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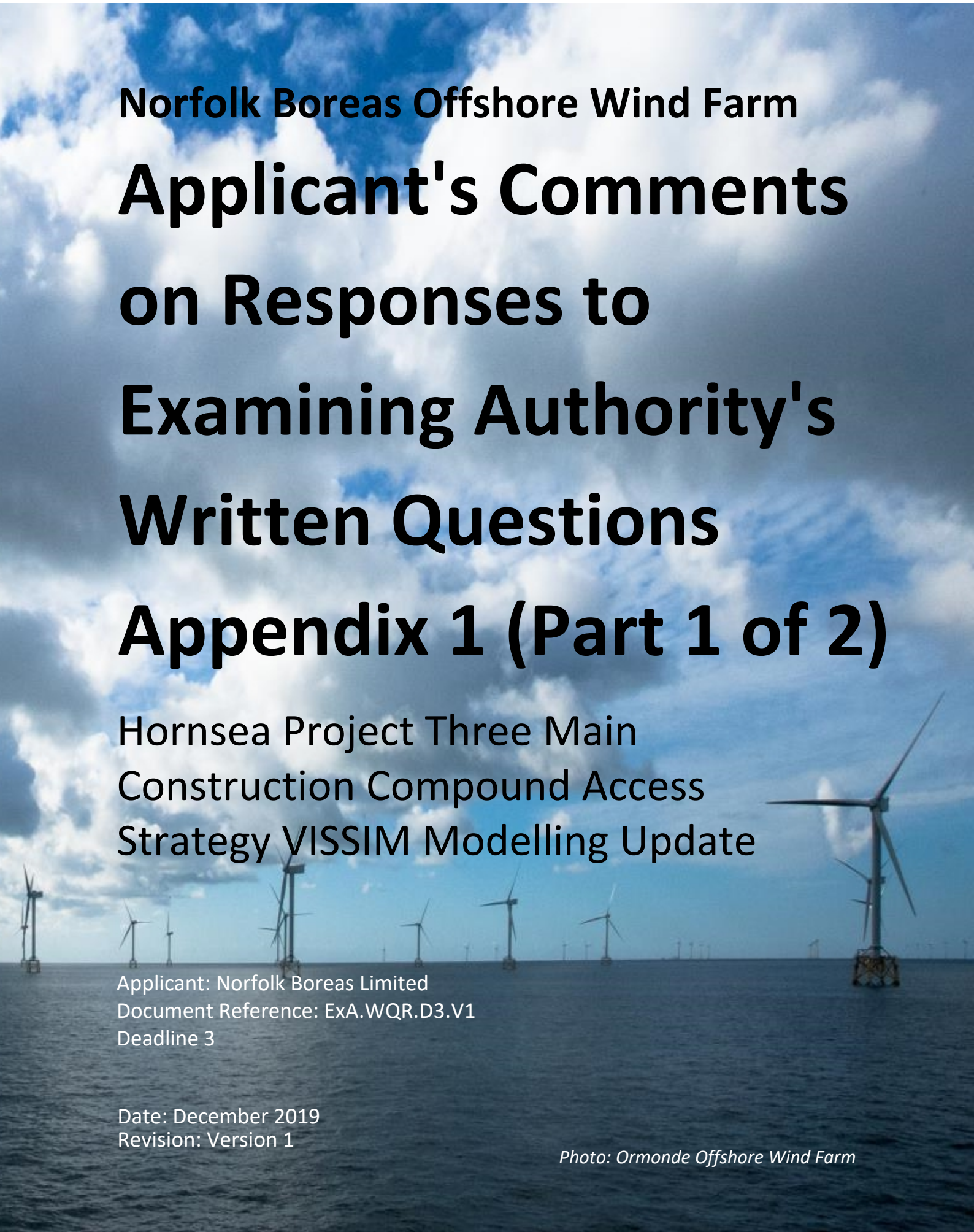


Norfolk Boreas Offshore Wind Farm

Applicant's Comments on Responses to Examining Authority's Written Questions Appendix 1 (Part 1 of 2)

