION / VALIDATION	26
<b>6</b>	<b>DEMAND MODEL</b>	<b>28</b>
6.1	INTRODUCTION	28
6.2	DEVELOPMENT OF THE VARIABLE DEMAND MODEL	28
6.3	REALISM TESTING	32
<b>7</b>	<b>FORECASTING</b>	<b>34</b>
7.1	OVERVIEW OF DEMAND FORECASTING PROCEDURE	34
7.2	CORE SCENARIO	35
7.3	ALTERNATE GROWTH ASSUMPTIONS	35



7.4	FORECAST MODEL DEVELOPMENT	35
<b>8</b>	<b>SUMMARY</b>	<b>38</b>
8.1	SUMMARY OF MODEL DEVELOPMENT	38
8.2	SUMMARY OF STANDARDS	38
8.3	MODEL REPORTING AND OUTPUTS	38

---

## ***TABLES***

Table 2-1:	Table of Sectors	9
Table 3-1:	Acceptability Guidelines	17
Table 3-2	Convergence	18
Table 3-3:	Significance of Matrix Estimation Changes	18
Table 5-1:	Common Verification Tests Summary	23
Table 6-1:	Cost Dampening Parameters	32
Table 7-1:	Summary of High and Low Growth Scenarios	36
Table 7-2:	Forecast Year Scenarios	36

---

## ***FIGURES***

Figure 1-1:	NWL Preferred Route	2
Figure 2-1:	Fully Modelled Area	4
Figure 2-2:	With NWL minus without NWL, 2050 AM peak	5
Figure 2-3:	With NWL minus without NWL, 2050 PM peak	5
Figure 2-4:	Area of Detailed Modelling	6
Figure 2-5:	Zoning System Around Norwich	7
Figure 2-6:	Sector System	8
Figure 3-1:	Highway Model Cordons and Screenlines	16
Figure 5-1:	Example Matrix Development Outline	25
Figure 7-1:	Fixed Trip Matrix Development Methodology	34





---

## GLOSSARY

Acronym	Meaning
AADT	Annual Average Daily Traffic
AAWT	Annual Average Weekday Traffic
AMCB	Analysis of Monetised Cost and Benefits
AQMA	Air Quality Management Area
ASR	Appraisal Specification Report
ATC	Automatic Traffic Count
BCR	Benefit to Cost Ratio
CO <sub>2</sub>	Carbon Dioxide
COBALT	COst and Benefit to Accidents – Light Touch
DfT	Department for Transport
DI	Distributional Impacts
DIADEM	Dynamic Integrated Assignment and Demand Model
DMRB	Design Manual for Roads and Bridges
EAST	Early Assessment and Sifting Tool
FBC	Full Business Case
GEH	Geoffrey E. Havers
GDP	Gross Domestic Product
GIS	Geographical Information Systems
HGV	Heavy Goods Vehicle
LCWIP	Local Cycling and Walking Infrastructure Plans
LDO	Local Development Order
LGV	Light Goods Vehicle
LMVR	Local Model Validation Report
LPA	Local Planning Authority
LSOA	Lower Super Output Area
LTP	Local Transport Plan
MCC	Manual Classified Count
M <sub>E</sub>	Hourly Observed Flow Data
M <sub>G</sub>	Hourly Saturn Modelled Flows



<b>Acronym</b>	<b>Meaning</b>
MRN	Major Road Network
NATS	Norwich Area Transport Strategy
NCC	Norfolk County Council
NDR	Northern Distributor Road ( <i>now named A1270 Broadland Northway</i> )
NMU	Non-Motorised User
NPPF	National Planning Policy Framework
NRTF	National Road Traffic Forecasts
NTEM	National Trip End Model
NWL	Norwich Western Link
NWQ	Norwich Western Quadrant
OAR	Option Assessment Report
OBC	Outline Business Case
OGV	Ordinary Goods Vehicle
PA	Production Attraction
PCU	Passenger Car Unit
PT	Public Transport
RIS	Road Investment Strategy
SATURN	Simulation and Assignment of Traffic to Urban Road Networks
SERTM	South East Regional Transport Model
SHMA	Strategic Housing Market Assessment
SOBC	Strategic Outline Business Case
SRN	Strategic Road Network
TEMPro	Trip End Model Presentation Program
TUBA	Transport User Benefit Appraisal
UEA	University of East Anglia
VDM	Variable Demand Model
VfM	Value for Money
VOC	Vehicle Operating Costs
VOT	Value of Time
WebTAG	Transport Analysis Guidance
WebTRIS	Highways England Traffic Information System

1

# INTRODUCTION





# 1 INTRODUCTION

---

## 1.1 PURPOSE OF THE REPORT

- 1.1.1. WSP has been commissioned by Norfolk County Council (NCC) to develop a transport model in support of the Norwich Western Link (NWL) Outline Business Case. This report will detail the update to the existing Norwich Area Transport Strategy (NATS) model.
- 1.1.2. This Model Specification Report is intended to inform the following bodies or organisations:
- Norfolk County Council (NCC), the promoters of the scheme
  - Transport East as part of the Regional Evidence Base
  - Department for Transport (DfT), to whom NCC are submitting the Outline Business Case
  - WSP, the scheme development consultants
  - Stakeholders.
- 1.1.3. Currently the scheme is at Stage 2 of the DfT Business Case guidance - [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/85930/dft-transport-business-case.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/85930/dft-transport-business-case.pdf). An Options Appraisal Report (OAR) has been completed, which sets out the long list of options, the sifting and the final shortlisted options to be taken forward for assessment. The SOBC has been completed setting out the assessment undertaken for the shortlisted options and the preferred route has been determined as set out in the Options Selection Report.

## 1.2 NORWICH WESTERN LINK

- 1.2.1. The city of Norwich performs a regional role in delivering growth and as a major employment, shopping and service centre, and a focus for transportation. Following the completion of the Northern Distributor Road (NDR) now known as the A1270, which was subsequently designated as an A-Road in the route hierarchy (A1270) and named Broadland Northway, there have been calls to complete the 'missing link' between the A47 and A1067.
- 1.2.2. The Norwich Western Link (NWL) would provide a higher standard route between the western end of Broadland Northway and the A47 and significantly improve travel between these two major roads. Traffic congestion, rat-running and delays to journeys are all significant issues on minor roads to the west of Norwich and there is strong support from the public, the business community, emergency services, local councils and MPs for a link road to be created.
- 1.2.3. NCC have now published a preferred route for the NWL as shown in Figure 1-1.
- 1.2.4. The new 3.9 mile dual carriageway road links from the roundabout at the western end of Broadland Northway and extends for around 350 metres along the A1067 Fakenham Road before turning in a south-westerly direction via a new junction. The road crosses the River Wensum on a viaduct and then continues at or near ground level for the remainder of its length. It links to the A47 via a new junction at Wood Lane (B1535), which forms part of Highways England's plan to dual the A47 between North Tuddenham and Easton.
- 1.2.5. Together with the dualling of the A47 between North Tuddenham and Easton, due to get underway in early 2022, delivering Option C as the preferred route would create a fully dual carriageway orbital route around the city.

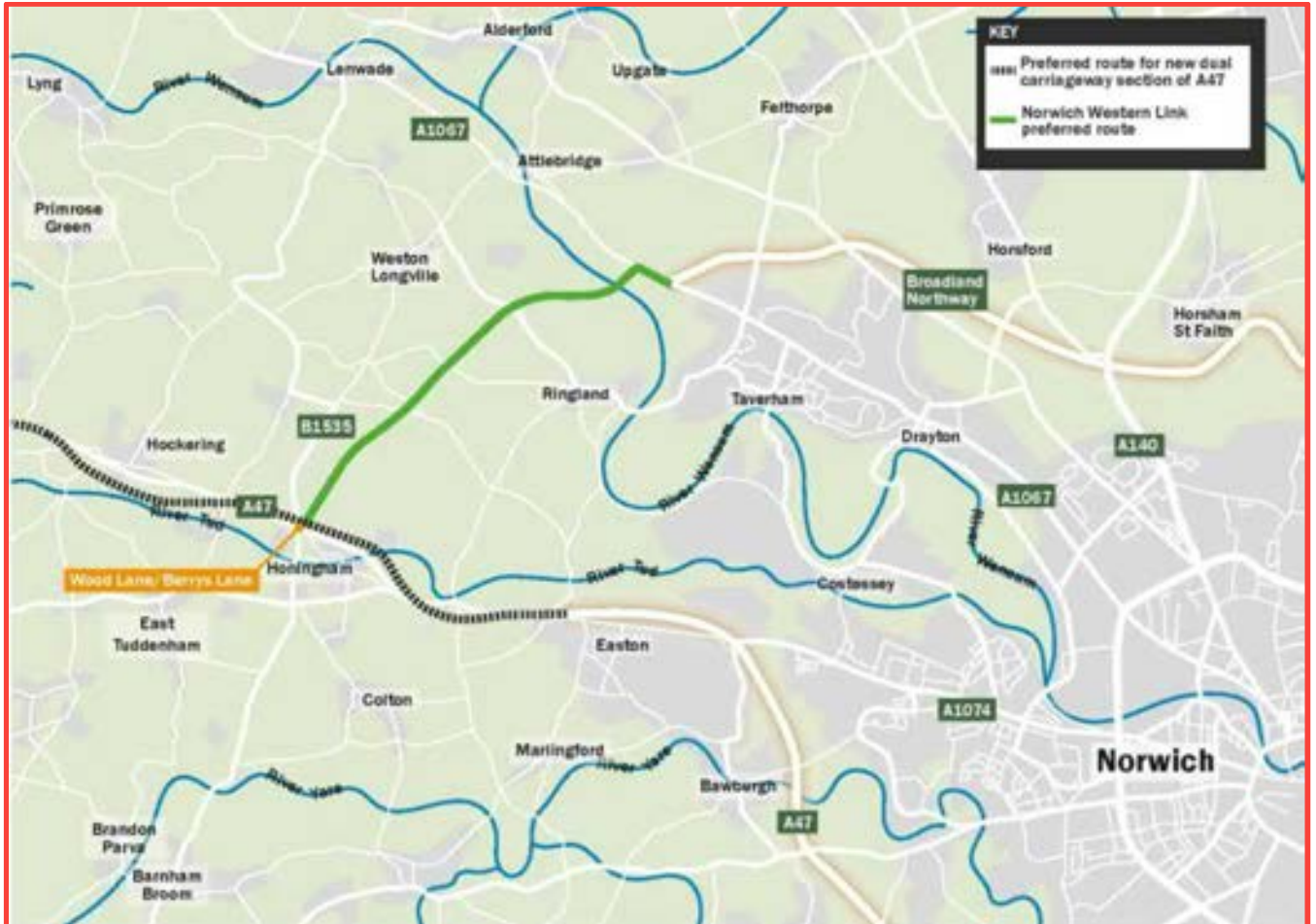


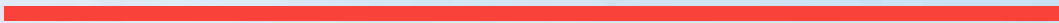
Figure 1-1: NWL Preferred Route

### 1.3 PROPOSED USES OF THE MODEL

- 1.3.1. Though the main focus of the model update is to produce a robust and up to date basis for the assessment of NWL, there is also an intention for the model to become an all-purpose tool for NCC to test a range of potential schemes or policies. These may include:
- Highway scheme appraisal
  - Inputs for transport business cases and funding applications
  - Inputs for environmental appraisal
  - Local plan/core strategy assessment
  - Smarter choices assessment
  - Development impact assessment.
- 1.3.2. A major update to NATS has been proposed that includes the collection of data to update the model to 2019 traffic conditions. This note will provide a summary of the NATS and the details of the data that is to be collated.

2

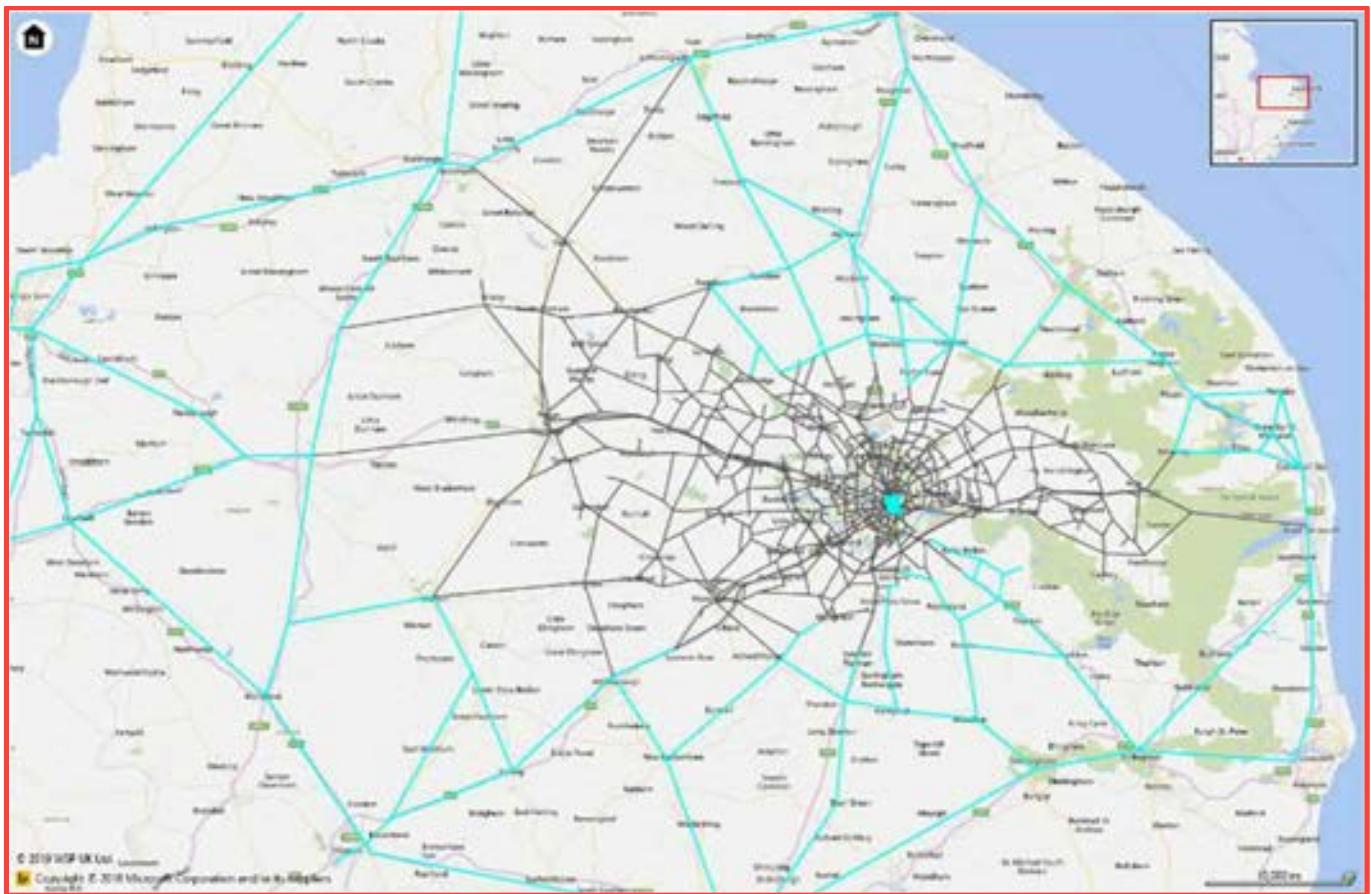
## KEY FEATURES



## 2 KEY FEATURES

### 2.1 MODELLED AREA

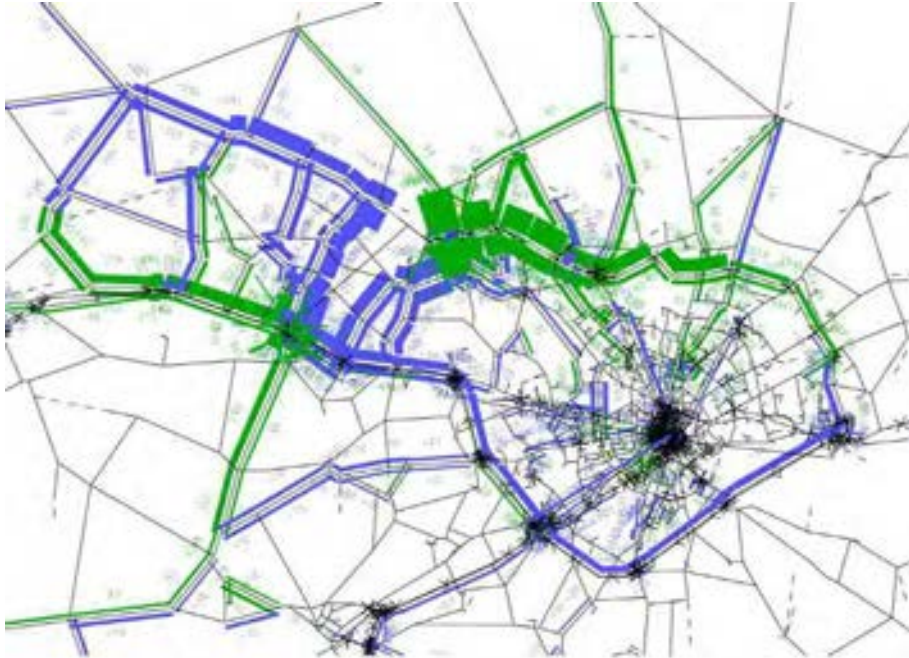
2.1.1. The Fully Modelled Area, formerly referred to as study area, of the updated model is shown in Figure 2-1. The Fully Modelled Area encompasses the area of Norfolk between King's Lynn in the west and towards Lowestoft in the South-East. The model will represent full detail of the highway network within the Norwich urban and surrounding areas. The highway network will be represented in less detail the further away from Norwich with only the strategic links represented on the periphery of the model.



