

Norfolk Vanguard Offshore Wind Farm

# Unresolved Traffic Matters with Highways England Position Statement

Issue Specific Hearing 6 Action Point 3

Document Reference: ExA; ISH6; 10.D7.4

Deadline: 7

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*Photo: Kentish Flats Offshore Wind Farm*

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## 1 UNRESOLVED TRAFFIC MATTERS

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### 1.1 Introduction

1. During the Issue Specific Hearing on Environmental Matters (ISH6) on the 24 April 2019, the Examining Authority (ExA) requested a position statement from the Applicant setting out the latest position with Highways England in relation to:
  - A47 sensitive junctions (Action Point 3).

### 1.2 Position Statement

2. Table 1 sets out the Applicant's position for this matter. Highways England's position is based on their response to this matter submitted to the examination at Deadline 6. The steps proposed to fully resolve this matter and associated timescales are also set out in the final column of Table 1.

**Table 1 Unresolved Matters**

Norfolk Vanguard Limited position	Highways England position (based on their Deadline 6 submission)	Next steps
<b>A47 Sensitive Junctions</b>		
<p>AECOM, on behalf of Highways England, has reviewed the A47 junctions identified as 'sensitive to increases in traffic' in relation to the proposed construction traffic assessed within the Applicant's Environmental Statement (Chapter 24 Traffic and Transport). The findings of this review are set out in AECOM's Technical Note BN 05 (Appendix 1).</p> <p>Two categories of recommendations were identified by AECOM:</p> <ol style="list-style-type: none"> <li>1. Critical (defined as requiring immediate action to confirm acceptability of the Applicant's assessment outputs); and</li> <li>2. Important, not critical (defined as of concern, but unlikely to be detrimental to the subsequent agreement of a planning application).</li> </ol> <p>The critical recommendations require resolution before the end of the examination.</p> <p>The two critical recommendations identified by AECOM are:</p> <ol style="list-style-type: none"> <li>1. The impact of construction of the Project on both Junction 1 (A47 Gapton Hall) and Junction 2 (A47 Vauxhall) should be controlled through the Traffic Management Plan, which should aim to minimise the number of additional vehicles using this junction during peak periods, for example through the use of an hours of working restriction.</li> <li>2. At Junction 4 (A47 Acle), consideration should be given to the use of a variable message sign aimed at</li> </ol>	<p>Highways England's Deadline 6 submission agreed in principle that the impacts at these locations can be addressed through the detailed Traffic Management Plan and awaits the Applicant's response to Technical Note BN 05 recommendations.</p>	<p>The Applicant will engage with Highways England and respond directly to the Technical Note BN05 recommendations. A revised OTMP will be submitted at Deadline 8 incorporating the final agreed positions on these matters.</p> <p>Following inclusion of these two critical matters in the final OTMP to be submitted at Deadline 8, all critical issues with Highways England in relation to A47 Sensitive Junctions will be resolved.</p>

Norfolk Vanguard Limited position	Highways England position (based on their Deadline 6 submission)	Next steps
<p>alerting westbound drivers on the A47 of the risk of excessive queues at this junction whilst they are still on the Acle Straight.</p> <p>The Applicant has committed to addressing critical item 1 and will undertake further engagement with Highways England to resolve this matter. The final agreed approach will be captured within a further update to the Outline Traffic Management Plan (OTMP) (document reference 8.8) to be submitted by the Applicant at Deadline 8.</p> <p>The Applicant has included the requested measure associated with critical item 2 within the updated Outline Traffic Management Plan submitted at Deadline 7.</p>		

## **APPENDIX 1**

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AECOM Technical Note BN 05

Project:	<b>Highways England Spatial Planning Arrangement</b>	Job No:	<b>60506522 DN052.003</b>
Subject:	<b>Norfolk Vanguard Windfarm Junction Assessment Review</b>		
Prepared by:	<b>Imogen Atkinson / Senth Sivanathan</b>	Date:	<b>December 2018</b>
Checked by:	<b>Andrew Cuthbert</b>	Date:	<b>January 2019</b>
Verified by:	<b>Liz Judson</b>	Date:	<b>17th January 2019</b>
Approved by:	<b>Andrew Cuthbert</b>	Date:	<b>4th February 2019</b>

## Executive Summary

Following a review of the Environmental Statement (ES) prepared by Royal Haskoning DHV (RHDHV), associated with development proposals for the Norfolk Vanguard Offshore Windfarm, AECOM have made the following recommendations.