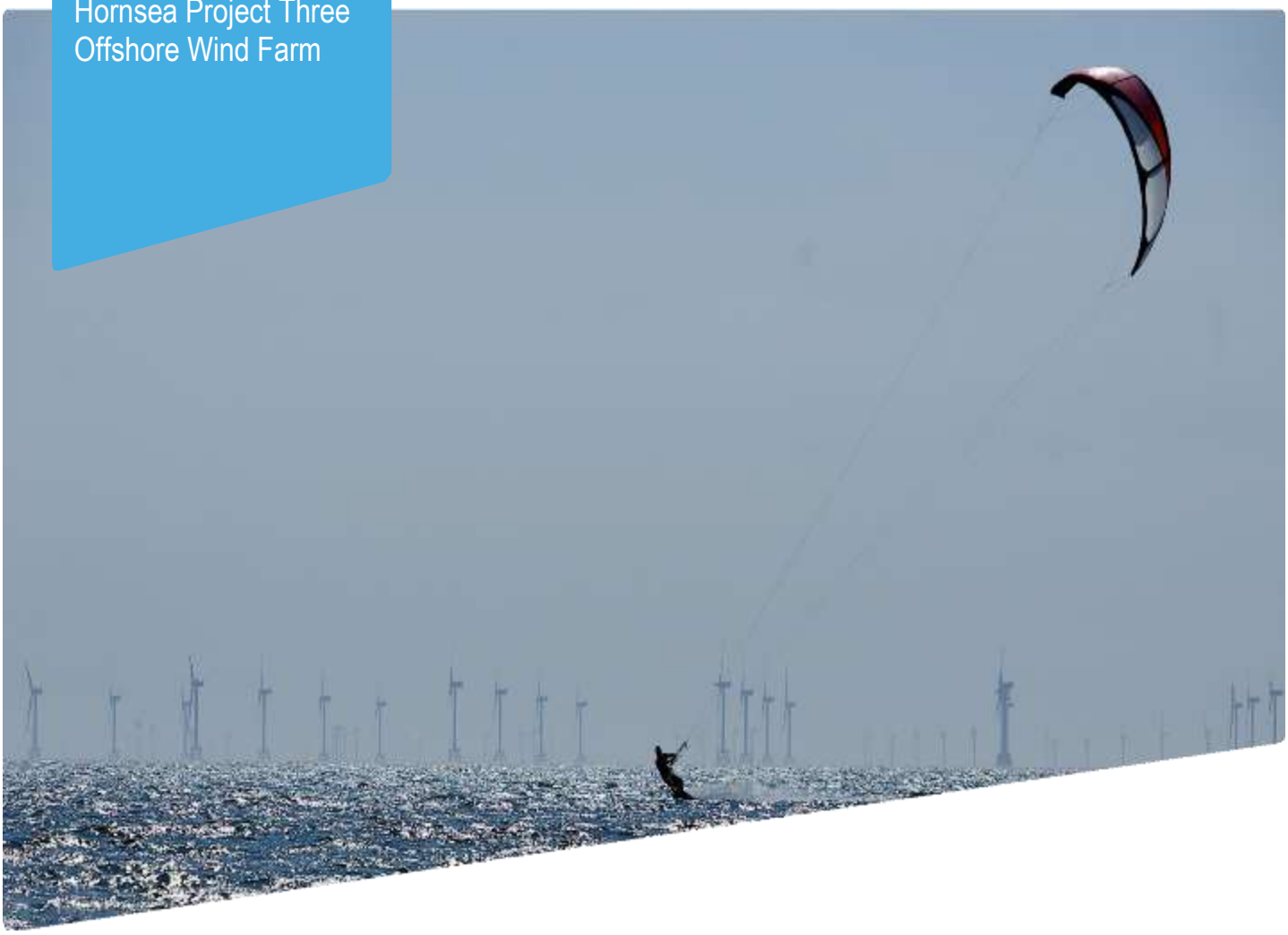
Hornsea Project Three Main Construction Compound Access Strategy VISSIM Modelling Update

Applicant: Norfolk Boreas Limited
Document Reference: ExA.WQR.D3.V1
Deadline 3

Date: December 2019
Revision: Version 1

Photo: Ormonde Offshore Wind Farm

Hornsea Project Three
Offshore Wind Farm



Hornsea Project Three

Offshore Wind Farm

Appendix 8 to Deadline 5 submission - Main Construction Compound Access Strategy VISSIM Modelling Update

Date: 23rd January 2019

Hornsea 3
Offshore Wind Farm

Ørsted

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Front cover picture: Kite surfer near a UK offshore wind farm © Ørsted Hornsea Project Three (UK) Ltd., 2019.

Table of Contents

1. Introduction

1.1 This document has been prepared to respond to matters raised by Oulton Parish Council (as noted in the Applicant's comments on Oulton Parish Councils Written representation, submitted at Deadline 5) to include the staff traffic movements flows associated with the Norfolk Vanguard planned cable logistics area and the sensitivity of applying additional traffic movements associated with the approved Potato Store, planning application reference number 2018_04_91, along the Street to access Street Farm.

1.2 This document with accompanying appendices comprises VISSIM Modelling Report for The Street and its junction with B1149, in Oulton, which represents the main access to the proposed main construction compound for the Hornsea Project Three offshore wind farm (hereafter referred to as Hornsea Three).

1.3 VISSIM is a microscopic behaviour based traffic simulation program developed by PTV. The VISSIM model uses on Wiedemann's psycho-physical car following model and Sparmann's line changing model.

1.4 VISSIM includes a wide range of tools with ability to assess interaction between links and junctions to accurately model networks for base year and to test network performance for future years.

1.5 VISSIM has a user-friendly graphical interface that allows the user to add traffic using base maps or drawings, which significantly improves the quality of traffic animation which aids presentation of outcomes.

1.6 The VISSIM model can be calibrated and validated using local traffic counts, journey times and queue information which allows for production of a site specific base model that can accurately reflect behaviour of the traffic in the local area.

1.7 This VISSIM Model has been developed to examine traffic implications of proposed highway improvements along The Street to support proposals for location of the main construction compound for Hornsea Three at former Oulton Airfield site.

1.8 The purpose of the VISSIM model is to demonstrate the impact of the proposed Hornsea Three compound, the planned cable logistics area by Norfolk Vanguard and other committed developments in the area on the operation of The Street and its junction with B1149. Figure 1.1 below shows the approximate location of the site and VISSIM study area.

Figure 1. Site Location and VISSIM Study Area

1.9 Proposed improvements along The Street are shown in Create drawing No 1554/03/101 and 102. **Annex A** includes the drawing highlighting the proposed improvements, as contained in Appendix 32 - Further Design Development of Option 1: Passing Places issued at Deadline 4 (REP4-053).

1.10 The VISSIM modelling report summarises the approach to the VISSIM modelling and analysis of the results for the proposed closing year 2028 to include;

- Proposed Hornsea Three Main Construction Compound,
- Potato Farm traffic,
- Increased Agricultural Activity and;
- Norfolk Vanguard Cable Logistics Area

2. Traffic Surveys and Analysis

2.1 Create has commissioned independent traffic survey company MHC Traffic to undertake following surveys along The Street between its junction with The Street/ B1149 Junction and The Street/ Main Construction Compound Access junction on Tuesday 16th October 2018:

- Manual Classified Counts (MCC) between 07:00-10:00 and 16:00-19:00;
- Queue Counts;
- Journey time surveys; and
- Automatic Traffic Counts – all day.

2.2 **Annex B** includes the raw traffic survey data supplied by MHC Traffic.