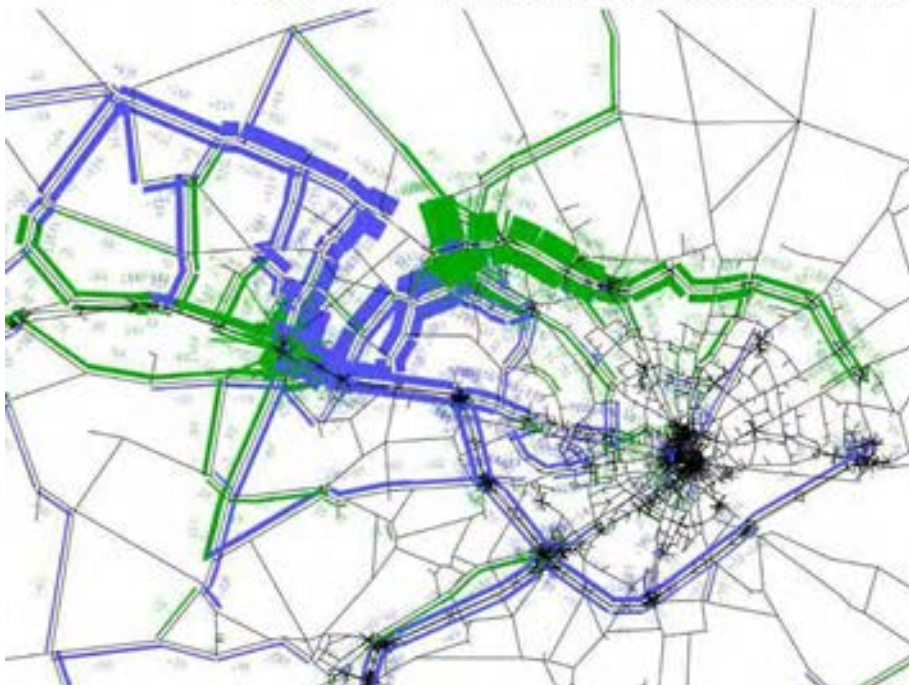
**Figure 2-1: Fully Modelled Area**

- 2.1.2. The Fully Modelled Area is chosen to build a traffic model that covers a sufficient area to accurately model the reassignment and redistribution effects that are likely to be produced by new development and infrastructure schemes in Norwich and more specifically the Norwich Western Link Road.
- 2.1.3. To determine the potential area of impact for the NWL, a comparison was made between the highway only models for a with and without NWL scenario (using the 2050 models as the worst scenario, which informed the NWL SOBC).
- 2.1.4. The models behind the flow diagrams shown below were utilised from the Highways England updated Norwich Area Transport Strategy (NATS) 2015 transport model.

2.1.5. The results of that comparison are shown in Figure 2-2 and Figure 2-3; green bandwidths show an increase in traffic and blue bandwidths show a reduction in traffic. The choice of the fully modelled area confirms that its extent is sufficient enough to cover the likely impact of the NWL because the changes do not extend beyond the fully modelled area.



**Figure 2-2: With NWL minus without NWL, 2050 AM peak**



**Figure 2-3: With NWL minus without NWL, 2050 PM peak**

2.1.6. The fully modelled area is further subdivided into:



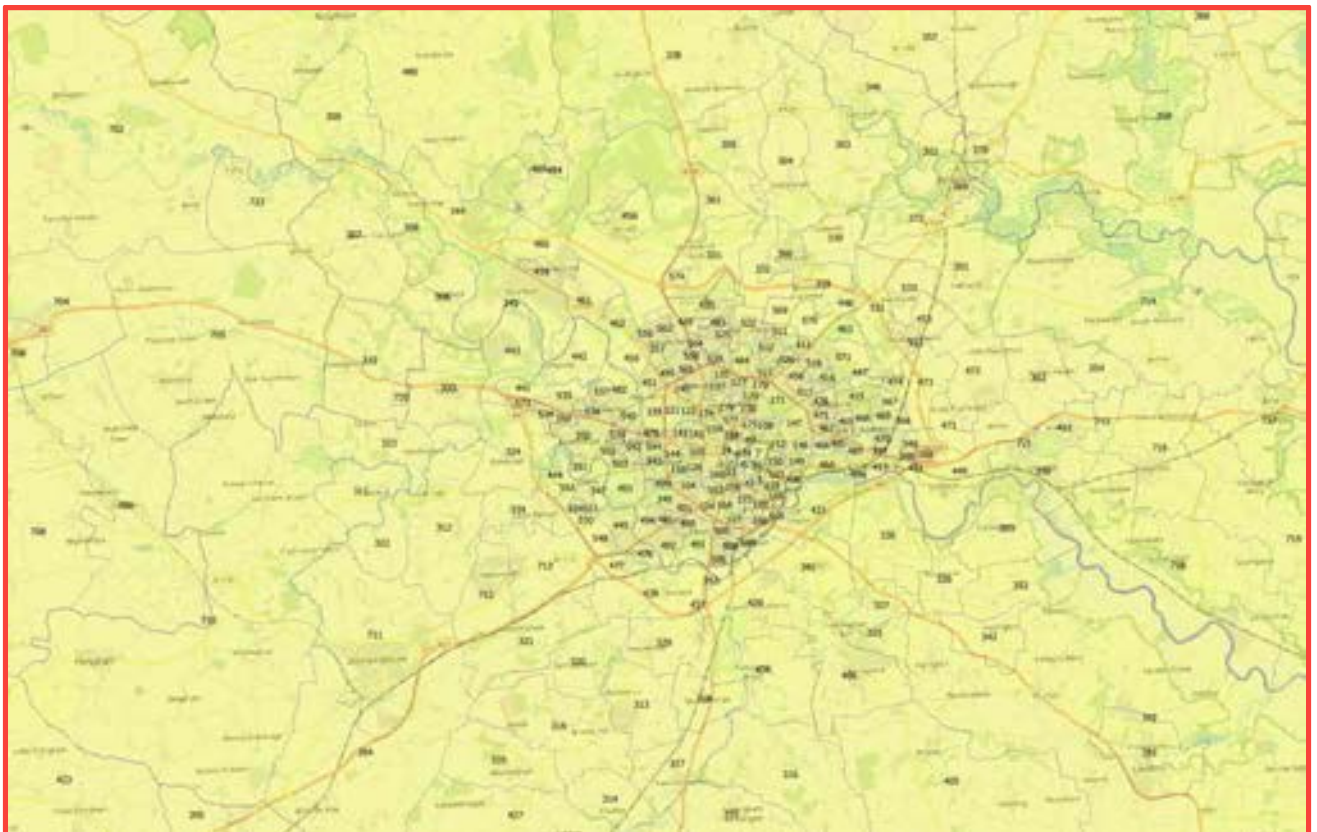
- Area of Detailed Modelling as shown in Figure 2-4. This is the area over which significant impacts of interventions are certain. Modelling detail in this area would be characterised by representation of all trip movements, small zones, very detailed networks and junction modelling. The area has been derived by analysis the impact of the scheme in Figure 2-2 and Figure 2-3. This area will have sufficient model network and zoning detail to be able to assess the likely impact of the scheme to an appropriate level for the purposes of the scheme appraisal;
- Rest of the Fully Modelled Area. This is the area over which the impacts of interventions are considered to be quite likely but relatively weak in magnitude. It would be characterised by: representation of all trip movements, somewhat larger zones and less network detail than for the Area of Detailed Modelling, and speed/flow modelling (primarily link-based but possibly also including a representation of strategically important junctions)
- The rest of the UK represents the External Area. In this area impacts of interventions are likely to be negligible. The External Area is characterised by skeletal networks and simple speed/flow relationships or fixed speed modelling and a partial representation of demand (trips to, from and across the Fully Modelled Area).



**Figure 2-4: Area of Detailed Modelling**

## 2.2 ZONING SYSTEM

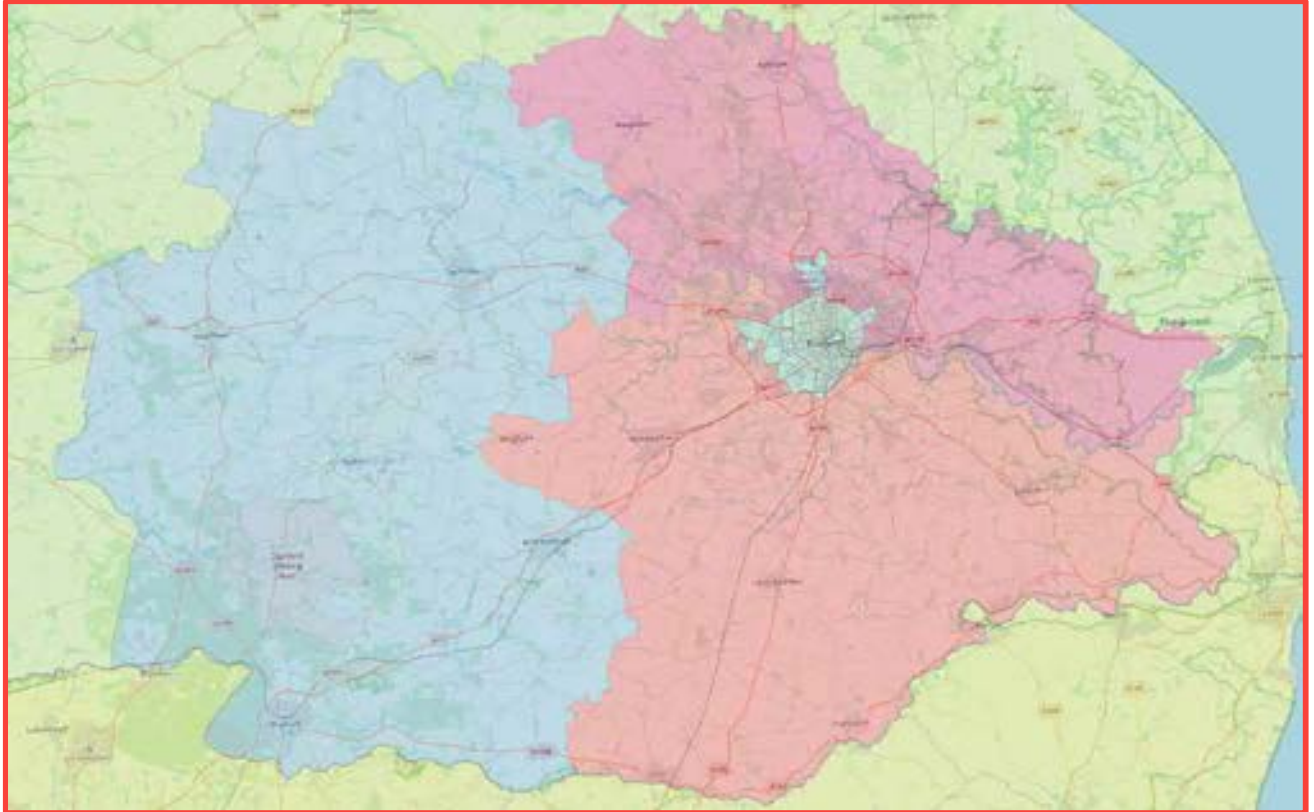
- 2.2.1. Traffic loads onto the model network from zones via centroid connector links. The centroid zone connectors in the NATS model within the NWL study area will be reviewed and refined to more realistically represent the way in which traffic joins the minor road network, prior to accessing strategic roads. As far as possible, specific access roads from residential and commercial areas will be used as a basis for connecting zones to the network via centroid connectors.
- 2.2.2. The zoning system as shown in Figure 2-5 will be revised, with local zones within the NWL study area disaggregated to better reflect the local area and to allow for more accurate loading of existing traffic onto the local road network. The NATS zoning system in the Area of Detailed Modelling will be refined to allow for more accurate assignment of the traffic flows.
- 2.2.3. The zoning system will be revised by initially using the Census Middle Super Output Areas (MSOA). These areas will then be altered depending on whether they are located within the Detailed Model Area or outside in the model buffer network. Within the detailed model area, the MSOAs will be split to provide a suitable representation of land use that enables the model to load trips onto the network appropriately. This enables a more detailed representation and enhances the model calibration and validation. The further away from the Norwich urban area and scheme impact area the zones are located the larger the area they represent. MSOAs will be grouped together for areas that are a significant distance away from the study area e.g. North of England and Scotland.



**Figure 2-5: Zoning System Around Norwich**

## 2.3 SECTORING SYSTEM

- 2.3.1. The model zone system will be aggregated into model sectors. The sector system will enable data to be extracted and summarised into more strategic datasets. The sector system will be used to demonstrate how the model is fit for purpose and is representative of traffic movements between these sectors. The sector system will be used during the matrix estimation process and for economic analysis. The sector system is shown below in Figure 2-6.



**Figure 2-6: Sector System**

- 2.3.2. There are twelve sectors in total. The initial four represent the local areas around Norwich, two represent the north and south hinterlands of Norfolk and the remaining six sectors represent the rest of Britain. This sectoring system will be reviewed prior to model development and will be updated accordingly. The specific details of the locations covered are displayed in Table 2-1.