2.3 MCC data has been analysed to obtain morning and evening peak hours. **Annex C** includes the 2018 traffic flow sheets for AM peak (07:45- 08:45) and PM Peak (17:15-18:15).

2.4 Growth factors have been applied to the survey traffic for the estimated closing year of 2028 for the construction compound using Tempro Growth Factors. **Annex C** includes traffic flow sheets showing 2028 Base Traffic.

2.5 Hornsea Three traffic using the main construction compound has been identified as two-way 118 HGV and 130 staff movements per day in Paragraph 5.2 of Main Construction Access Strategy issued in September 2018 as Appendix 20 to Deadline 1 (REP1-176), with reference to paragraph 7.8.344 of Volume 3, Chapter 7: Traffic and Transport of the Environmental Statement (APP-079).

2.6 Traffic for the Norfolk Vanguard site has been identified as 96 HGV's per day as per as Paragraph 5.9 of Main Construction Compound Access Strategy issued in September 2018 as Appendix 20 to Deadline 1 (REP1-176).

2.7 In addition, information from the Norfolk Vanguard Transport chapter of the Environmental Statement has been applied to make a subsequent allowance for staff movements per day. The daily flows for staff for Norfolk Vanguard confirmed at Table 24.21 of the Norfolk Vanguard ES Transport Chapter state a total construction daily flows of 176 vehicles of which 96 are HGVs, therefore staff movements are predicted to be 80 movements per day.

2.8 The entire (i.e. 100%) construction traffic for both Hornsea Three and Norfolk Vanguard has been distributed to the south of the construction compound access on to The Street with even split for both incoming and outgoing traffic. As a result staff traffic for Hornsea Three and Norfolk Vanguard has been distributed and assigned to the highway network. **Annex C** includes the Hornsea Three and Norfolk Vanguard Traffic for AM and PM Peaks.

2.9 Traffic generated (average Daily Movement Tractors -22 and HGV's 10) by EF Harrold Potato Farm has been extracted from the access and design statement recently approved for the site by the local authority. **Annex C** includes peak hour traffic generated by EF Harrold Potato Farm.

2.10 This update redistributes the daily EF Harrold Potato Farm traffic flows along the Street to Street Farm. It should be noted following reference to the Design and Access Statement submitted as part of the Potato Store states at Para 5.2;

…..All tractors and trailers and goods vehicles will enter and exit the site via the existing main entrance with its good visibility splays in both directions along Oulton Street. There have been no reported problems with the existing access. The slight reduction in the intensity of its use by HGV's during harvest will improve this situation…..

……The proposal will not increase the traffic movements as cropping is unaltered. The proposal will help spread out traffic movements throughout the year rather than a high level at harvest……

2.11 We have therefore applied traffic above the levels predicted given the survey period used to compile the VISSIM model took place during the peak season.

2.12 To confirm the volume of agricultural traffic generated outside of the survey period, the Hornsea Three project has contacted landowners known to currently use The Street to access the B1149 to request traffic data from them. No data has been provided to the Applicant at the time of writing this report. Thus, to ensure an allowance has been made for other agricultural activities 'a peak' agricultural traffic assumption has been assumed based on 4 times (average Daily Movement Tractors -88 and HGV's 40) from the potato farm traffic to/from B1113. **Annex C** includes the agricultural traffic generated during peak season.

2.13 In order to assess the operation of The Street and its junction with B1149 in VISSIM the following scenarios have been created using a combination of the traffic options defined above.

- Scenario 1 - 2028 Base Traffic;
- Scenario 2 - 2028 Base + Hornsea Traffic;
- Scenario 3 - 2028 Base + Hornsea + Potato Farm Traffic;
- Scenario 4 - 2028 Base + Hornsea + Potato Farm + Agricultural Activity Traffic; and
- Scenario 5 - 2028 Base + Hornsea + Potato Farm + Agricultural Activity + Norfolk Vanguard Traffic.

3. VISSIM Model

3.1 A base model has been developed in accordance with guidance in both DMRB Volume 12a and Interim advise Note 36-01 'The use and application of microsimulation models'.

3.2 OS / topographical mapping from Create drawing No 1554/03/101 and 102 has been used as a background (in JPEG format) to accurately model the existing highway infrastructure for the study area. Figure 3.1 below the extent of the modelled VISSIM network.

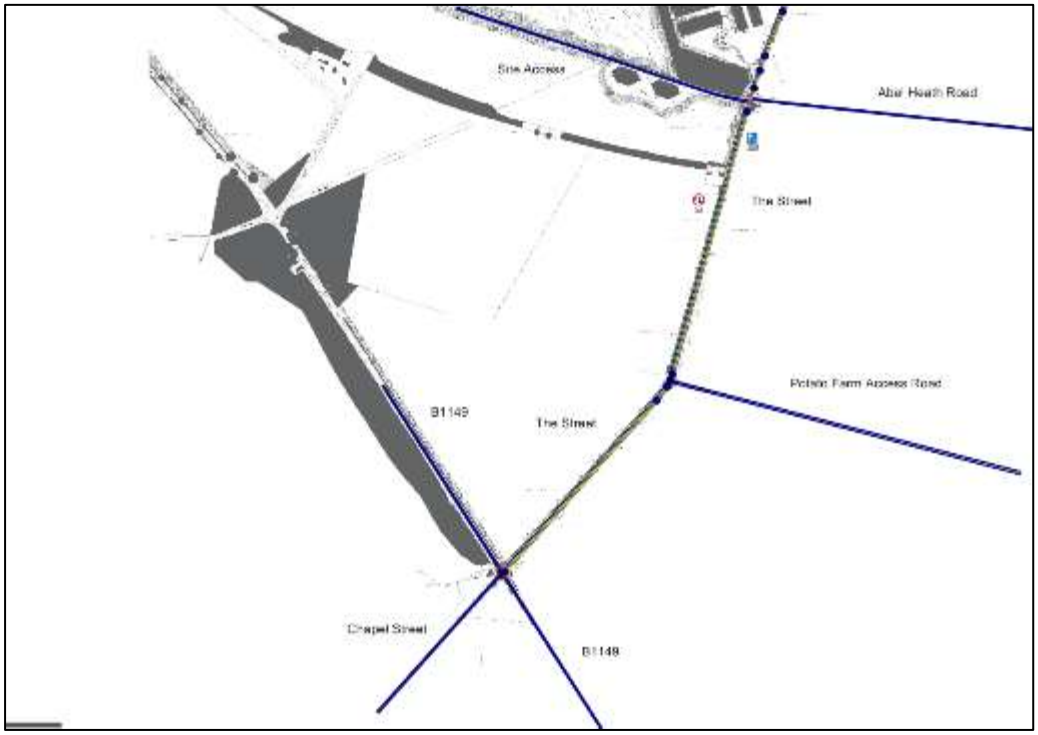


Figure 3.1: Modelled VISSIM network

3.3 The VISSIM network is built using a series of links and connectors by defining lane widths, link lengths and number of lanes. Traffic enters the network through vehicle input points, uses defined static routes before leaving the network from defined exit point.

3.4 Vehicular parameters were reviewed in order to make the model reflect existing site conditions as accurately as possible. VISSIM sets default values for various vehicle characteristics such as vehicular dimensions, weights power distribution, maximum and minimum acceleration/deceleration. In order to represent a tractor, VISSIM loader with utility trailer was used. The acceleration/ deceleration and maximum speeds were amended to match that of a large John Deere tractor.

3.5 Desired speed decisions to determine the speed distribution profile are placed along the link to ensure that once a vehicle has passed through the marker, it adopts the speed distribution associated with that marker.

3.6 The prevailing vehicle speeds along The Street and B1149 were obtained from the Automatic Traffic Count data.

3.7 Priority markers have been placed along The Street and its junction with B1149 to inform vehicles to wait unless gap time in opposing traffic is large enough for it to pull out safely and continue its journey. As a part of calibration process the gap time and headway distance were adjusted to reflect journey times and queues observed.

3.8 Reduced speed areas have been inserted before junctions and at bends to slow vehicles down on approaches where the layout results in drivers having to slow down.

3.9 Conflict areas are inserted into VISSIM models as a method of preventing vehicles overlapping when the model is in operation.

3.10 Driver Behaviour and Lane Change parameters can be changed in VISSIM to reflect local driver behaviours in complex urban models. Given the simple model for The Street and its junction with B1149 in rural setting default values Driver Behaviour and Lane Change parameters have been maintained.

Matrix Generation

3.11 In order to obtain traffic flows for input into the VISSIM model using static mode, traffic flow matrix between all entry and exit points within the study area has been generated using modelling software LinSig 3.2.29.0.

3.12 A representative base network has been created in LinSig to resemble the study area. Figure 3.2 below shows the extent of the modelled network in LinSig.

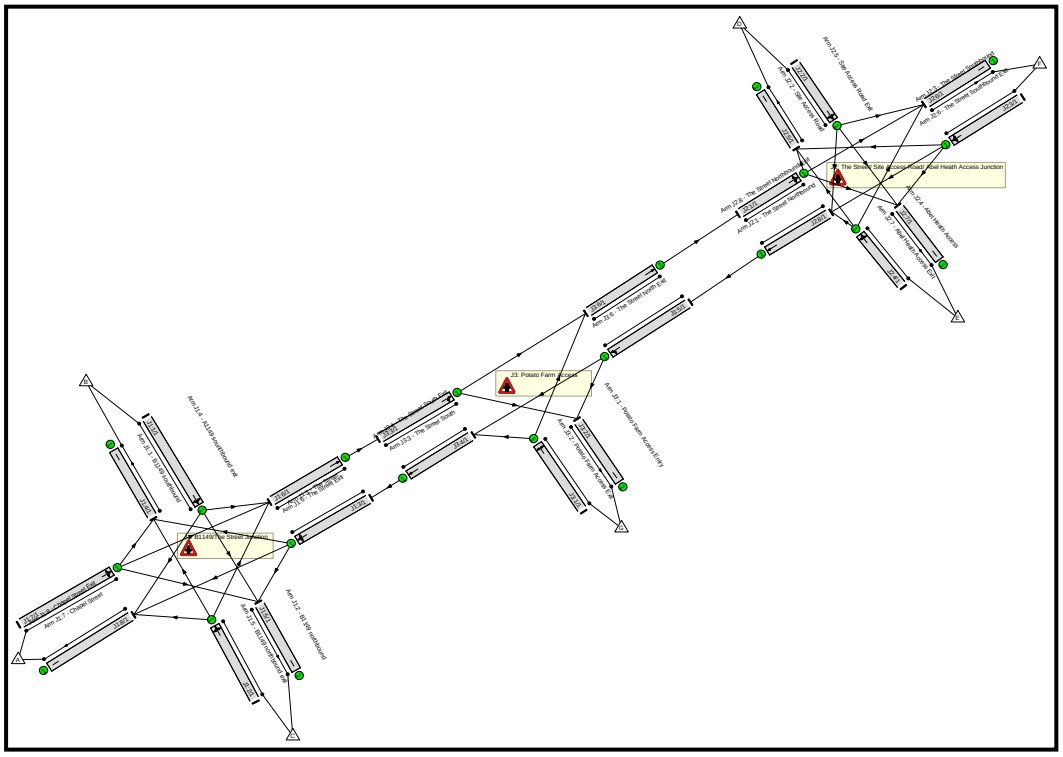


Figure 3.2: Modelled LinSig network

3.13 Peak hour traffic flows for 2018 surveyed traffic have been input into the LinSig model, shown in Figure 3.2 above, in turning count mode. Traffic flows in LinSig have been adjusted to validate the traffic flow between junctions.