**Table 2-1: Table of Sectors**

Sector	Location
1	Broadland
2	Breckland
3	South Norfolk
4	Norwich
5	North Norfolk
6	Cambridgeshire
7	West Midlands
8	North East
9	London
10	Scotland
11	South West
12	Wales

## 2.4 MODEL YEARS

- 2.4.1. The base year of the updated model is 2019.
- 2.4.2. The following model forecast years have been identified:
  - 2019: Base Year
  - 2025: Opening year
  - 2040: Design year
  - 2050: Horizon year

## 2.5 TIME PERIODS

- 2.5.1. The base year models will be developed for the following time periods:
  - average Weekday (Monday to Thursday) AM peak hour (08:00 - 09:00)
  - average Weekday (Monday to Thursday) Inter peak hour (average 10:00 – 16:00)
  - average Weekday (Monday to Thursday) PM peak hour (17:00 - 18:00).
- 2.5.2. The modelled time periods will be confirmed will represent the busiest hours within the Fully Modelled Area and will be confirmed using the newly collected ATC data.

## 2.6 MODEL STRUCTURE AND DEMAND SEGMENTATION

2.6.1. NATS will inherit the model structure from the previous model, which consists of the following sub-models:

- Highway model
- Public Transport (PT) model
- Variable Demand Model (VDM).

2.6.2. The existing 2015 Public Transport (PT) model developed in VISUM has the purpose of providing journey generalised cost information to be input within VDM. It is intended that the updated PT model will be used for the same purpose and will not be used for testing any PT transport schemes or strategies in Norwich. Therefore, the scope and the data collection for the PT model development will be proportionate to the intended application of the model. This model requires information on the following:

- timetables
- service restrictions
- alignments
- stopping patterns
- passenger demand
- Rail station, rail service, bus station and bus service usage

2.6.3. The highway model will include five user classes:

- Car Work
- Car Commuting
- Car Other
- LGV
- HGV.

2.6.4. This is consistent with advice presented in Section 2.6 of TAG Unit M3.1 (January 2014).

2.6.5. The PT model user classes will include:

- PT Work
- PT Commuting
- PT Other.

2.6.6. All PT matrices will be split by car availability i.e. into car available (CA) and non-car available (nCA).

2.6.7. To summarise, the trip matrices will be segmented as indicated below:

- Time period: AM peak hour, Inter-peak period, and PM peak period
- Mode: Private vehicle and Public transport
- Vehicle types: Light vehicles and Heavy vehicles
- Purpose: Work, Commuting and Other
- Car availability: Car available and No car available (public transport only).

## 2.7 DATA COLLECTION

- 2.7.1. The update of the model will require the following datasets:
- Automatic Traffic Counts (ATC)
  - Manual Classified Turning Counts (MCTC)
  - DfT TrafficMaster Origin Destination and Journey Time Data
  - Mobile Network Data
  - INRIX Origin Destination and Journey Time Data.
- 2.7.2. The ATC and MCTC data sets will enable the highway model calibration and validation and will be used within matrix estimation. The ATC and MCTC data collection is taking place in October 2019 and is fully described in the Norwich Transport Model Data Specification Brief<sup>1</sup>.
- 2.7.3. The journey time data is used for validating the model journey times.
- 2.7.4. The mobile network data and the GPS origin-destination data will be used within the trip matrix development stage. This is detailed in Section 5 of this report.
- 2.7.5. To adhere to the principle of proportionality, no on-site public transport data will be collected. Instead, existing data will be utilised as much as possible, for example, local bus counts, rail station annual patronage and rail service passenger loading derived from Moira.

---

<sup>1</sup> Norwich Transport Model Data Specification Brief – 1 October 2019

# 3

## **HIGHWAY ASSIGNMENT MODEL**

---



## **3 HIGHWAY ASSIGNMENT MODEL**

---

### **3.1 OVERVIEW**

- 3.1.1. The Norwich Area Transport Strategy (NATS) model originally developed has been updated on numerous occasions and has been used in the assessment of several variations of the NDR and NWL. The existing NATS model consists of a highway assignment model developed in Simulation and Assignment of Traffic to Urban Road Networks (SATURN) modelling software, which is an industry standard tool.
- 3.1.2. In updating the model the latest, relevant guidance in DfT WebTAG Unit M3.1 Highway Assignment (January 2014) is to be followed, referenced throughout this report as 'TAG Unit M3.1'.

### **3.2 SOURCE MODEL**

- 3.2.1. Highways England updated the base year and locally enhanced the transport network to satisfactorily model A47 RIS scheme beyond the Norwich area.

### **3.3 MODELLING SOFTWARE**

- 3.3.1. The Highway Assignment Model will be developed using the latest (non-beta) versions of the software suite of programs in SATURN. The current version of SATURN is version 11.4.07H.

### **3.4 NETWORK DEVELOPMENT**

- 3.4.1. The model network development will involve updating the previous version of the NATS model. The update will involve reviewing the highway layout and including any highway schemes that have been built since the last update. The review will cover the following items of the network:
- Network structure;
  - Signal Timings;
  - Link speeds (cruise speeds and speed flow curves);
  - Link and junction saturation flows;
  - Link distances;
  - Give-way priority and flare length markers; and
  - Number of lanes.



## **3.5 APPROACH TO CALIBRATION AND VALIDATION**

3.5.1. Calibration and validation will be undertaken for the four main components of the model:

- Network calibration and validation
- Route choice calibration and validation
- Trip matrix calibration and validation
- Assignment calibration and validation.

3.5.2. Each of the tasks above is linked with each other and it is often a combination of all that are required to address each problem identified by the calibration and validation process. Each of the tasks is considered further in this section in turn.

## **3.6 NETWORK CALIBRATION**

3.6.1. An initial assignment will be carried out prior to any adjustment of the demand matrices. The results will be compared against observed flows, speeds and delays to identify any further areas which may require adjustment to the network coding. The following instances will be checked:

- Turn / link capacity is less than observed count
- Calculated delays significantly greater than observed delays
- Modelled flows significantly above observed flows
- Modelled delays unacceptably lower than observed delays.

3.6.2. Remedial action on the network coding will be undertaken where the above is identified; changes will only be made that are in accordance with direct observations of actual network properties.

## **3.7 NETWORK VALIDATION**

3.7.1. High level checks of the network will be undertaken and will focus on the strategic movements of trips across the area and the model journey times on key routes.

3.7.2. Network validation will be confirmed through presentation of time/distance graphs for each modelled journey time route, as discussed below.

## **3.8 ROUTE CHOICE CALIBRATION**

3.8.1. At various stages of model development, the minimum cost routes for a range of selected O-D pairs will be plotted and checked for plausibility. Modelled route choice depends on:

- Zone size
- Network structure
- Centroid connectors
- Trip matrix accuracy
- Representation of speeds and delays
- Junction coding accuracy.

## **3.9 ROUTE CHOICE VALIDATION**

3.9.1. Sense checks will be carried out on a number of strategic and local routes across the study area.

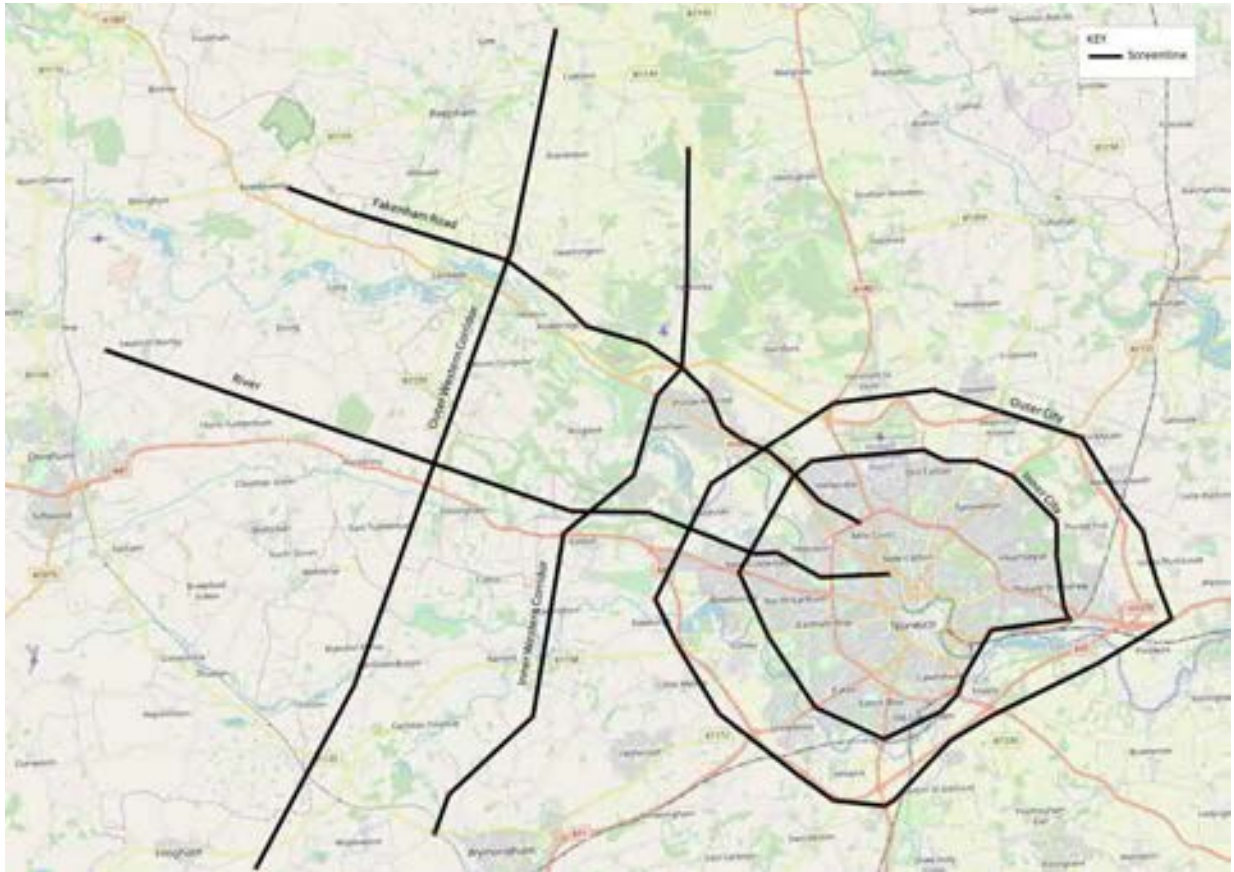
- 3.9.2. Following calibration and validation of the model, information will be presented for a selected number of origin-destination pairs to demonstrate that the routing is logical. To some extent this is not true validation, as there is no empirical data to act as a benchmark, but selected routes plotted from SATURN will be compared to equivalent routes prepared using Google Maps, supported by a commentary discussing the feasibility of each route.
- 3.9.3. Routes selected will focus on important centres of population or employment, or through key intersections. They will:
- Relate to significant numbers of trips
  - Are of significant length
  - Pass through key areas of interest
  - Include both directions of travel
  - Link different compass areas
  - Coincide with journey time routes, where appropriate.

### **3.10 TRIP MATRIX CALIBRATION**

- 3.10.1. Following the development of the prior trip matrices, matrix estimation will be undertaken.
- 3.10.2. Matrix estimation will be used on all screenlines, using counts that have been allocated to the calibration process. Counts on cordons and screenlines will be constrained and monitored within the process so the model build conforms to TAG criteria.
- 3.10.3. Guidance presented in section 8.3 of TAG Unit M3.1 (January 2014) will be followed. In particular:
- Counts used in matrix estimation will be derived from a minimum 2-week ATC
  - Count constraints will be grouped at a screenline level
  - Constraints will be only applied to directly observed counts, e.g. all car user classes will be grouped to a single “car” constraint.
- 3.10.4. To ensure that matrix estimation is a controlled process, due care and attention will be given to the requirements set out in TAG to monitor the impacts of matrix estimation. Information will therefore be presented on:
- Regression statistics at trip end level
  - Trip length distributions with means and standard deviations.

### **3.11 TRIP MATRIX VALIDATION**

- 3.11.1. Information will be presented for both the prior and post matrix estimation matrices on the following:
- Screenlines and cordons of counts used in matrix estimation
  - In accordance with the requirements presented in section 3.2 of TAG Unit M3.1 (January 2014), screenline totals will be presented for each vehicle type. Total modelled flows across screenlines for each vehicle type should be within 5% of observed flows. TAG recommends that this should apply to “all, or nearly all” screenlines. We will apply a threshold of 85% of screenline totals to meet this criterion
- 3.11.2. From the data that is available, the following screenlines will be used, which are illustrated in Figure 3-1.



**Figure 3-1: Highway Model Cordons and Screenlines**

## 3.12 ASSIGNMENT CALIBRATION

3.12.1. Assignment calibration simply involves further steps to identify any issues that are preventing an acceptable level of calibration of the network, route choice and trip matrix, as outlined above. This will include:

- Checking appropriateness of centroid connectors
- Production of forests to understand the nature of competing routes between OD pairs
- Checking representation of queues on surveyed journey time routes.

3.12.2. Any additional changes required to signal times, saturation flows, lane use, etc. to resolve the assignment calibration issues will be highlighted and reported accordingly.

## 3.13 ASSIGNMENT VALIDATION

3.13.1. In addition to the calibration/validation aspects described above, the final validation of the model will be confirmed through presentation of modelled and observed data for the following:

- Traffic flows on links – In addition to the screenline information flows will be presented on individual links for cars, LGV and HGV
- Journey times – Information will be presented along whole routes, with means and 95% confidence intervals, supplemented with time/distance graphs
- Turning movements – Information will be presented for key junctions, aggregated across all vehicle types.

### 3.14 VALIDATION CRITERIA AND ACCEPTABILITY GUIDELINES

3.14.1. The validation criteria and acceptability guidelines as specified in TAG M3.1 are shown in Table 3-1 below. The observed flow and screenline flow criteria are applied to “all vehicles” and “cars/LGVs”.

**Table 3-1: Acceptability Guidelines**

Criteria and Measure		Acceptability Guideline	
<b>Flow Difference Criteria</b>			
<b>1</b>	Total Screenline flows (normally > 5 links) to be within +/- 5%	All (or nearly all) screenlines	
<b>2</b>	Observed (individual) link flow < 700 vph	Modelled flow within +/- 100 vph	> 85% of links
	Observed (individual) link flow 700 to 2700 vph	Modelled flow within +/- 15%	> 85% of links
	Observed (individual) link flow >2700 vph	Modelled flow within +/- 400 vph	> 85% of links
<b>GEH Criteria</b>			
<b>3</b>	GEH Statistic for individual link flows <5		> 85% of links
<b>Journey Time Validation</b>			
<b>4</b>	Modelled times along routes should be within 15% (or 1 minute, if higher)		> 85% of links

3.14.2. The GEH statistic will be used to compare the observed and assigned flow. The statistic uses the following formula to calculate a value for the difference between observed (survey data) ( $M_E$ ) and modelled ( $M_G$ ) (SATURN flow) traffic flow:

$$GEH\ Statistic = \sqrt{\frac{(M_E - M_G)^2}{0.5(M_E + M_G)}}$$

3.14.3. The GEH statistic takes account of the fact that when traffic flows are low the percentage difference between observed and modelled flow may be high but the significance of this difference is small and conversely, a small percentage difference on a large base might be important.

3.14.4. A GEH value greater than 10 indicates that closer attention is required, as the match between observed and modelled flows is poor, while a GEH less than 5 indicates a very good fit. The aim is to achieve at least 85% links and turns with a GEH less than 5 as specified in TAG Unit M3.1.