3.14 Matrices for 2018 base scenarios have been obtained using the "estimate the matrix based on turning counts" function of LinSig. Tables 3.1 to 3.2 below shows the matrices for 2018 surveyed am and pm peak.

Table 3.1 Matrix – 2018 surveyed traffic – am peak

		Destination							
		A	B	C	D	E	F	G	Tot.
Origin	A	0	12	4	0	3	7	0	26
	B	10	0	173	0	0	1	0	184
	C	1	213	0	0	2	6	0	222
	D	0	0	0	0	0	0	0	0
	E	1	2	3	0	0	3	1	10
	F	4	6	9	0	4	0	3	26
	G	0	0	1	0	2	7	0	10
	Tot.	16	233	190	0	11	24	4	478

Table 3.2 Matrix – 2018 surveyed traffic – pm peak

		Destination							
		A	B	C	D	E	F	G	Tot.
Origin	A	0	13	1	0	0	6	0	20
	B	17	0	191	0	0	1	0	209
	C	2	207	0	0	1	11	1	222
	D	0	0	0	0	0	0	0	0
	E	0	0	0	0	0	1	0	1
	F	8	5	10	0	3	0	3	29
	G	0	0	0	0	0	4	0	4
	Tot.	27	225	202	0	4	23	4	485

3.15 Traffic flows from above matrices are input into 2018 VISSIM base models.

Base Model Validation

3.16 In order to verify the accuracy of the base model to provide reliable basis for forecasting, base models were validated to the following criteria:

- All entry links flows in the model, averaged over 5 runs using different random seed numbers, should be within GEH value 5 of the observed flows (adjusted LinSig flows); and
- Journey times for all vehicles, averaged over 5 runs using different random seed numbers, should be within 15% of the observed journey times. Figure 3.3 below shows the journey time measurement section.

Figure 3.3: Journey Time Measurement Section

3.17 Table 3.3 and Table 3.4 below shows comparison of the results from calibrated base models runs with surveyed results for the AM and PM peak periods.

Junction	Entry Link	Movement	2018 Surveyed flows		LinSig Input Flows				Vissim Base Model output				% Difference		GEH Statistic	
			AM Peak	PM Peak	AM Peak		PM Peak		AM Peak		PM Peak		AM Peak	PM Peak	AM Peak	PM Peak
B1149/ The Street Junction	B1149 west	left	0	1	1	184	1	209	4	187	1	211	2%	-1%	0.2	0.1
		ahead	173	191	173		191		174		194					
		right	10	17	10		17		9		16					
	B1149 East	left	1	2	1	223	2	221	1	226	1	226	1%	-2%	0.2	0.3
		ahead	213	207	213		207		213		209					
		right	9	12	9		12		12		16					
	The Chapel	left	12	13	12	27	13	21	12	28	16	21	4%	0%	0.2	0.0
		ahead	11	7	11		7		11		4					
		right	4	1	4		1		5		1					
The Street/ Site Access/ Able Heath Road Junction	Abel Heath Road	left	6	1	6	9	1	2	7	9	0	2	0%	0%	0.0	0.0
		ahead	0	0	0		0		0		0					
		right	3	1	3		1		2		2					
	Site Access	left	0	0	0	0	0	0	0	0	0	0	0%	0%	0.0	0.0
		ahead	0	0	0		0		0		0					
		right	0	0	0		0		0		0					
	The Street North	left	4	3	4	26	3	29	4	22	4	31	-15%	-7%	0.8	0.4
		ahead	22	26	22		26		18		27					
		right	0	0	0		0		0		0					

Table 3.3 Traffic flow comparison - observed to VISSIM

Link	Peak	Travel Time			
		Observed (secs)	Vissim		
			2018 Base scenario (secs)	Difference (secs)	% Difference
The Street Northbound	am peak	69	69	0	0%
	pm peak	63	69	6	9%
The Street Southbound	am peak	76	73	-3	-3%
	pm peak	69	77	8	11%

Table 3.4 Observed- VISSIM travel time comparison along The Street

3.18 It can be observed that the base model meets the standard VISSIM model validation criteria as GEH Static is less than 5 and percentage difference in observed and modelled travel times is within 15%. Therefore, it can be concluded that the base model is a good fit for the observed highway network and traffic conditions within the study network.

Proposed Model

3.19 VISSIM models for the proposed improvements along The Street were developed using the validated base model. The base model has been amended to reflect the location of formal passing bays and priority arrangement for southbound traffic near Railway Cottage as shown in Create Drawing No 1554/03/102.

3.20 Matrices for the future scenarios 1 to 5 have been obtained by repeating the process mentioned in section 3.2 to 3.6. Table 3.5 and 3.14 below shows the matrices for future scenarios.

		Destination							
		A	B	C	D	E	F	G	Tot.
Origin	A	0	13	4	3	2	6	1	29
	B	11	0	194	7	5	12	3	232
	C	1	239	0	3	2	5	1	251
	D	0	0	0	0	0	0	0	0
	E	1	2	4	0	0	3	0	10
	F	5	7	12	0	4	0	2	30
	G	0	0	1	0	0	1	0	2
	Tot.	18	261	215	13	13	27	7	554

Table 3.5 Matrix – Scenario 1 - 2028 Base traffic – am peak

		Destination							
		A	B	C	D	E	F	G	Tot.
Origin	A	0	15	1	0	0	7	1	24
	B	19	0	216	0	0	1	0	236
	C	2	234	0	0	1	12	1	250
	D	0	0	0	0	0	0	0	0
	E	0	0	0	0	0	1	0	1
	F	9	6	12	0	3	0	2	32
	G	1	0	1	0	0	5	0	7
	Tot.	31	255	230	0	4	26	4	550