### 3.15 CONVERGENCE CRITERIA AND STANDARDS

3.15.1. To ensure a satisfactory model convergence, TAG M3.1 recommends the criteria shown in Table 3-2.

**Table 3-2 Convergence**

Criteria	Type	Acceptable values
Delta and %GAP	Proximity	Less than 0.1% or at least stable with convergence fully
Percentage of links with flow change (P) < 1% or Percentage of links with cost change (P2) < 1%	Stability	Four consecutive iterations greater than 98%

### 3.16 TRIP MATRIX CHANGES

3.16.1. TAG M3.1 recommends that the changes brought about by matrix estimation should be carefully monitored by the following means:

- Scatter plots of matrix zonal cell values, prior to and post matrix estimation, with regression statistics (slopes, intercepts and R<sup>2</sup> values)
- Scatter plots of zonal trip ends, prior to and post matrix estimation, with regression statistics (slopes, intercepts and R<sup>2</sup> values)
- Trip length distributions, prior to and post matrix estimation, with means and standard deviations
- Sector to sector level matrices, prior to and post matrix estimation, with absolute and percentage changes.

3.16.2. The changes brought about by matrix estimation should not be significant. The criteria by which the significance of the changes brought about by matrix estimation may be judged are given in Table 3-3.

**Table 3-3: Significance of Matrix Estimation Changes**

Criteria and Measure	Significance Criteria
Matrix zonal cell levels	Slope within 0.98<Slope<1.02, Intercept near zero, R <sup>2</sup> in excess of 0.95
Matrix zonal trip ends	Slope within 0.99<Slope<1.01, Intercept near zero, R <sup>2</sup> in excess of 0.98
Trip length distributions	Means within 5%, Standard deviations within 5%
Sector to sector level matrices	Differences within 5%

# 4

## **PUBLIC TRANSPORT MODEL**

---



## 4 PUBLIC TRANSPORT MODEL

---

### 4.1 OVERVIEW

- 4.1.1. The latest, relevant guidance in DfT TAG Unit M3.2 Public Transport Assignment (January 2014) is to be followed, referenced throughout this report as: 'TAG Unit M3.2'. As discussed earlier the main purpose of the updated PT model will be as a prime source of journey generalised cost information to be input within VDM. The model is not intended to be used for testing any PT transport schemes or strategies in Norwich. Therefore, the scope of the PT model development is proportionate to the intended application of the model.
- 4.1.2. The PT model should achieve the validation acceptability guidelines specified in TAG Unit M3.2. As indicated in TAG Unit M3.2, the PT model validation includes:
- Validation of the trip matrices
  - Network and service validation
  - Assignment validation.

### 4.2 TRIP MATRIX VALIDATION

- 4.2.1. TAG Unit M3.2 states that “Wherever possible, a check should be made between the annual patronage derived from the model and annual patronage derived by the operator”.

### 4.3 NETWORK AND SERVICE VALIDATION

- 4.3.1. The PT model bus network will be identical in structure to the validated highway network. The coding of bus services will be verified by checking the modelled flows of buses by route against available bus count data.
- 4.3.2. Modelled bus journey times will be compared against published timetables. TAG Unit M3.2 does not contain a specific target for the accuracy of modelled journey times. However, for the model validation, an acceptability target of +/-15% will be used, which is consistent with highway model journey time validation criteria.
- 4.3.3. The rail network will be checked using industry accepted network diagrams to ensure distances between stations are accurate. Rail service station to station run times will be explicitly included in the transit lines coding.

### 4.4 ASSIGNMENT VALIDATION CRITERIA

- 4.4.1. TAG Unit M3.2, paragraph 7.1.5 states that the validation of the assignment should involve comparing modelled and observed:
- Passenger flows across screenlines and cordons
  - Passengers boarding and alighting in urban centres.
- 4.4.2. The criteria in TAG Unit M3.2 states that “across modelled screenlines, modelled flows should, in total, be within 15% of the observed values. On individual links in the network, modelled flows should be within 25% of the counts, except where the observed flows are particularly low (less than 150)”. The GEH statistic, as defined in Section 2, should be used to give a measure of the fit of the model to counts less than 150. A GEH of less than 5 indicates a good fit of the modelled link flow to the observed count on low volume links, as specified in highway model validation criteria.

# 5

## **TRIP MATRIX DEVELOPMENT**

---





## 5 TRIP MATRIX DEVELOPMENT

---

### 5.1 INTRODUCTION

- 5.1.1. The trip matrix for the model will be built up from a series of data sources, using Mobile Network Data as the primary source with other sources filling in or adjusting locations where the Mobile Network Data is not able to predict trip ends accurately.
- 5.1.2. Mobile network data is a rich data source, but one that is likely to have inherent problems due to the way the data is captured. Until the data is received from the mobile network provider and verified against other data sources it is difficult to specify the exact process that will be applied to turn the MND into a prior matrix. This matrix development chapter is therefore a discussion of the verification that needs to occur and the likely corrections that might be needed based off previous experience of working with mobile network data, and how the matrix will be calibrated for use in the model.
- 5.1.3. The DfT's TAG sets out that the matrix development chapter of a model specification report should discuss travel demand data, partial trip matrices from surveys, trip synthesis and merging data from the surveys. In the case of using MND the 'observed' data is much more complete than in a typical model build, and therefore the usage of synthetic data is more limited.

### 5.2 MOBILE NETWORK DATA

#### Mobile Network Data Providers

- 5.2.1. There are a range of mobile network data providers, each of which processes their data in a different way and provides an output that is different from one another. This introduces problems in trying to determine the exact methodology used to process the MND into a trip matrix at this stage of the project where it is not certain which provider is to be used.

#### Verification of Data

- 5.2.2. No matter which provider is used, the data provided will need to be compared against other datasets which are trusted to one extent or another. The verification process is necessary to see how the MND differs from datasets such as Census data, although only some elements of the data can be compared. For example, the Census data provides travel to work journeys, and these often need interpretation when compared to the subset of travel to work trips in the MND due to there being other trips mixed in to the MND such as education trips or other trips that look like travel to work to the mobile network data provider and therefore they are not able to be filtered out.
- 5.2.3. The verification will need to be completed prior to building a trip matrix, and adjustments to the methodology for building the trip matrix may need to be put in place to account for the problems found during the verification process.
- 5.2.4. One of the common issues with Mobile Network Data which will be confirmed during verification is shortfalls in short trips. The definition of a trip within the data is for a phone to change which mast it is using, and this is reliant on them moving out of range of one mast and into range of another. Masts often service different sizes of areas depending on where in the country they are and how urban an area is. The infill of these trips may therefore need to be dynamic depending on the area of the matrix that is being considered.

5.2.5. Table 5-1 sets out the common verification tests undertaken. These tests are often undertaken at different spatial and temporal levels depending on what data is available for the data source being compared against. Care needs to be taken when comparing some of these data sources as the years that they are valid for will be different e.g. Census data is a snapshot from 2011 while MND will be closer to the current year, and there will be inherent differences as a result of this. The purpose of the verification is not to ensure the data matches exactly, but just to verify the MND does not have major flaws that need correcting in some way.

**Table 5-1: Common Verification Tests Summary**

Verification Area	Data Sources	Objective
Baseline data comparison	<ul style="list-style-type: none"> <li>2011 National Trip End Model (NTEM) 7.2 Home-Based Work (HBW)</li> <li>Census Journey To Work (JTW)</li> </ul>	<ul style="list-style-type: none"> <li>Check how the baseline data sources compare against each other</li> </ul>
Rail Trip Removal	<ul style="list-style-type: none"> <li>Mobile Network Data (MND) HBW</li> <li>Census JTW</li> </ul>	<ul style="list-style-type: none"> <li>Check rail trips have been removed by the MND provider correctly</li> </ul>
Trip Rates	<ul style="list-style-type: none"> <li>MND home and workplace locations</li> <li>Census populations</li> </ul>	<ul style="list-style-type: none"> <li>Test trip rate plausibility against population values</li> </ul>
Trip Ends	<ul style="list-style-type: none"> <li>MND home and work</li> <li>Census JTW</li> <li>NTEM</li> </ul>	<ul style="list-style-type: none"> <li>Test spatial accuracy</li> </ul>
Trip Purpose	<ul style="list-style-type: none"> <li>MND</li> <li>National Travel Survey (NTS)</li> <li>NTEM</li> </ul>	<ul style="list-style-type: none"> <li>Investigate whether purposes are split correctly, or exactly what each purpose appears to contain if further splitting required</li> </ul>
Symmetry	<ul style="list-style-type: none"> <li>MND</li> </ul>	<ul style="list-style-type: none"> <li>Confirm balance of inbound versus outbound trips</li> </ul>
Trip Distribution	<ul style="list-style-type: none"> <li>MND</li> <li>Census JTW</li> </ul>	<ul style="list-style-type: none"> <li>Veracity of HBW distribution against Census</li> </ul>
Trip Length Distribution	<ul style="list-style-type: none"> <li>MND</li> <li>NTS</li> </ul>	<ul style="list-style-type: none"> <li>Veracity of trip length distribution</li> </ul>
Daily Profile	<ul style="list-style-type: none"> <li>MND</li> <li>NTS</li> </ul>	<ul style="list-style-type: none"> <li>Compare trip start time profile</li> </ul>

Previous Experience – Corrections for Trip Ends

5.2.6. There are a few issues with the exact position of trip ends that have arisen during previous projects where MND has been used. These are due to the exact nature of the MND, where it records trips from their person-trip origin to person-trip destination, while often we want to use some portion of that trip for the model we are building. In the case of a highway model, we are looking at those trips using the highway network, and this means that only the portion of a trip where a person is using a car is relevant.

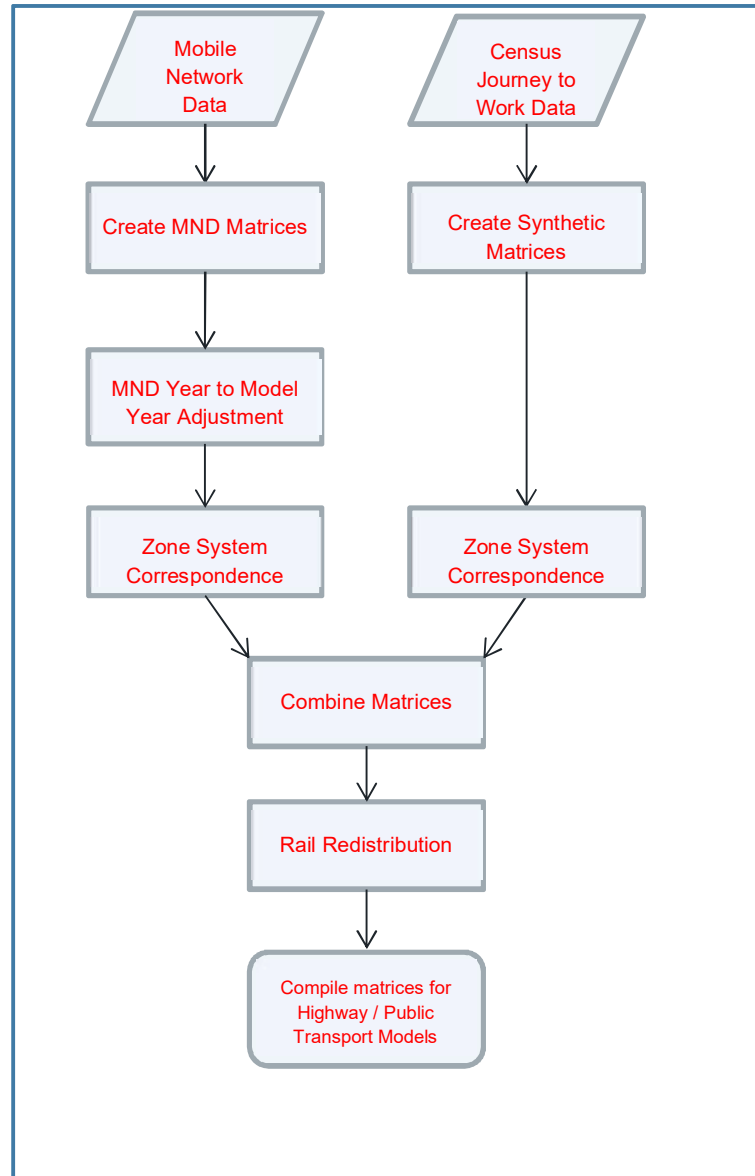
- 5.2.7. In the case of a rail trip we may therefore need to split out a section of the trip as the person drives to the station, or in the case of a park and ride trip we need to remove the section where the person is on a bus. These corrections are difficult to do accurately due to a lack of knowledge about the trip specifically.
- 5.2.8. For rail trips, the MND operator may be able to tell us that a trip used the rail network but not convey which station they used at each end of the trip. It's easy to identify where trips must not have originated at a station (as the origin is not located in the same area as the station) but correcting for this may require certain assumptions to be made as to which station is the most likely for the person to have used. On previous projects this has been carried out through use of a gravity model, taking in to account data for stations such as how much car parking is available and how frequent trains are at the station.
- 5.2.9. For city centre trips where users travel to workplaces but do not park at the workplace due to a lack of parking, a correction should be made to account for the difference in highway trip end and person trip end. These discrepancies have been noticed on previous projects but have been minor in the context of the model as a whole and not corrected for; for this model these discrepancies are likely to have a more significant effect on the operation as the scope of the model is more urban in nature. Further investigation of these effects will be carried out during the verification stage for the MND and corrections will be discussed at that stage depending on how much of an error it is determined there might be.

#### Trip Density and Network Detail

- 5.2.10. The mobile network data provides every trip in the area where data is required. The model network needs to provide enough detail within that area that problems do not arise due to lack of alternative routes.
- 5.2.11. For example, in a rural area there may be a number of small villages or hamlets connected by a reasonably disaggregate network of highways links, while in the model this is represented by a single zone with a single link travelling through that area connecting them to more major links. The MND will provide every trip within this area, and if the links that are modelled are modelled as if they are individual highway links of a standard of the single highway links in the real area, they may not cope with the volume of traffic the zone produces.
- 5.2.12. There needs to be enough capacity on feeder links to cope with the level of trips being produced especially in more rural areas of the model where there may be multiple real ways of travelling between places, but only one or two modelled routes.

### **5.3 EXAMPLE DEVELOPMENT PROCESS**

- 5.3.1. As an example of the matrix development process, Figure 5-1 is an extract from the Suffolk County Transport Model Local Model Validation Report. The flow chart shows the major steps used to develop a prior matrix for matrix estimation. The matrix development process for this model is likely to follow a similar path at this high level, however the detail of each step (or even the data sources used for each step) may vary, depending on the exact nature of the data received from the mobile network data provider and how this data verifies against other data sources.



**Figure 5-1: Example Matrix Development Outline**

## 5.4 TRIP SYNTHESIS

5.4.1. The infill of data from the MND matrix where shortfalls in the verification are found will likely require some alternative data source to fill in. The creation of an alternative matrix from non-observed data sources is typically called a ‘synthetic’ matrix, utilising data such as the data that lies behind the National Trip End Model (CTripEnd). Further discussion of this will need to be carried out once the specifics of the MND are determined as the synthetic matrix will need to be tailored to what it is required for.

## 5.5 MERGING MOBILE NETWORK DATA AND TRIP SYNTHESIS

5.5.1. The exact merging mechanism will need to be discussed as part of the verification of the MND as the level of verification shown may affect how the process needs to be carried out.

- 5.5.2. It is likely that there will be a shortfall in short trips, and therefore, at a minimum, the synthetic matrix will need to infill this part of the matrix. The mechanism proposed to apply the synthetic matrix is to replace those trips shorter than a certain length from the MND generated matrix with those trips in the synthetic matrix. Trip length distributions will need to be compared in both cases to verify that this process is appropriate.
- 5.5.3. It may be necessary to vary the trip length that is replaced depending on the nature of the zone. On previous projects this has been replaced based on urban or rural zoning, where urban to urban trips have a shorter cut-off for replacement than rural to rural trips, due to the MND better replicating short trips in urban areas due to higher mobile mast density.

## **5.6 TRIP MATRIX ESTIMATION**

- 5.6.1. It is likely that matrix estimation will be required to adjust the matrix so that it matches the observed data more closely. Matrix estimation is the process of taking a matrix (the 'prior' matrix) and adjusting it using routing data and survey data in an iterative process to generate a new matrix that better matches the count data.
- 5.6.2. The matrix estimation process should be used to inform the matrix build, and should not be used in isolation as a process to 'fix' the output from the prior matrix. Investigating the changes that matrix estimation is doing to the prior matrix and fixing the problems that this identifies will result in a better matrix overall. One of the key elements to get right in the estimation process is to check that the data sources used for survey data are consistent, as inconsistency will result in the matrix estimation being unable to come up with a solution and therefore the process will corrupt the matrix in one way or another when trying to solve what it's been given.
- 5.6.3. The matrix estimation process is also reliant on the routing information being correct, which in turn is reliant on the model network being as accurate as possible. If the model network is not accurate or has clear discrepancies with the real network, it is unlikely matrix estimation will change the matrix in the right ways.
- 5.6.4. Due to the issues with finding consistency in the surveyed data, and making sure the routing is correct based on the model network, the matrix estimation process should be restarted from the start often, and the changes that are made to the matrix should be closely monitored to ensure the estimation process is not substantially warping the matrix without good reason. The estimation process will be reviewed against the criteria set out in Table 5 of TAG Unit M-3.

## **5.7 TRIP MATRIX CALIBRATION / VALIDATION**

- 5.7.1. Calibration of the matrix will be carried out to observed count data, with this data used in the matrix estimation process. Some count data will be reserved to validate the model operation as independent checks.

# 6

## DEMAND MODEL



## 6 DEMAND MODEL

---

### 6.1 INTRODUCTION

- 6.1.1. The principles of demand modelling are all set out in DfT TAG Unit M2 (March 2017). This chapter does not attempt to replicate the information contained in this TAG unit but aims to represent the approach to developing a NATS demand model.
- 6.1.2. Chapter 2 of TAG Unit M2 (March 2017) elaborates the steps required to specify the scope of a variable demand model. The guidance encourages adopting a hierarchical model structure, with the least sensitive responses placed first in the hierarchy, and the most sensitive placed last.
- 6.1.3. Chapter 4 of TAG Unit M2 (March 2017) gives specific guidance on four of the variable demand mechanisms:
- Trip frequency
  - Mode choice
  - Trip distribution
  - Time of day choice.
- 6.1.4. The guidance notes that the decision to include any of the above responses in a demand model depends on:
- The availability of data
  - Circumstances and policy interests of the assessment
  - The amount of effort justified for a particular application.
- 6.1.5. The input files from the SATURN highway supply models will include:
- Assigned validated base year highway networks (to pivot off the base)
  - Assigned DM highway networks (if running the DS and pivoting off the DM)
  - Forecast year reference highway trip matrices
  - Forecast year/scenario (e.g. 2025 Do-Minimum) network data files.
- 6.1.6. To maintain consistency with the existing structure of the model, the DfT DIADEM (Dynamic Integrated Assignment and Demand Modelling) software will be used as it provides simple hierarchical structure of trip frequency, mode choice, distribution, time of day choice and a direct interface with the SATURN assignment.

### 6.2 DEVELOPMENT OF THE VARIABLE DEMAND MODEL

- 6.2.1. There are two methods of presenting demand for travel within a transport model:
- Production/Attraction (P/A) form considering 'tours' (any round trip, starting and finishing at home, potentially containing stops at several different destinations)
  - Origin/Destination (O/D) form considering individual trips between start and end points, not necessarily related to each other.
- 6.2.2. TAG Unit M2, Variable Demand Modelling, recommends the use of P/A where possible. The three main options to address this issue are as follows:

- Create P/A Matrices from Survey Data.

6.2.3. A 'first principles' approach of returning to the original data to derive P/A form matrices is the first option.

6.2.4. The data required for this approach was only collected for a relatively small sample of trips in the study area (those observed by the roadside interviews and car park surveys) with responses only providing a guide to the return period. This data was not considered to be sufficiently reliable to allow P/A matrix construction for this study.

- Create P/A Matrices from O/D Peak Matrices.

6.2.5. By employing synthetic trips and matrix estimation, the O/D matrix build process outlined above has broken the link between outbound and return trip legs, making direct conversion to P/A impractical.

6.2.6. The process could be attempted, but the derived P/A matrices are likely to return O/D peak matrices which are essentially the same as the original inputs; too many of the parameters would need to be inferred from the O/D peak matrices to constitute an independent process.

- Retain O/D Matrix Format.

6.2.7. The demand matrices already exist in this form and are sufficient for running VDM with DIADEM.

6.2.8. The appropriate method will be discussed later and presented to NCC for comment.

#### Time Periods

6.2.9. The following time periods will be modelled, consistent with advice presented in section 5 of TAG Unit M3.1:

- AM peak hour (08:00-09:00) (AM)
- Average interpeak hour (10:00-16:00) (IP)
- PM peak hour (17:00-18:00) (PM)
- Average off-peak hour (19:00-07:00) (OP).

6.2.10. TAG Unit M2 (March 2017) advises that the demand model should operate at a 24-hour level in production-attraction format, so it is therefore necessary to represent costs in the off-peak period. However, validated base assignment models of the off-peak period have not been built.

6.2.11. Instead, the off-peak model will be developed by running the Inter Peak model with a reduced demand. The level of reduction can be determined by analysing the traffic survey data used to calibrate and validate the NATS base year transport model.

6.2.12. This off-peak model will only be created for the purpose of running the variable demand model, and will therefore not be used in further economic analysis.

#### Demand Segmentation

6.2.13. Traffic demand is split into various demand segments in order to generate the correct responses in the demand model.

- Home-based work (HBW)
- Home-based employer's business (HBEB)
- Non-home-based employer's business (NHBEB)
- Home-based other (HBO)
- Non-home-based other (NHBO).



- 6.2.14. LGV and HGV are not included in the demand model, as growth in these vehicles is driven by factors other than those affecting the generalised cost of travel.
- 6.2.15. The user class structure will also incorporate user classes from the PT model. The structure will be set up to include car availability to allow for mode shift.

#### Model Form

- 6.2.16. In keeping with guidance in TAG Unit M2 (March 2017), the preferred demand model form is a nested hierarchical logit model. The model uses an incremental formulation, in which each stage of the model is forecast based on the relative cost changes compared to the validated base model. The standard functional form is:

$$P_p = \frac{\exp(\theta \Delta U_p)}{\sum_q \exp(\theta \Delta U_q)}$$

Where:

- $P_p$  is the proportion of travellers choosing alternative p from the set of possibilities q
  - $U_p$  is the disutility of option p
  - $\Delta U_p$  is the change in disutility of option p
  - $\theta$  is a scaling, or sensitivity, parameter, which changes depending on the stage of the model.
- 6.2.17. Disutility is represented by a form of generalised cost, and the treatment of these is discussed in section 6.2.25.
- 6.2.18. Doubly constrained models are used for commuting. This reflects the relative confidence in the measures of attraction (employment) for commuting trips, as well as the relatively fixed nature of these attraction values in the short term. Other purposes such as employer's business and others are production-end constrained. For these purposes, the trip end factors reflect the attraction of destinations, not the actual numbers of trips attracted and ideally the availability of intervening similar destinations between the origin zone and the zone in question.
- 6.2.19. Journey purposes with a home-based trip end are assumed to form a simple 'tour' comprising on the outbound leg and a return leg, therefore all those segments are modelled in PA matrix format according to the WebTAG criteria. Non-home-based demand segments are still in OD format without any conversion.

#### Generalised Cost

- 6.2.20. Generalised cost is a measure of the factors that affect each individual's decisions on transport choices. It is measured in generalised minutes and its definitions for car and public transport users are set out in section 6.2.25
- 6.2.21. People's travel choices depend on both the monetary and time costs of the alternatives available to them. In the NATS demand model, the generalised costs associated with each mode are all formulated as recommended in section 3 of TAG Unit M2 (Variable Demand Modelling, March 2017).
- 6.2.22. The generalised costs of travel in the demand model are expressed in units of time (in minutes) and include both the times and monetary costs associated with each trip.
- 6.2.23. The generalised costs have been derived using variables relating to the trips under consideration and others relating to the choice-making individuals.

6.2.24. The generalised costs will be extracted from the highway assignment model all highway trips with the public transport generalised being extracted from the PT VISUM model.

Car Generalised Cost Formulation

6.2.25. The car generalised costs for a specific OD pair, time of day and demand stratum are calculated in the demand model as follows:

$$G_{car} = t_{ride} + \frac{d * VOC}{occ * VOT}$$

Where:

- $G_{car}$  is the car generalised cost (in min)
- $t_{ride}$  is the journey time spent in the car (in min)
- $d$  is the journey distance travelled in the car (in km)
- $VOC$  is the vehicle operating cost per km for the trip purpose (in p/km)
- $occ$  is the number of people in the car (who are assumed to share the cost)
- $VOT$  is the value of time for the demand stratum (in p/min).

6.2.26. The  $t_{ride}$  and  $d$  values are exported as skim matrices from the calibrated base year highway assignment model for each time period and each assigned demand segment.

Cost Damping

6.2.27. In most models, using generalised costs directly in mode split and distribution results in the model's elastic response to car fuel price changes being dominated by very long trips in a way that does not seem to accord with actual experience. According to Section 3.3 of TAG Unit M2 (Variable Demand Modelling, March 2017), there is also evidence that the impact of changes in generalised costs on demand responses reduces with increasing trip length. It is therefore common practice to apply some form of cost damping to long trips in order to reduce the elasticity of response and get satisfactory realism test results.

6.2.28. The NATS demand model applies the damping function below to car generalised costs:

$$G' = \left(\frac{d}{k}\right)^{-\alpha} \cdot \left(t + \frac{c}{VOT}\right)$$

6.2.29. Where:

- $G'$  is the damped generalised cost
- $t + \frac{c}{VOT}$  is the generalised cost
- $t, c$  are the trip time and monetary cost
- $VOT$  is the value of time
- $d$  is the trip length
- $\alpha$  is the adjusting parameter of cost damping formula
- $k$  is the average trip distance according to the national averages.

6.2.30. Cost Damping Parameters are the same across all time periods and modes but they vary by purpose and these are provided in Table 6-1.

**Table 6-1: Cost Dampening Parameters**

<b>Parameter</b>	<b>Home Based Work</b>	<b>Home Based Employer's Business</b>	<b>Non-Home Based Employer's Business</b>	<b>Home Based Other</b>	<b>Non-Home Based Other</b>
$\alpha$	0.50	0.50	0.50	0.50	0.50
$\kappa$	30	30	30	30	30

6.2.31. Cost dampening scaling parameter is the same for all purposes.

### **6.3 REALISM TESTING**

6.3.1. Realism testing will be undertaken in accordance with TAG Unit M2 to demonstrate that the model has suitable fuel cost and journey time elasticity, in line with elasticity ranges given in WebTAG. Where a model has an elasticity value that is outside of the ideal range, adjustments will be made to the model sensitivity parameters or by introducing and adjusting parameters associated with cost damping.

7

**FORECASTING**



## 7 FORECASTING

### 7.1 OVERVIEW OF DEMAND FORECASTING PROCEDURE

7.1.1. The demand forecasting procedure involves interrogation of local planning documents to identify developments to be point loaded to specific zones within the model. Once all developments have been identified and point loaded, the forecast growth achieved is compared to TEMPro version 7.2 projections at the district level. The overall level of growth for each Temprom district will be constrained to Temprom using an adjustment factor.

7.1.2. “Fixed Demand” refers to future trip demand related to changes in demography, land use and changes in car ownership and trip rates. It assumes trip costs at base year levels, and it does not allow for changes in travel times; perceived value of time; the cost of fuel and other car operating costs. Figure 7-1 shows an overview of the process that will be used to develop the forecast demand.

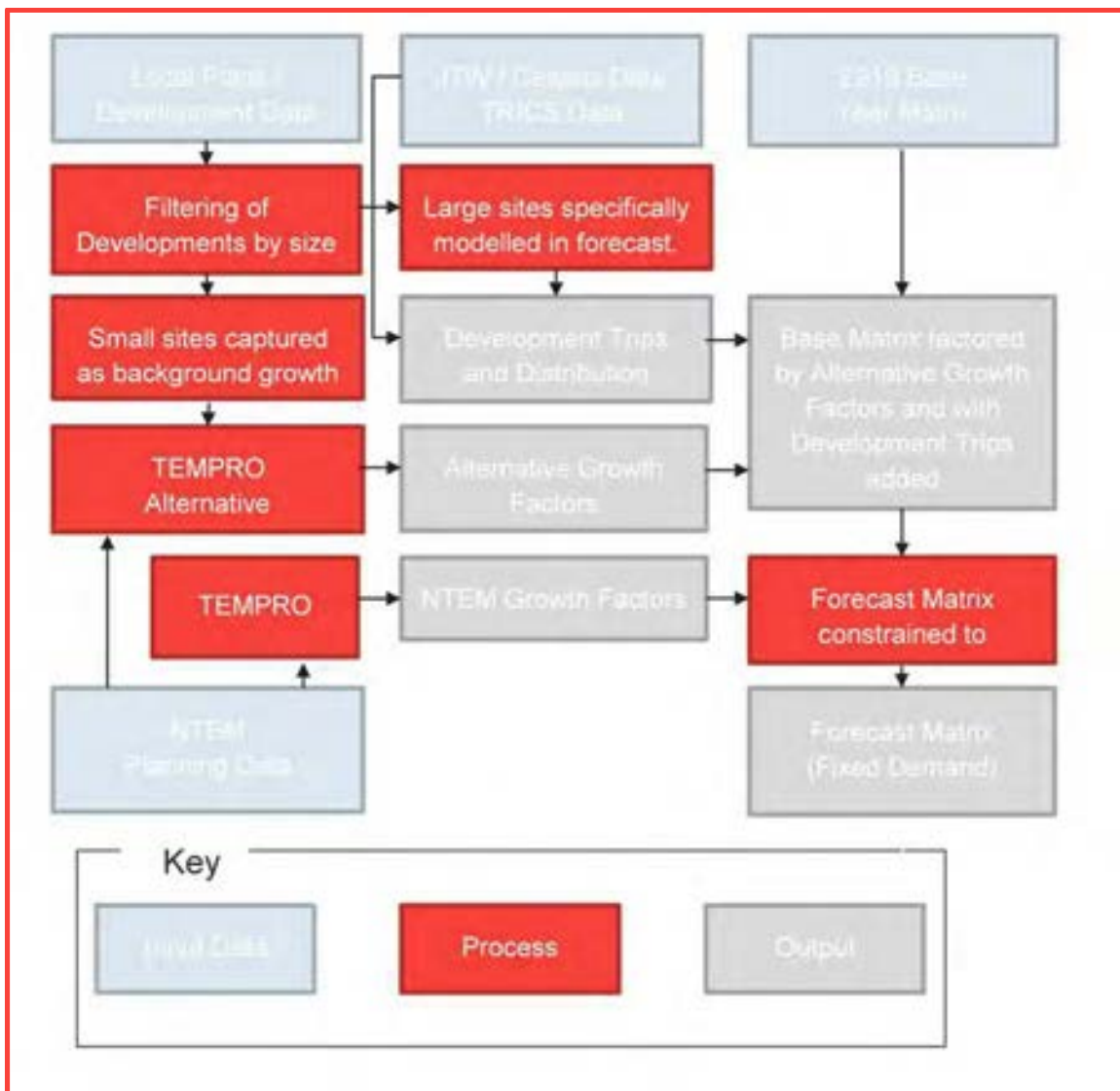


Figure 7-1: Fixed Trip Matrix Development Methodology

7.1.3. Fixed demand matrices will then be input into VDM to produce the final forecast matrices.

## 7.2 CORE SCENARIO

7.2.1. The core scenario forms the most suitable basis for decision making given current evidence. It is to be based on more certain, unbiased assumptions and that are the most consistent. The core scenario is to include:

- NTEM growth in demand, at a suitable spatial area
- Sources of local uncertainty that are more likely to occur than not
- Appropriate modelling assumptions.