Table 3.6 Matrix – Scenario 1 - 2028 Base traffic – pm peak

		Destination							
		A	B	C	D	E	F	G	Tot.
Origin	A	0	13	4	7	2	5	0	31
	B	11	0	194	9	2	6	0	222
	C	1	239	0	15	4	10	1	270
	D	3	14	15	0	1	0	5	38
	E	1	3	3	0	0	3	0	10
	F	2	9	11	0	4	0	3	29
	G	0	2	2	6	1	4	0	15
	Tot.	18	280	229	37	14	28	9	615

Table 3.7 Matrix – Scenario 2 - 2028 Base + Hornsea Three traffic – am peak

		Destination							
		A	B	C	D	E	F	G	Tot.
Origin	A	0	15	1	5	0	4	0	25
	B	19	0	216	11	0	7	0	253
	C	2	234	0	18	1	13	1	269
	D	6	13	16	0	0	0	1	36
	E	0	0	0	0	0	1	0	1
	F	5	10	13	0	3	0	1	32
	G	0	0	0	3	0	1	0	4
	Tot.	32	272	246	37	4	26	3	620

Table 3.8 Matrix – Scenario 2 - 2028 Base + Hornsea Three traffic – pm peak

		Destination							
		A	B	C	D	E	F	G	Tot.
Origin	A	0	13	4	7	2	5	0	31
	B	11	0	194	9	2	8	0	224
	C	1	239	0	15	4	12	1	272
	D	3	15	16	0	1	0	3	38
	E	1	3	3	0	0	3	0	10
	F	2	13	14	0	4	0	2	35
	G	0	0	1	6	1	4	0	12
	Tot.	18	283	232	37	14	32	6	622

Table 3.9 Matrix – Scenario 3 - 2028 Base + Hornsea Three + Potato Farm traffic – am peak

		Destination							
		A	B	C	D	E	F	G	Tot.
Origin	A	0	15	1	5	0	4	0	25
	B	19	0	216	11	0	10	1	257
	C	2	234	0	18	1	16	1	272
	D	5	13	16	0	0	0	3	37
	E	0	0	0	0	0	1	0	1
	F	5	13	15	0	3	0	3	39
	G	0	1	2	3	0	2	0	8
	Tot.	31	276	250	37	4	33	8	639

Table 3.10 Matrix – Scenario 3 - 2028 Base + Hornsea Three + Potato Farm traffic – pm peak

		Destination							
		A	B	C	D	E	F	G	Tot.
Origin	A	0	13	4	5	1	8	0	31
	B	11	0	194	13	3	23	0	244
	C	1	239	0	16	4	30	1	291
	D	2	16	17	0	1	0	3	39
	E	0	3	3	0	0	3	0	9
	F	4	28	30	0	4	0	7	73
	G	0	3	3	3	0	7	0	16
	Tot.	18	302	251	37	13	71	11	703

Table 3.11 Matrix – Scenario 4 - 2028 Base + Hornsea Three + Potato Farm + Increase Agricultural Activity traffic – am peak

		Destination							
		A	B	C	D	E	F	G	Tot.
Origin	A	0	15	1	3	0	6	0	25
	B	19	0	216	14	0	26	0	275
	C	2	234	0	19	1	35	0	291
	D	3	15	17	0	0	1	1	37
	E	0	0	0	0	0	1	0	1
	F	7	30	33	0	3	0	4	77
	G	0	1	1	1	0	3	0	6
	Tot.	31	295	268	37	4	72	5	712

Table 3.12 Matrix – Scenario 4 - 2028 Base + Hornsea Three + Potato Farm + Increase Agricultural Activity traffic – pm peak

		Destination							
		A	B	C	D	E	F	G	Tot.
Origin	A	0	13	4	4	3	6	1	31
	B	11	0	194	12	12	23	4	256
	C	1	239	0	16	14	28	6	304
	D	2	16	16	0	1	0	2	37
	E	1	14	15	0	0	3	2	35
	F	3	30	31	0	4	0	6	74
	G	0	3	4	5	4	11	0	27
	Tot.	18	315	264	37	38	71	21	764

Table 3.13 Matrix – Scenario 5 - 2028 Base + Hornsea Three + Potato Farm + Increase Agricultural Activity + Vattenfall traffic – am peak

		Destination							
		A	B	C	D	E	F	G	Tot.
Origin	A	0	15	1	2	2	5	0	25
	B	19	0	216	15	11	28	0	289
	C	2	234	0	19	14	34	0	303
	D	3	16	17	0	0	0	1	37
	E	2	12	13	0	0	1	1	29
	F	6	31	33	0	3	0	4	77
	G	0	1	2	1	1	3	0	8
	Tot.	32	309	282	37	31	71	6	768

Table 3.14 Matrix – Scenario 5 - 2028 Base + Hornsea Three + Potato Farm + Increase Agricultural Activity + Vattenfall traffic – pm peak

3.21 Taking account of the above the VISSIM model for the proposed improvements has been run for future scenario using the above matrices. Table 3.15 below shows VISSIM results and compares travel time along The Street for the base scenario with the future scenarios. The models which sit behind these results (for all scenarios) comprise large video files and as such have either been shared,or will be shared with relevant stakeholders (considered in this instance to be NCC and OPC) through ongoing engagement.

Link	Peak	Travel Time	Travel Time									
		Observed (secs)	VISSIM									
			2018 Base scenario (secs)	Scenario 1 - 2028 Base	Increase in Journey Times (secs) = 2028 Base - 2018 Base	Scenario 2 - 2028 Base + Hornsea	Increase in Journey Times (secs) = Scenario 2 - Scenario 1	Scenario 3 - 2028 Base + Hornsea + Potato Farm Traffic	Increase in Journey Times (secs) = Scenario 3 - Scenario 1	Scenario 4 - 2028 Base + Hornsea + Potato Farm + Increased Agricultural Activity Traffic	Increase in Journey Times (secs) = Scenario 4 - Scenario 1	Sce - 20 + H + F Inc Agri Ac Vat T
The Street Northbound	am peak	69	69	76	7	83	7	81	5	99	23	
	pm peak	63	69	76	7	81	6	83	7	94	18	
The Street Southbound	am peak	76	73	83	10	84	1	86	3	118	35	
	pm peak	69	77	82	5	85	3	86	4	117	35	

Table 3.15 Travel Time Comparison

3.22 It has been observed that the proposed model operates satisfactorily with the development traffic and proposed improvements with marginal increase in travel times along the Street.