7.2.2. The amount of development to be specifically modelled will be detailed in the uncertainty log that will be obtained from and agreed with NCC. The developments to be included in the core scenario will have a certainty of more than likely (MTL) and near certain (NC).

## 7.3 ALTERNATE GROWTH ASSUMPTIONS

7.3.1. The further into the future modelling scenarios are, the less certainty there is over the accuracy over the projections and assumptions used in the process. Therefore, it is best to test the uncertainty by modelling low and high growth assumptions in addition to the core scenario. This provides an assessment of the impact the uncertainty has upon future year forecasting and appraisals.

7.3.2. The low and high growth scenarios are to be based upon guidance set out by WebTAG. The method essentially uses a parameter that reflects the uncertainty surrounding the National Transport Model (NTM). It is used to calculate the level of base year demand that is added or subtracted from the core scenario forecast.

7.3.3. Further alternative growth scenarios will also be developed that reflect the different assumptions on the uncertainty log. A pessimistic scenario assumes all development listed in the uncertainty log are to be built and an optimistic growth scenario that assumes the minimum amount of development is to be built. This essentially provides a best and worst-case scenario in terms of trip generation within Norwich.

## 7.4 FORECAST MODEL DEVELOPMENT

7.4.1. It is proposed that forecast models are developed for the following years:

- 2019: Base Year
- 2025: Opening year
- 2040: Design year
- 2050: Horizon year.

7.4.2. Forecast year networks will be prepared which will include committed highway schemes for the forecast years of 2025, 2040 and 2050. These will only include schemes classified as 'near certain' or 'more than likely' as outlined in WebTAG Unit M4 '*Forecasting and Uncertainty*' (July 2017).

7.4.3. High and low growth sensitivity tests will be carried out for the forecast years of 2025, 2040 and 2050 in accordance with the specifications set out in Table 7-1.

**Table 7-1: Summary of High and Low Growth Scenarios**

Scenario	Supply	Demand
Core Scenario	Near Certain and More Than Likely Schemes	Near Certain and More Than Likely Developments
High growth Scenario	Near Certain and More Than Likely Schemes	Near Certain and More Than Likely Developments
Low Growth Scenario	Near Certain and More Than Likely Schemes	Near Certain and More Than Likely Developments

7.4.4. The high and low growth sensitivity tests will be developed based upon the guidance for the high and low growth scenarios set out in WebTAG 4.1, whereby forecast scenarios are subject to an increase or reduction of +/-2.5% of the base year demand multiplied by the square root of the number of years from the model base year (to a maximum of +/-15% for 36 years).

7.4.5. A summary of each of the proposed forecast scenarios is provided in Table 7-2.

**Table 7-2: Forecast Year Scenarios**

	Forecast Year		
	2025	2040	2050
<b>Purpose</b>	Scheme opening Year	Scheme design Year	Horizon Year
<b>Matrix development</b>	Point loaded development for sites categorised as ' <i>near certain</i> ' or ' <i>more than likely</i> ' and anticipated to be completed by 2025; constrained to TEMPro	Point loaded development for sites categorised as ' <i>near certain</i> ' or ' <i>more than likely</i> ' and anticipated to be completed by 2040; constrained to TEMPro	Point loaded development as per 2040 matrices, TEMPro growth for 2040-2050; constrained to TEMPro
<b>Network development</b>	Only schemes committed up to 2025	Only schemes committed up to 2040	Only schemes committed up to 2050
<b>High and low growth scenarios?</b>	Yes	Yes	Yes

# 8

## SUMMARY





## 8 SUMMARY

---

### 8.1 SUMMARY OF MODEL DEVELOPMENT

- 8.1.1. This report describes the proposed development, calibration and validation of the NATS to a 2019 base year. It describes how the base year models will be calibrated to represent current travel conditions and validated against recent observed data.
- 8.1.2. New trip matrices will be built based on a number of new data sources and existing data.

### 8.2 SUMMARY OF STANDARDS

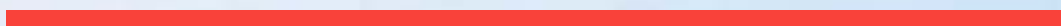
- 8.2.1. The new model will comply with the recognised standards as set out in WebTAG, specifically:
- Highway Assignment Model: TAG Unit M3.1 Highway Assignment (January 2014)
  - Public Transport Model: DfT TAG Unit M3.2 Public Transport Assignment (January 2014)
  - Demand Model: DfT TAG Unit M2 Variable Demand Modelling (March 2017).

### 8.3 MODEL REPORTING AND OUTPUTS

- 8.3.1. A final data report will be required to document all data used in the model update.
- 8.3.2. For the highway and public transport model a Local Model Validation Reports (LMVR) will be produced containing the following information:
- Data sources
  - Network development
  - Matrix development
  - Model calibration and validation.
- 8.3.3. This will include reporting of model validation against the required standards. Model outputs for the PTAM will include assignment summary statistics for each transit line and network totals.
- 8.3.4. For the Demand Model, a Development Report will be produced describing:
- The Demand Model structure
  - Model parameters and factors
  - Model calibration – realism tests and convergence.

# Appendix G

## **PROPOSED STRUCTURE OF THE ENVIRONMENTAL STATEMENT**





List the structure of Environmental Statement or EIA Report e.g. below. Add in chapters and volumes in line with what you have scoped into your EIA.

## **Volume 1 – Main Report**

### **Front End**

- Chapter 1: Introduction
- Chapter 2: The Project
- Chapter 3: Approach to EIA
- Chapter 4: Environmental elements scoped out

### **Technical Chapters**

- Chapter 5: Air Quality
- Chapter 6: Noise and Vibration
- Chapter 7: Cultural Heritage
- Chapter 8: Landscape and Visual Effects (including Arboriculture)
- Chapter 9: Biodiversity
- Chapter 10: Road Drainage and the Water Environment and Groundwater
- Chapter 11: Geology and Soils
- Chapter 12: Material Assets and Waste
- Chapter 13: Climate
- Chapter 14: Population and Human Health
- Chapter 15: Arboriculture
- Chapter 16: Major Accidents and Disasters
- Chapter 17: Traffic and Transport
- Chapter 18: Cumulative Effects

### **Concluding Chapters**

- Chapter 19: Summary

## **Volume 2 – Technical Appendices (non-exhaustive list included below)**

- Flood Risk Assessment
- Draft Construction Environmental Management Plan (CEMP)
- Ground investigation reports
- Ecological survey reports

## **Volume 3 – Figures**

## **Non-Technical Summary**



Kings Orchard  
1 Queen Street  
Bristol  
BS2 0HQ

[wsp.com](http://wsp.com)

# Appendix B

EIA SCOPING OPINION



## **INTRODUCTION**

### **Background**

On the 11 June 2020 the County Planning Authority (CPA) received a Scoping Request from Norfolk County Council Infrastructure Delivery Team (the Applicant) under Regulation 15 of the Town and County Planning (Environmental Impact Assessment) Regulations 2017 (the EIA Regulations) for the proposed Norwich Western Link (the Proposed Development).

This is the Scoping Opinion (the Opinion) adopted by the CPA in respect of the Proposed Development. It is made on the basis of the information provided in the submitted Scoping Report (the Scoping Report). This Opinion can only reflect the proposals as currently described by the Applicant and the Opinion should be read in conjunction with the Scoping Report and consultation responses received as a result of the consultation process.

In paragraph 1.3.2 of the Scoping Report, the Applicant is of the view the Proposed Development falls within Schedule 2, 10(f) of the EIA Regulations, and in accordance with the EIA Regulations intends to provide an Environmental Statement (ES) in respect of the Proposed Development, to accompany the subsequent planning application. The Proposed Development is considered EIA development by the CPA.

In accordance with Regulation 15(6) before adopting a Scoping Opinion the CPA must take account of:

- (a) any information provided by the applicant about the proposed development;
- (b) the specific characteristics of the particular development;
- (c) the specific characteristics of development of the type concerned; and
- (d) the environmental features likely to be significantly affected by the development.

The Opinion has taken into account the requirements of the relevant EIA Regulations and guidelines regarding the preparation of an ES.

The CPA has consulted on the Scoping Report and the consultation responses received have been taken into account in adopting this Opinion. For your information, the responses are included at the end of this letter and can be found on the County Council's website via the following link <http://eplanning.norfolk.gov.uk/PlanAppDisp.aspx?AppNo=SCO/2020/0001>

The Scoping Report has been carefully considered and the Opinion is based on an Officers' professional judgement. The Opinion is without prejudice subject to the consideration of any subsequent formal planning application relating to the Proposed Development.

Regulation 15(2)(a) states that a request for a Scoping Opinion must include:

- (i) a plan sufficient to identify the land;
- (ii) a brief description of the nature and purpose of the development, including its location and technical capacity;
- (iii) an explanation of the likely significant effects of the development on the environment; and
- (iv) such other information or representations as the person making the request may wish to provide or make;

The CPA is satisfied that the Scoping Report meets this requirement.

In accordance with Regulation 18(4)(a) of the EIA Regulations, the ES that accompanies a planning application must be based on the most recent Scoping Opinion issued, unless the Proposed Development becomes materially different.

### **The County Planning Authority's Consultation**

In accordance with the EIA Regulations the CPA has consulted the consultation bodies before adopting the Opinion. The list of consultation responses received within the statutory timeframe and whose comments have been taken into account in the preparation of the Opinion is provided at the end of this letter, to which you should refer to when preparing the ES.

The submitted ES to accompany the planning application should demonstrate consideration of the points raised by the consultees. For ease, when considering the application, it is recommended that a table is provided in the ES summarising the scoping responses from the consultees and how they are, or are not, addressed in the ES.

Please note that any consultation responses received after the statutory deadline for receipt of comments have not been taken into account within this Opinion. However, any late responses received will be forwarded to you as the Applicant and uploaded to the Council's website under the planning reference: SCO/2020/0001, for consideration when preparing the ES.

### **The European Union (Withdrawal Agreement) Act 2020**

On 31 January 2020, the United Kingdom (UK) left the European Union (EU). A transition period is now in place until 31 December 2020. This provides for the relevant EU legislation relating to Planning and Environmental Assessments to be retained as UK law, until amended by Parliament. This Scoping Opinion is based on the retained law.

## **THE PROPOSED DEVELOPMENT**

### **Description of the Proposed Development**

The Applicant's description of the Proposed Development, site and its surroundings is set out in Section 2, paragraphs 2.3.1 to 2.4.7 of the Scoping Report. A Location Plan, Constraints plan and Project Layout Plan are included at Appendices A to C of the Scoping Report.

The Proposed Development comprises the construction of a dual carriage way link road from the A1067 Fakenham Road, at its existing junction with the A1270 Broadland Northway, to a new junction with the A47 near Honingham, completing an orbital route around Norwich. To facilitate the Proposed Development associated works include: viaduct crossing of the River Wensum (a Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI)); wildlife crossings in the form of bat and badger underpasses; bridges at interaction with Ringland Lane, Weston Road and Breck Road; Green bridge crossings; and culvert crossing the River Tud.

Passing through arable and agricultural fields and woodland, the Proposed Development is located to the North-West of Norwich A1270 running south to the A47 at its junction with Wood Lane and Berrys Lane.

Whilst in principle the CPA has assumed the description set out in the Scoping Report is an accurate description of the Proposed Development, the potential constraints of the site and receptors. Please note paragraph 2.4.1 states the dual carriageway is 2.8 miles and at paragraph 1.2.4 states 3.9 miles. The correct distance should be set out in the ES.

It is my understanding that at this stage as the detailed design of the Proposed Development is evolving the description of the Proposed Development may not be completely confirmed. However, the Applicant will need to ensure that the description of the Proposed Development in the ES for which the subsequent planning application is made is as accurate as possible, including any proposed works required as ancillary to the Proposed Development, (whether on or off-site),

because this will form the basis of the Environmental Impact Assessment (EIA) and should be assessed as part of an integrated approach to EIA.

Subject to planning approval and all other relevant consents, it is intended to commence construction in early 2022.

### **Construction**

The CPA notes little information has been provided in the Scoping Request regarding the temporary access road and the formation of the construction compounds, paragraph 1.1.3 states these are yet to be confirmed. Nor is any information provided regarding the size and location of construction compounds. Whilst it is appreciated that this information may not be available at this stage in the evolution of the Proposed Development, this information will be required in the ES and the compounds should be encompassed within the application site boundary site. Nor does the Scoping Report make clear how the site will be accessed during construction. The Applicant should consider making this information explicit within the ES.

The CPA considers that information on construction including: construction phasing; construction methods, plant and activities associated with each phase; siting of construction compounds (including on and off site); lighting equipment/requirements; and number, movements and parking of construction vehicles (both HGVs and staff) should be clearly indicated in the ES. It should be made clear whether any materials would be arriving by road, rail or other means.

### **Alternatives**

Regulation 18(d)(c) of the EIA Regulations requires an ES to include a description of the reasonable alternatives which are relevant to the Proposed Development and its specific characteristics, and an indication of the main reasons for the chosen option, taking into account the environmental effects.

In setting out the structure of the Scoping Report, Paragraph 1.5.1 states that the proposed approach for the alternatives considered as part of the design development is set out in Chapter 3. It is not clear from Chapter 3 what the approach is.

The CPA acknowledges that Paragraph 2.1.3 advises that the Applicant has completed assessments and undertaken environmental studies on alternative routes to inform the selection of the preferred road alignment of the Proposed Development. Paragraph 3.3.1 goes on to state the scheme design maybe subject to change due to information from ongoing environmental surveys. The ES should clearly set out the rationale and justification for the Proposed Development, in response to the issues it is seeking to address, taking into account a range of traffic interventions and alternative routes as the possible solution. The ES should also include the reasonable alternative options, the justification for the preferred / chosen option, including a comparison of the environmental effects, and a description of any further issues that may lead to changes to the final alignment of the Proposed Development which the ES will examine in detail.

The Scoping Report refers to the Option Selection Report (OSR) and Strategic Outline Business Case (SOBC) and that an Outline Business Case (OBC) is to be developed alongside the ES for the Proposed Development. If this is where the information regarding the alternatives is to be set out, it should be demonstrated with clear cross referencing.

### **Flexibility**

The CPA notes that a number of elements of the Proposed Development are yet to be finalised, such as the traffic forecasts (Paragraph 6.2.8 states that finalised traffic forecasts were not available at



the time of writing the Scoping Report), detailed design, mitigation measures and whether further water quality analysis is required.

The Applicant's attention is drawn to the Rochdale Envelope principle in dealing with areas of uncertainty when preparing the ES. Case law has established an acceptable way of dealing with uncertainty in preparing and assessing projects, (particularly those prepared in an outline manner). This approach should only be used where exceptional and necessary. It is for the CPA as decision maker to agree the level of flexibility that can be permitted. Whilst this provides for an element of flexibility, the ES should assess the worst case variations, to ensure the likely significant environmental effects have been fully assessed.

During the preparation of the planning application every attempt should be made to narrow the elements of the Proposed Development to be finalised. Where this is not possible, the ES should clearly explain which elements of the Proposed Development have yet to be finalised and provide reason justification. At the time of application, any proposed scheme parameters should not be so wide-ranging as to represent effectively different schemes from that in the accompanying ES. In preparing the ES, the Applicant will need to consider whether it is possible to robustly assess a range of impacts resulting from a number of undecided parameters.

It should be clear in the application submission what is being applied for. If the Proposed Development changes substantially during the EIA process, prior to the submission of the planning application you may wish to consider the need to request a new Scoping Opinion.

### **Mitigation / Monitoring**

The CPA notes that a Construction Environmental Management Plan (CEMP), Construction Traffic Management Plan (CTMP), Materials Management Plan (MMP) and Site Waste Management Plan (SWMP) are to be produced.

The ES should identify specific mitigation measures to be delivered (rather than an outline of the measures). Where the ES relies upon mitigation measures which would be secured through management plans, it should be demonstrated (with clear cross-referencing) where each measure is set out in the management plan. Full copies of the relevant management plans should be included or appended to the submitted ES and the Applicant should also demonstrate how the measures will be secured. Where full copies are not included in the subsequent planning application, clear justification must be provided stating the reason for such approach.

The ES should identify and describe any proposed monitoring. It is suggested the Applicant agrees methods, any necessary mitigation and or/compensatory measures and monitoring regimes with the relevant consultees.

### **Planning Policy context**

In developing the Proposed Development and preparing the EIA Report, regard should be given to the relevant provisions of The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 and good practice guidance. The Planning Application should demonstrate compliance with the adopted Development Plan, unless materials considerations, such as Emerging Plans (depending on the stage of the plan process), National Planning Policy Guidance, and Transport Plans, indicate otherwise.

### **Topics proposed to be scoped out of the Environmental Statement**

Table 4-1 of the Scoping Report provides a list of the topic areas to be scoped out. The Applicant should seek agreement of such matters with the CPA and / or the relevant consultee(s).

To ensure topic areas haven't been overlooked during the EIA process, justification should be provided for the topic to be scoped out and why this particular approach has been taken.

### **Confidential Information**

It may be appropriate for information relating to rare / protected species or commercially sensitive information, to be kept confidential. Where documents are intended to be confidential, separate copies should be provided, clearly marked confidential, together with a statement setting out the reason the Applicant considers the information to be of a confidential nature. The CPA may be obliged to disclose information under the Freedom of Information Act 2000 and / or Environmental Information Regulations 2004. If such a request is received by the County Council, consideration will be given to the reasons provided why the information should not be disclosed.

In accordance with the General Data Protection Regulations (GDPR), the CPA will seek to minimise the publication of personal details.

### **CORONAVIRUS (COVID – 19) Survey work and data collection**

In response to the current issues relating to the Coronavirus outbreak, the CPA understands that Central Government and/or Local Authority enforced restrictions may have consequences for the ability to conduct certain surveys and obtain relevant data required for the purposes of the ES.

In determining a planning application accompanied by an ES, the CPA must in examining the environmental information, reach a reasoned conclusion on the significant effects of the Proposed Development on the environment. The CPA will also consider the advice received from consultees during the planning process.

Given the current circumstances, I strongly advise you to continue the dialogue with the relevant consultees and agree approaches/methodologies to data collection and how it is to be presented in the ES.

### **EIA Scope and Topics**

Following consultation with the statutory consultation bodies, the scope and level of detail of the information to be provided in the ES using the factors listed in Regulation 4(2) of the EIA Regulations, is set out below:

#### Chapter 5 Air Quality

In Table 5-5 - Elements Scoped In or Out of Further Assessment, proposes to scope out emissions from plant and machinery during the construction phase. The Environmental Health Officer is content that this is scoped out, however, advised that all plant and machinery used should be maintained to ensure that emissions are minimised, with particular care taken with semi static plant.

Within the scope of Air Quality, the ES should consider the impacts of the Proposed Development on Public Health and take account of the risks of air pollution, road and dust and emissions and how these can be managed or reduced during the operation of the project.

The scope of Air Quality also falls within other Chapters of the Scoping Report, information on air pollution impacts and the sensitivity of different habitats/designated sites can be found on the Air Pollution Information System [www.apis.ac.uk](http://www.apis.ac.uk)

#### Chapter 6 Noise and Vibration

According to Paragraph 6.8.1 a study area is yet to be determined. The ES should clearly state and justify the study area selected.

The Scoping Report does not appear to include any baseline monitoring for the Proposed Development (complete road scheme). The ES should include noise monitoring to validate modelling and establish background levels. In addition, given the traffic noise can affect bat activity and feeding behaviour, animals such as bats should be identified as noise sensitive receptors in the ES.

#### Chapter 7 Cultural Heritage (Archaeology and Heritage)

Justification should be provided for the extent of the study area used to assess the baseline conditions in the Scoping Report. This includes the 500m study area proposed for non-designated heritage assets, as no justification for this area is given. The study area should be the appropriate to ensure that all heritage assets likely to be affected by the Proposed Development have been included and can be properly assessed.

The Proposed Development could impact on a number of designated heritage assets that are situated within the vicinity of the Proposed Development, and their settings. Therefore, Historic England would expect an assessment of the likely effects of the Proposed Development on the elements which contribute to the significance of the heritage assets and their settings, such as the potential impacts on any Conservation Areas and Grade I, II\* and II Listed Buildings and non-designated features of historic, architectural, archaeological or artistic interest. In addition, the assessment should take account of the potential impacts of associated activities and the alteration to drainage patterns. To assist in understanding the impacts of the Proposed Development, section drawings and photomontages would be useful.

Whilst the County Council's Norfolk Historic Environment Service are satisfied with information provided in the submitted Scoping Report, Historic England strongly recommend that the Applicant involves the Council's Historic Environment Team (Conservation and Archaeology Officers) and welcomes the opportunity to comment on further details of the Proposed Development.

Whilst it is noted that consultation has taken place with the County Council's Historic Environment Officer, please note that Broadland District Council wish to assess the impacts of the Proposed Development on the above ground heritage assets, their settings and proposed mitigation.

#### Chapter 8 Landscape and Visual

The proposed methodology for this topic area is appropriate and in line with GLVIA3. The baseline work undertaken and proposed is considered acceptable. Both should inform the assessment of the landscape and visual impacts, including mitigation measures and where they are to be situated.

The Scoping Report states that the study area will be agreed with the LPA. The CPA welcomes this, as does the Broadland District Council Landscape Architect, of which justification should be set out in the ES, and viewpoint locations agreed. Photomontages / visualisations to be taken from agreed viewpoint locations should be provided to demonstrate the possible visual impacts of the Proposed Development. These should show visual effects (at various intervals) on completion of the Proposed Development through to after the establishment of the landscaping scheme. The Applicant should seek to agree the methodology for, and number of required photomontages / visualisations and the intervals the photomontages / visualisation should illustrate, with the relevant consultees.

The Scoping Report proposes to scope out artificial lighting on the basis that no operational lighting is proposed other than for signage and at the junction with the A47, therefore it is recommended that construction lighting is considered as part of the overall impacts and operation lighting be kept to a minimum.

I draw the Applicants attention to Paragraph 8.8.1 which appears to be unfinished.

Whilst the Proposed Development does not fall within Breckland Council area, it maybe visible from within the boundary. I draw your attention to the comments received from the County Council's Natural Environment Team, Broadland District Council and Breckland Council, and advise the Applicant to continue the pre-application dialogue with relevant Officers.

#### Chapter 9 Biodiversity

The approach to the Biodiversity Assessment is considered acceptable. According to Natural England the Proposed Development passes over Internationally, Nationally and Local Non-Statutory designated sites, therefore the potential impacts on the sites should be addressed, as well as on county level habitats. It is noted that the protected species and habitat surveys has been agreed with Natural England.

In relation to lighting, the impacts of lighting from vehicles on bats should be assessed. In Table 8-1, it is not clear whether the lighting impact on biodiversity (namely bats) will be assessed in the ES. Consideration should be given to other bat trapping locations and the structures to be considered for hibernation surveys for bats listed in Paragraph 9.2.60, should also include underground structures including ice houses. The duration of the Vantage Point survey referred to in paragraph 9.2.64 should be clarified in the ES and the length of the survey justified. To take account of bat behaviour, consideration should be given to surveying during night and sub-optimal periods. Surveyors should be positioned to allow for comparison post construction monitoring. Generally, with regards to monitoring, the Applicant should consider how pre and post construction survey results are effectively compared.

Based on the results of the White Clawed Crayfish Survey, the EA notes that in Table 9-9 - Biodiversity Scoped in or Out of Further Assessment, of the Scoping Report it proposed to scope out this type of species. The CPA are content with this approach.

The Scoping Report should make reference to the need for good biosecurity practices to avoid the spread of non-native species during construction. Ecological Surveys should identify any invasive non-native species already present, which should then help to inform appropriate preventive measures. Given the proximity of the proposed works to the River Wensum this is important and should to be included in the ES.

Norfolk County Council adopted its Environmental Policy on 25 November 2019. Although it doesn't form part of the Development Plan, it is a material consideration when determining Planning Applications for County Council development. The Applicant is encouraged to demonstrate how the Policy has informed the Proposed Development, whether it is compliant, and a minimum of 10% Net Biodiversity Gain, inline with the pending Environment Bill. It is noted that as part of the Biodiversity Net Gain and mitigation measures additional land is likely to be required. Once the extent of the off-site mitigation and compensation measures are known, the scope of the ES should be reviewed. The additional land should be included in the application site boundary and the scope of the ES.

It is noted a number of studies are still to be completed, which will inform the baseline.

Given the current Covid-19 pandemic, officers are currently working remotely, therefore it recommended that data is also submitted as shape files and all relevant biodiversity data, including absences be submitted to Norfolk Biodiversity Information Service (NBIS).

The Applicant's attention is drawn to the consultation responses from the Councils Natural Environment Team and Natural England.

## Chapter 10 Road Drainage and the Water Environment

Paragraph 10.7.26 states that a standalone Flood Risk Assessment (FRA) will be prepared to support the ES. Please note this should cover **all sources of flooding**. Highways England note that the drainage system from the Proposed Development is separate to the A47 and expect the Applicant to consider the effects of flooding on the A47.

### Fluvial Flood Risk

The Environment Agency (EA) will continue to work with the Applicant on the FRA, which should assess the flood risk of the Proposed Development; and support the proposal to submit a 1D-2D hydraulic model which will assess the current flood risk, take account of climate change and demonstrate that the Proposed Development will not increase flood risk extents or depths elsewhere.

### Surface Water Drainage

The Scoping Report acknowledges that the Proposed Development lies within the Internal Drainage District (IDD) of the Norfolk Rivers Internal Drainage Board (IDB). Any works as part of the Proposed Development that fall within the IDD will require separate consent from the IDB. Works that effect the flow of an ordinary watercourse (outside of the IDB remit) will require consent from the Lead Local Flood Authority (LLFA). The Applicant should seek to obtain the relevant drainage consents at the earliest opportunity. This process will be separate and in addition to the planning process.

The FRA to accompany the ES should include a surface water drainage strategy to address local sources of flood risk (e.g from ordinary watercourses, surface water flow, including impacts to overland flow paths), identify how surface water drainage will be managed on site, compliance with the SuDS hierarchy, any required mitigation measures and maintenance and management plan.

It is noted from the Scoping Report that a Water Vole Survey has been carried out, on the River Wensum, but it is not clear whether other watercourses have been surveyed. The IDB recommend that a Water Vole Survey is carried out in the Boards adopted water course, and on other riparian watercourses likely to be impacted by the Proposed Development.

### Surface Water quality

Whilst the Scoping Report covers the Surface Water Quality impacts of the Proposed Development during both construction and operation, in the assessment methodology there is no mention of containment or contingency for a road traffic accident leading to a spillage. Given the reference in other parts of the Chapter, it is wondered whether the omission in Paragraph 10.4 is an error. This will need to be clarified in the ES.

The Water Framework Directive (WFD) assessment referred to in the Scoping Report should include the River Tud and highlight the two key objectives of no deterioration in waterbody status and ultimate aim of improving all waterbodies to Good status. To ensure no adverse effects on the water quality of the Wensum, The Habitats Directive assessment for the River Wensum SAC needs to include consideration of the tighter water quality targets.

### Surface Water resources

Regarding surface water resources the Scoping Report doesn't make reference to the use of water as resource during construction or operation therefore, it is presumed that no local water will be used or abstracted. This needs to be clarified in the ES and consideration should be given to the impact of water abstraction licenses, particularly abstraction points within close proximity to the Proposed Development.

Measures to deliver Biodiversity Net Gain are supported. Regarding the reference to the River Wensum Restoration Strategy (in particular at 10.3.34), the EA highlight opportunities to address changes to the River should not be overlooked, because it does not necessarily mean that there are not potential improvements to be made to the morphology of the River.

#### Groundwater

The scope for groundwater resources is generally considered appropriate and the Applicant is drawn to specific comment in the consultation response received from the EA. Paragraph 10.3.20 states that “A data request to determine any nearby licensed and unlicensed groundwater abstractions will be completed moving to ES Stage” The Broadland District Council Environmental Health Officer has requested to be consulted on this in order to assist in identifying private drinking water supplies in the vicinity.

The EA advise that shallow groundwater is likely to be present in many places along the route of the Proposed Development, which could affect the viability of using simple infiltration features, SuDS features should be in accordance with CIRIA SuDS Manual and that direct discharge of potentially hazardous substances is not permitted.

Detailed comments received from the LLFA, EA, Highways England and AW can be found in the consultation responses at the end of this letter. It is suggested that the Applicant liaises with the relevant water bodies to ensure an appropriate drainage strategy is proposed.

Anglian Water (AW) suggest the Applicant checks for AW assets in the area, using asset maps which can be found via [www.digdat.co.uk](http://www.digdat.co.uk)

#### Chapter 11 Geology and Soils

Paragraph 12.3.6 seems to suggest that the assessment of safeguarded material resources and use of minerals in construction is included in Chapter 11 of the Scoping Report. This does not appear to be case, as the assessment appears to be included in Chapter 12 – Materials Assets and Waste.

Further to the comments received from the EA, set out in Table 11-1 - Consultation Undertaken to Date, there is a safeguarded waste management facility (former Attlebridge Landfill) close to the site boundary for the Proposed Development, which has a 250m consultation zone around it that intersects part of the Northern site boundary for the Proposed Development. As a result, there is the potential for indirect impacts to the aftercare of the former waste facility that need to be assessed.

It is not clear whether paragraphs 11.3.5 and 11.3.7 of the Scoping Report are referring to licensed abstractions or all abstractions? This needs to be clearly set out in the ES.

Paragraph 11.4.2 regarding mitigation should also include validation (if required) and monitoring (if required).

Paragraphs 11.7.3 and 11.7.4 should note that CLR11 is being superseded. The most up to date guidance to follow is Land contamination: risk management guidance, see: <https://www.gov.uk/guidance/land-contamination-how-to-manage-the-risks>

In light of planning policy for the protection of the best and most versatile agricultural land, it is recommended that soils should be considered in the context of the sustainable use of land and the ecosystem services they provide as a natural resource.