3.23 The maximum increase is 38 secs in southbound directions in Scenario 5 with Norfolk Vanguard Traffic in the am peak hour.

Abnormal Load Delay

3.24 In order to assess the traffic impact of the Abnormal Load journeys to and from the Site VISSIM model for Scenario 5 with Norfolk Vanguard traffic has been amended to reflect the planned cable drum vehicle using The Street and its junction with B1149.

3.25 Due to the size of the cable drum transport vehicle, which at its largest would have a payload width of 4.4m, this vehicle would be subject to a separate AIL approval and under escort for this location.

3.26 Management measures associated with AIL movements will be developed and agreed with NCC through the detailed CTMP required under Requirement 18 of the draft DCO (REP4-004). However, to consider the effect of moving the abnormal load vehicles during the same time period as the assessment period, a further model run has been undertaken for completeness.

3.27 This assumes the traffic profile from Scenario 5 is on The Street network and an abnormal load is arriving during the same time period. Under a managed AIL approval, a temporary closure of The Street would be introduced from the compound access to the B1149. This would effectively hold traffic on the Street north of the Compound access to allow the abnormal load to traverse The Street to the Hornsea Three Compound. Traffic from the B1149 will continue behind the abnormal load to ensure no traffic is backed up from the Street to the B1149.

3.28 Table 3.16 below shows the increase in journey times. The models which sit behind these results (for all scenarios) comprise large video files and as such have either been shared, or will be shared with relevant stakeholders (considered in this instance to be NCC and OPC) through ongoing engagement.

Link	Peak	Travel Time		
		Vissim		
		Scenario 1 - 2028 Base	Scenario 5 (with Abnormal Load) - 2028 Base + Hornsea + Potato Farm + Increased Agricultural Activity + Vattenfall Traffic	Increase in Journey Times (with Abnormal Load) (secs) = Scenario 5 - Scenario 1
The Street Northbound	am peak	76	139	63
	pm peak	76	145	69
The Street Southbound	am peak	83	128	45
	pm peak	82	135	53

Table 3.16 Travel Time Comparison- Abnormal Load

3.29 In this theoretical model run, the maximum delay predicted to allow the abnormal load to travel from the B1149 along The Street to the Hornsea Three site main construction compound is 69 seconds.

4. Conclusions

4.1 Create Consulting has been commissioned by Orsted to undertake VISSIM modelling of the study network with proposed improvements and future development scenarios.

4.2 VISSIM modelling software is considered suitable for the purpose of accurate modelling of base and future scenarios.

4.3 The VISSIM study area selected fully covers the key impact area resulting from the Hornsea Three and other committed proposals in the area.

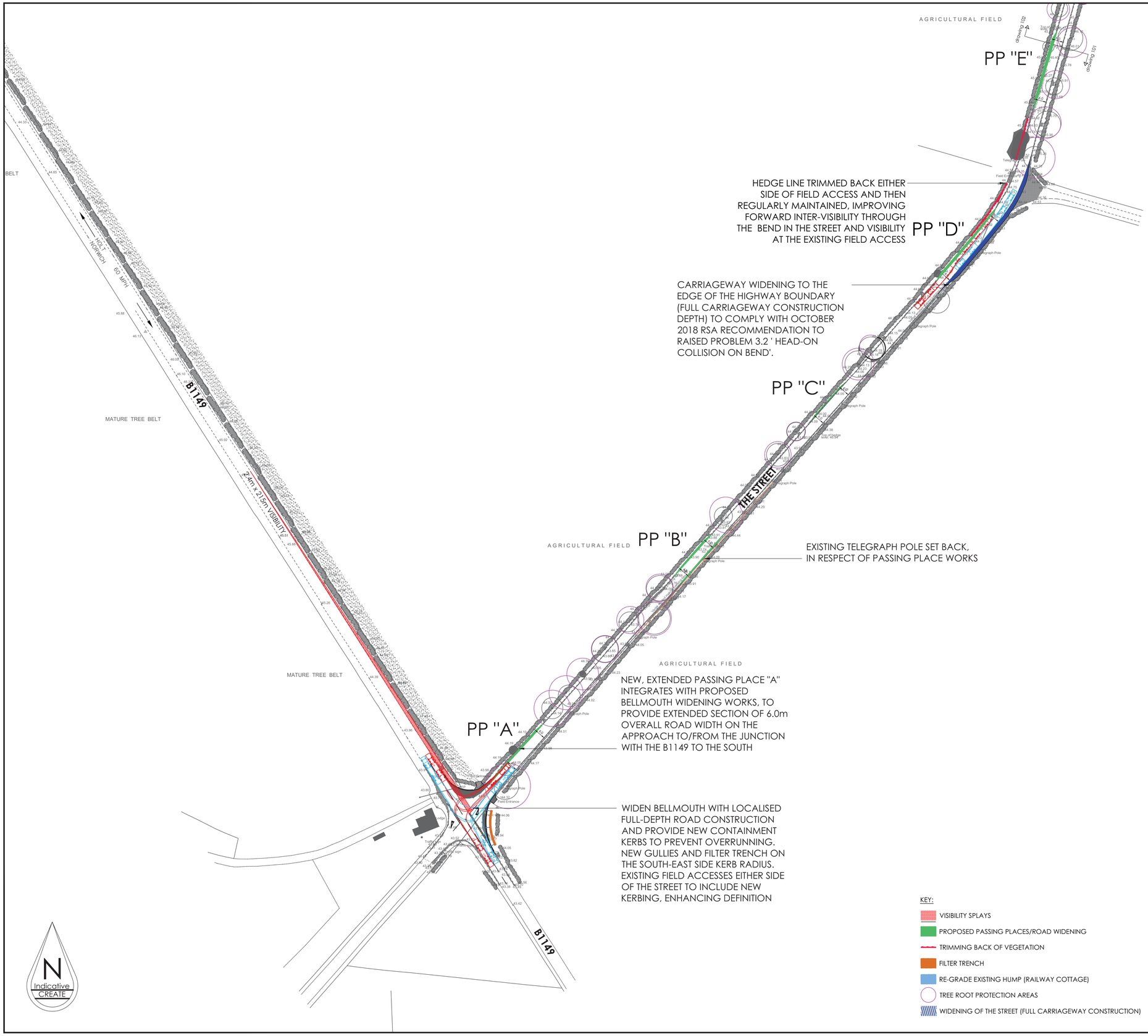
4.4 Traffic surveys and analysis is considered fit for purpose and robust representation of worst case traffic scenarios. The matrix generated for the base and future scenarios are considered robust and fit for purpose.