## Chapter 12 Material Assets and Waste

The site covered by the Scoping Report is mostly underlain by a Mineral Safeguarding Area (sand and gravel).

Paragraph 12.1.2 states that Defra have been consulted and stated that Construction Demolition & Excavation (CDE) waste arisings data is only available at national level for England. Whilst this is correct in terms of waste arisings, other information on CD&E waste is available that would be relevant to the ES.

Paragraph 12.2.2 lists the Minerals and Waste Planning Authorities (WPA) in the East of England. However, for clarity and completeness it does not include the unitary authorities. These should be included in the ES

Paragraph 12.3.6 acknowledges that the Proposed Development passes through both sand and gravel and silica sand deposits and states that the scheme will not sterilise resources. However, this statement is incorrect because any location of safeguarded mineral that is built upon without prior extraction of the underlying mineral will sterilise the underlying mineral as it cannot be extracted in the future. Whilst there are other locations of that mineral in the County, the quantity of mineral that underlies the development will have been sterilised by the Proposed Development being located upon it. This paragraph refers both to safeguarded sand and gravel, and silica sand deposits. Please note that safeguarded silica sand deposits only occur close to the western boundary of Norfolk. Paragraph 12.3.6 goes onto state "...the importance of these resources and impact of the Scheme will be reported in the Geology and Soils chapter of the ES." On review of the Scoping Report it appears that Chapter 11 Geology and Soils focusses on ground contamination and does not currently refer to mineral resources either in terms of use or safeguarding or use in the project.

It is not clear from Paragraph 12.3.10 what the quantity of materials required for the construction of the Proposed Development scheme will be, or that this will be set out in the ES. Although it is noted that the Paragraph states that the sensitivity of materials needed for the Proposed Development is low. Table 12-5 - Potential design, mitigation and enhancement measures, makes reference to a Materials Management plan (MMP); this should include information on the quantity of materials (including minerals) to be used in the project.

Paragraph 12.3.12 states that there is not data available for CD&E production or recovery rates in the East of England. However, it is possible to get figures for the quantities of CD&E waste that have been recovered in the East of England (and in the individual WPA areas) from the EA's Waste Data Interrogator (WDI). Table 12-1 includes all types of waste (hazardous, non-hazardous and inert) arising from all sectors and therefore is not necessarily directly comparable to any trends in CD&E waste recovery. This information should therefore be replaced with data specifically for CD&E waste recovery from the EA's WDI.

Table 12-3 - Permitted waste recovery management sites in East of England (2018), lists the number of waste management facilities in the East of England. It does not include their capacity, the types of waste that they can accept, or whether there is sufficient capacity available arising from the construction of the Proposed Development. The EA's WDI may provide more information surrounding this particular issue.

For information, Norfolk County Council publishes annual monitoring reports which include data on waste management which may be relevant for the ES (see: <https://www.norfolk.gov.uk/what-we-do-and-how-we-work/policy-performance->

[andpartnerships/policies-and-strategies/minerals-and-waste-planning-policies/annual-monitoringreports](https://www.norfolk.gov.uk/media/norfolk/downloads/what-we-do-and-how-we-work/policy-performance-andpartnerships/policies-and-strategies/minerals-and-waste-planning-policies/annual-monitoringreports) ).

Norfolk County Council has also published a Waste Management Capacity Assessment which contains information on waste arisings, waste movements and the capacity at waste management facilities in Norfolk (see:

<https://www.norfolk.gov.uk//media/norfolk/downloads/what-we-do-and-how-we-work/policy-performance-andpartnerships/policies-and-strategies/minerals-and-waste-planning/preferred-optionsconsultation/waste-management-capacity-assessment-2017.pdf?la=en&hash=E85C21869C051D2E044DD52D7A57B4F83B2549F8>).

The other WPA's in the East of England are likely to publish similar information.

The Scoping Report does not appear to include information regarding the quantities of waste that are likely to arise from the project, or regarding the quantity of minerals that are likely to be needed in the project, or the quantity of minerals that are likely to be extracted as part of the project. Therefore, a Site Waster Management Plan and Material Management Plan – Minerals should be included in the ES.

With regard to Table 12-8 – Significant Criteria, please note the project area is not located on a Peat resource and safeguarding mineral resources are shown as area on maps, therefore it is not appropriate to measure the impact on mineral safeguarding in terms of sites.

Mineral Planning Authority has published standing advice on mineral safeguarding, which can be found on the Norfolk County Council website at [www.norfolk.gov.uk/nmwdf](http://www.norfolk.gov.uk/nmwdf) on the 'Adopted Policy Documents' page, and welcomes discussion, if there are any queries regarding the preparation of a Mineral Resource Assessment.

The EA advise that an appropriate waste exemption or an Environmental Permit will be required for any use of waste in the works.

Included in this Scoping Opinion is a full consultation response from the Mineral and Waste Planning Authority, and relevant contact details should you have any queries.

### Chapter 13 Climate

Whilst it is noted that the Applicant has not undertaken any consultation relating to Greenhouse Gases emission or Climate Resilience, the CPA welcomes that discussions have been held with the Norfolk County Council Sustainability Manager.

The England Biodiversity Strategy published by Defra establishes principles for the consideration of the effects of climate change. The ES should reflect these principles and identify how the Proposed Development effects on the natural environment will be influenced by climate change, the impacts greenhouse gases, climate resilience both during construction and when in operation.

### Chapter 14 Population and Health

It is noted that the Applicant has not undertaken any consultation relating to this Chapter of the Scoping Report. However, the Scoping Report states "Consultation with the Norfolk County Council and Broadland District Council may be required for the ES." The CPA welcomes the Applicant consulting with the relevant Authorities relating to this topic area, to ensure detailed assessment of the Population and Health impacts are included in the ES.



It maybe that the Applicant addresses Public Health within the Air Quality Chapter. The assessment of the impacts of the Proposed Development on Public Health should include risks of air pollution, road and dust and emissions and how these can be managed or reduced during construction and in operation.

Whilst there does not appear to be any historical or cultural Gypsy Roma Traveller Sites that would be affected by the Proposed Development. It is suggested that the when developing the final design, the Applicant considers the potential for areas to create stopping places that may become vulnerable to use, resulting in Unauthorised Encampments.

#### Chapter 15 Arboriculture

Broadland District Council Arboricultural Officer wishes to be consulted on the production of this Chapter of the ES. Paragraph 15.7.2 suggested that tree renewal and replacement would be on a county-wide basis. However, it considered that tree renewal and replacement should take place within the vicinity of the Proposed Development rather than county wide.

From an arboricultural perspective the County Council's Senior Arboriculture and Woodland Officer considers that the information provided in the Scoping Report appears to be in line with national guidelines.

The Proposed Development will result in ancient and veteran trees loss, therefore the ES should include an Arboricultural Impact Assessment (AIA), site specific Arboricultural Method Statement (AMS) including monitoring regime and Tree Protection Plan (TPP). Due to the level of tree loss the ES should include a 30 year compensation strategy based on a calculation of habitat loss and demonstrating net gain. It is recommended the Applicant considers a package of mitigation and compensatory measures.

#### Chapter 16 Major Accidents and Disasters

Based on the information provided in the Scoping Report and the consultation response received from the Health and Safety Executive (HSE), the CPA is content that the proposed development is not of a type that would use or store hazardous substances in quantities relevant to the potential for major accident hazards, and therefore the topic area of major accidents related to such hazardous substances can be scoped out.

No justification is given for the extent of the study area used to assess the baseline conditions in the Scoping Report, this should be included in the ES.

The proposed development appears to cross the route of a major accident hazard pipeline and lies within the HSE Consultation Zone for National Grid's 3 Feeder Bacton/Roudham Heath gas pipeline (Transco ref 1709), and therefore could be vulnerable to harmful effects from a major accident at the major hazard pipeline. The ES should consider the significant effects of relevant major accident scenarios at the identified major accident hazard pipeline that could affect people who will be at the Proposed Development, and also give consideration to the potential to initiate a major accident that could affect people who will be at the Proposed Development. I draw your attention to the full consultation received from HSE.

In preparing the Scoping Report the Applicant has used the HSE's LUP web app, however it is noted that this process has not been completed, as the entries have not yet been 'continued' (past the zones identification stage) to the advice stage. Please contact HSE's Land-use-planning Advice team [lupenquiries@hsl.gsi.gov.uk](mailto:lupenquiries@hsl.gsi.gov.uk) if you require further assistance.

HSE advise the Applicant to liaise with the pipeline operator National Grid, and to undertake a risk assessment as early as possible to ensure the design and operations meet the requirements of relevant Health and Safety Regulations.

There is a high-pressure gas pipeline – feeder within close proximity to the Proposed Development. For information a location plan identifying the location of National Grid high pressure gas pipelines is included in the consultation response from National Grid, enclosed in this Scoping Opinion. As the design for the section of the road at the junction with the A47 is developed further National Grid recommend they be consulted.

The EA advise that to scope out the transport and pollution accidents and flood risk is acceptable providing the issues are fully addressed within Chapter 10.

#### Fire

To assess the impact of the Proposed Development on emergency response times NFRS advise that Highways notify NFRS of planned or emergency road closures.

#### Chapter 17 Traffic and Transport

The ES should clearly state and justify the study area selected for both the construction and operational phase in respect of traffic and transport.

A full Transport Assessment (detailing the impact of the proposed development on the local road network and Walking, Cycling and Horse-Riding (WCH) routes) will form part of the subsequent planning application, the detailed scope of which should be discussed with the Highway Authority and the Public Right Of Way (PROW) team. It is recommended that the ES should clearly set out the impacts of the proposed development on the footpaths and any PROWs including bridleways and byways within the vicinity and adjacent / nearby National Trails. To support the ES it is recommended a Non- Motorised User (NMU) Strategy be developed identifying opportunities for new and alternative NMU routes.

The proposed development will connect to the A47 at the junction with Wood Lane, which forms part of the A47 North Tuddenham to Easton duelling scheme currently being developed by Highways England through the NSIP regime. Highways England agree with the methodology set out in the submitted Scoping Report and advise the Transport Assessment will need to take account of the impacts of their scheme and any necessary mitigation measures.

The Assessment should be in accordance with DfT Circular 02/2013 – The Strategic Road Network and the Delivery of Sustainable Development and be informed by the Walking Cycling and Horse-Riding Assessment Report (WCHAR).

Highways England also advise that where there is interaction between the Proposed Development and the A47, the design should be in accordance with the requirements of the Design Manual for Roads and Bridges (DMRB). In addition, other requirements to be referenced on the ES include the appropriate Stage One Road Safety Audit for the junction design with the A47, and A47 collision analysis (without the dualling scheme). As the proposed timescales for delivery of the Proposed Development is similar to that of the proposed dualling of the A47 promoted by Highways England, the ES should clearly set out how the schemes can be delivered in tandem with an appropriate mitigation strategy.

It is noted from the submitted Scoping Report and consultation responses that pre-application discussions have taken place with the Highway Authority and Highways England. The CPA welcomes this and expects on-going discussions and agreement, where possible.

I draw the Applicants attention to the comments from the Highway Authority, Highways England and the Norfolk Council Projects Manager.

#### Chapter 18 Cumulative Effects

The Scoping Report does not appear to identify a study area for this assessment and nor have any specific projects been identified for consideration in this Chapter of the Scoping Report.

The ES should clearly state and justify the selected study area. The Applicant should consult and/or agree with the relevant Planning Authorities the projects to be included / excluded from the cumulative effects assessment. It is recommended that the list of projects is updated as appropriate during the preparation of the Planning Application.

The Applicant may wish to provide a plan identifying the locations of the projects to be considered in the ES.

Chapter 17 (Traffic and Transport) Paragraph 17.7.30 advises that the A47 dualling being promoted by Highway England and the Food Enterprise Zone at Easton will form part of the baseline in the updated NATS model. It is suggested that these developments are included in the Chapter 18. Depending on when they are to be developed, the ES needs to fully assess how they interact and the cumulative effects of this.

The list is not exhaustive but a development to include when assessing the cumulative effect is the Hornsea Project Three, the underground cable is intended to cross the Proposed Development. Details of the National Infrastructure Project (NSIP) can be found on the Planning Inspectorate (PINS) website. A decision by the Secretary of State of Business, Energy and Industrial Strategy (BEIS) is expected later this year.

Consideration should be given to site specific allocations within the vicinity of the Proposed Development, that are identified in the emerging Greater Norwich Local Plan (GNLP), particularly the site allocations that have not been challenged. Depending on the stage of the plan process, at the time of submitting the Planning Application, appropriate weight should be afforded to the allocated sites that maybe included in the Cumulative Effects Assessment.

#### **Socio Economic**

The Scoping Report appears to be deficient in information regarding the impacts of the Proposed Development on Economic Development. A study area should be identified and justified in the ES.

Given the potential for job creations during the construction phase and the number of businesses located closed to the Proposed Development and the businesses located further afield that would benefit from improved access to the Northern and Western areas of Norwich, the ES should include an assessment of the following:

- How the Proposed Development will support job creation and Gross Value Added (GVA) growth – this should include a breakdown of personnel that would be employed / number of jobs that would be created during construction phase and whether full or part time
- Opportunities for existing businesses parks and allocated employment sites
- Opportunities during the construction phase to support local supply chains development, also providing direct and indirect jobs created as a result

- How the Proposed Development will contribute to local skills
- Risk of construction delays as a result of the current Coronavirus pandemic
- Potential economic impacts of coronavirus pandemic considered– sectors impacted (e.g. Hospitality, Tourism).

I draw you attend to the comments provided by the Councils Business Development Manager.

### **Aerodrome Safeguarding**

Whilst consulted on the Scoping Report, unfortunately Norwich Airport were unable to provide comments relating to aerodrome safeguarding. It is recommended that as the design of the road evolves and the mitigation measures are identified, the Applicant liaises with the Airport to assess the impacts of the Proposed Development, particularly if proposed SuDS features within the vicinity of the Airport are likely to attract birds.

### **Non-Technical Summary**

A non-technical summary of the ES should be provided as part of the application submission. The content of which should be in accordance with Regulation 18 (3)(e) of the EIA Regulations 2017 and best practice.

### **Other issues**

The CPA received a third party representation which raises issues relating to the consideration of cycle users and the assumptions of traffic volumes given the current COVID-19 situation. For information, the response is included at the end of this letter.

### **Schedule 4 Information**

In addition to the above information, please ensure that the ES includes all information specified in Schedule 4: Information for Inclusion in Environmental Statements of the EIA Regulations which, in addition to a description of the Proposed Development covering points 1(a)-1(d), which includes (but isn't limited to), a description of reasonable alternatives, a description of the relevant aspects of the current state of the environment and an outline of the likely evolution thereof without implementation of the development, a non-technical summary of the information, and a reference list detailing sources used for the descriptions and assessments included.

### **Conclusion**

**This letter should be taken as the County Planning Authority's Scoping Opinion under the Town and County Planning (Environmental Impact Assessment) Regulations.**

If you have any queries about the content of the Opinion, do not hesitate to contact me. Please let me know if anything is incorrect. As aforementioned, in accordance with Regulation 18(4)(a) of the EIA Regulations, the ES must be based on the most recent Scoping Opinion issued, unless the Proposed Development becomes materially different, in which case you may wish to consider the need to request a new Scoping Opinion.



4th Floor  
6 Devonshire Square  
London  
EC2M 4YE

[wsp.com](http://wsp.com)

PUBLIC