4.5 VISSIM base network and traffic model/ parameters adopted are deemed suitable for the scale of modelled network with the Base VISSIM model validated as per standard VISSIM validation criteria and is considered to fully reflect the observed traffic conditions.

4.6 VISSIM model for future scenario shows that the entire study network including The Street/B1149 junction would operate satisfactorily with delays of only 38 seconds to the journey from The Street to the B1149.

4.7 A theoretical VISSIM model considering the traffic impact of an abnormal Load vehicle using The Street and its junction with B1149 is predicted to increase journey time by 69 secs in a northbound direction, the likelihood of such a scenario occurring is low with the majority of abnormal loads expected to be travelling outside the normal working day to limit the effect on the wider highway network.

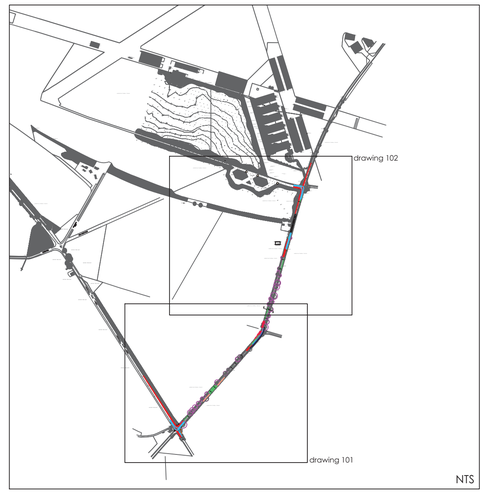
Annex A – Create Proposed Improvements Drawing 1554_03_101 and 1554_03_102



KEY:

- VISIBILITY SPLAYS
- PROPOSED PASSING PLACES/ROAD WIDENING
- TRIMMING BACK OF VEGETATION
- FILTER TRENCH
- RE-GRADE EXISTING HUMP (RAILWAY COTTAGE)
- TREE ROOT PROTECTION AREAS
- WIDENING OF THE STREET (FULL CARRIAGEWAY CONSTRUCTION)

Ørsted



OPTION 1: PASSING PLACES

GENERAL NOTES:

1. PASSING PLACES (PP) TO BE FORMED BY SHALLOW-DIG CELLULAR SYSTEM (E.G. GRASSCRETE, OR SIMILAR) PROVIDING LOCALISED 6.0m OVERALL ROAD WIDTH, WITH PERMEABLE DRAINAGE TO SUB-STRATA. PASSING PLACES ARE LOCATED AND SPECIFIED WITH SHALLOW-DIG CELLULAR SYSTEM SO TO MINIMISE IMPACT OF THEIR CONSTRUCTION ON EXISTING TREE ROOT PROTECTION AREAS.
2. THE DRAWING IS BASED ON A TOPOGRAPHIC SURVEY UNDERTAKEN BY PLANDESCIL REF 17697 IN CONJUNCTION WITH DIGITAL OS MAPPING.
3. ANY EXCAVATION CLOSE TO TREES/HEDGES TO BE CARRIED OUT IN ACCORDANCE WITH NJUG GUIDELINES.
4. SERVICES ARE TO BE PROTECTED IN ACCORDANCE WITH THE REQUIREMENTS OF THE RELEVANT STATUTORY AUTHORITIES.
5. TO BE READ IN CONJUNCTION WITH ALL OTHER LAYOUT AND DETAIL DRAWINGS.
6. ACCESS FOR PEDESTRIANS AND CYCLISTS IS TO BE MAINTAINED AT ALL TIMES. ACCESSES TO PROPERTIES ARE TO BE MAINTAINED AND WORKS PROGRAMMED IN CONSULTATION WITH PROPERTY OWNERS.
7. ANY ROAD MARKINGS/ROAD SIGNS ARE TO BE IN ACCORDANCE WITH THE SI DOCUMENT "TRAFFIC SIGNS REGULATIONS AND GENERAL DIRECTIONS, 2016"

REV	DATE	AMENDMENT DETAILS	DRAWN	APPROVED
A	15.11.18	ROAD WIDENING ON THE BEND	EC	PZ

Telephone: 01603 877010

PROJECT: HORNSEA 3 OFF-SHORE WIND FARM	DATE: 18.09.18	DRAWING STATUS: INFORMATION		
	SCALE(S): 1:1,000	DESIGNED: MDA	DRAWN: MDA	
DRAWING TITLE: PROPOSED IMPROVEMENTS THE STREET, OULTON (OPTION 1) SHEET 1 OF 2		CHECKED: PZ	APPROVED: PZ	
	JOB No: 1554			
CLIENT: ORSTED	DRAWING No: 03/101	REVISION: A		

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ORIGINAL SHEET SIZE - A1 Landscape

DO NOT SCALE