### Recommendations regarded as critical to the acceptability of this modelling review:

1. The impact of wind farm construction on both Junctions 1 (A47 Gapton Hall) and 2 (A47 Vauxhall) should be controlled through the Construction Traffic Management Plan (CTMP), which should aim to minimise the number of additional vehicles using this junction during peak periods, for example through the use of an hours of working restriction (para 3.6, 4.9).
2. At junction 4 (A47 Acle), consideration should be given to the use of variable message signifying aimed at alerting westbound drivers on the A47 of the risk of excessive queues at this junction whilst they are still on the Acle Straight (para 6.5).

### Recommendations regarded as important but not critical to the acceptability of this modelling review:

3. A base year comparison should be made to understand how well the models represent existing road conditions as a basis for understanding how they will operate in the forecast assessment year (para 2.9).
4. The results of the models for Junctions 1 and 2 should be treated with an appropriate level of caution as 2012 surveyed data has been used (para 2.10).
5. Queue length data should be provided to assess the validity of the queue lengths provided in the base modelling outputs (para 2.11).
6. Further detail should be provided to support the TEMPro growth factors so that the derivation of the future base flows can be established (para 2.12).

## 1. Introduction

- 1.1. AECOM, on behalf of Highways England, have been invited to review Royal Haskoning DHV's (RHDHV) Environmental Statement (ES) dated June 2018 relating to the Norfolk Vanguard Offshore Windfarm project.

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- 1.2. This review (BN05) is intended to advise Highways England (HE) as to whether the traffic forecasting and junction capacity assessments set out in the ES can be accepted as appropriate for use; and whether they lead to the conclusion that the impact of the development will be acceptable in the terms required by Circular 02/2013. Furthermore this Technical Note will identify any additional work that is required to reach an acceptable position in respect of the traffic forecasting.
- 1.3. For ease of reference, AECOM's main comments and recommendations are presented in bold and underlined text throughout the note. Recommendations requiring immediate action are coloured **red**. Recommendations that are of concern but are unlikely to be detrimental to agreement of a subsequent planning application are highlighted in **amber**.

## 2. Development Impact Assessment

- 2.1. The RHDHV ES includes the following junctions that are of direct interest to Highways England:
- Junction 1 - A47 Gapton Hall Road/ A1243 Pasteur Road ;
  - Junction 2 - A47/A149 Acle New Road/ Runham Road 'Vauxhall';
  - Junction 3 - A149 Acle new Road/ A149 North Quay/ Fullers Hill/ B1141; and
  - Junction 4 - A47/A1064 Acle.
- 2.2. Junctions 1, 2 and 4 are located on the strategic road network (SRN) whilst Junction 3 is located just off the SRN but has the potential to generate a queue back to Junction 2 and is therefore of relevance to the proposed development's impact on the SRN. The locations of these junctions are illustrated in Figure 1 below:

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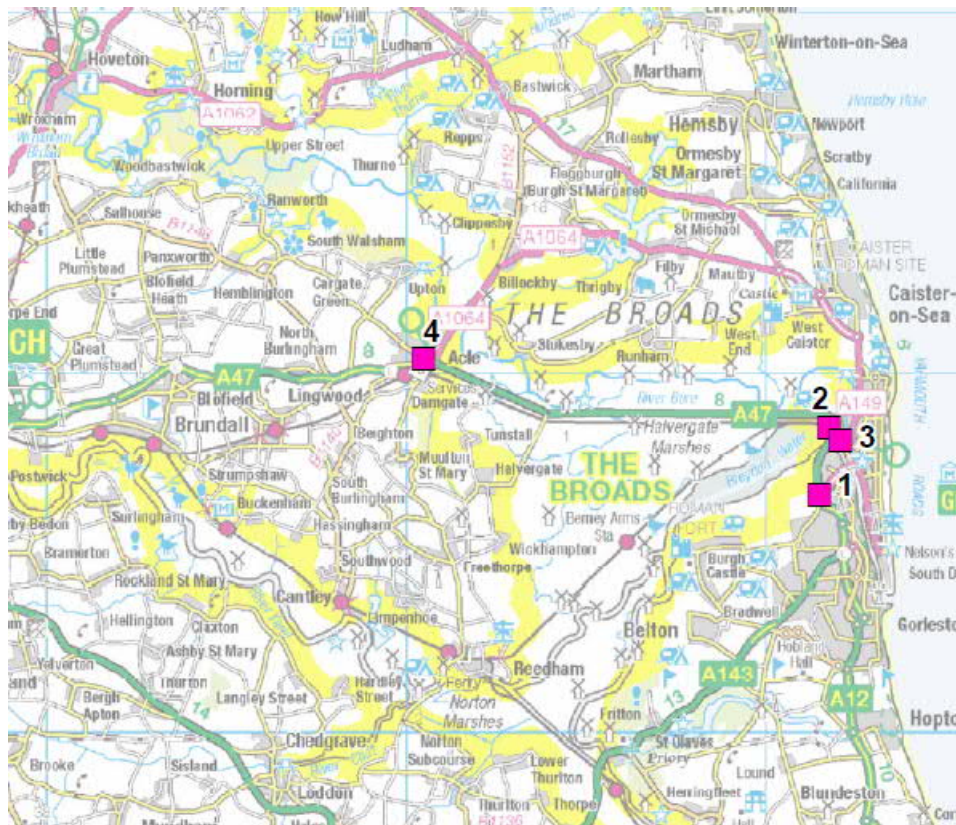
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**Figure 1 - Location of junctions relevant to Highways England considered in this Briefing Note**

- 2.3. These assessments have been undertaken using LinSig software for Junction 1, as it is a signalised junction, and ARCADY Junctions 8 software for Junctions 2, 3 and 4, which are unsignalised roundabout junctions.
- 2.4. The junctions assessed in this Briefing Note (BN) are remote from the location of the onshore construction work associated with the wind farm. They have been examined by RHDHV because of the potential for construction traffic associated with material brought in through either Great Yarmouth or Lowestoft ports could result in an impact at these locations, which were identified as sensitive to the impact of traffic flow increases following the review of the Preliminary Environmental Information Report (PEIR) during November 2017.
- 2.5. As such, the majority of development construction traffic predicted to run through each of these junctions in the peak hour is expected to be HGVs, which AECOM considers appropriate due to the nature of the traffic generated.
- 2.6. The quantity of additional construction traffic forecast to use these sensitive junctions is tabulated below:

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Table 1 - Net predicted increases in hourly flows through sensitive junctions

Junction	Total Increase in peak hourly flow (Light Vehicles)	Total Increase in peak hourly flow (Heavy Vehicles)
1 (A47 / Gapton Hall)	5.5	74
2 (A47 / A149 Vauxhall, Scenario 1)	5	64
2 (A47 / A149 Vauxhall, Scenario 2)	5	74
3 (A149 / B1141 / Fullers Hill)	2	94
4 (A47/A1064 Acle)	5	64

2.7. Whilst these additional flows are relatively small in absolute terms, the PEIR acknowledged their potential to exacerbate problems at these junctions and the need to quantify this.

#### Assessment Year

2.8. The following assessment scenarios have been assessed by RHDHV for the AM and PM peak hours:

- 2022 forecast base flows; and
- 2022 forecast base flows plus development traffic.

2.9. AECOM note that there is no base year comparison provided by RHDHV in the ES and that only one assessment year has been assessed. **It is therefore recommended that a base year comparison is made to understand how well the models represent existing road conditions as a basis for understanding how they will operate in the forecast assessment year.**

#### Data Sources

2.10. Manual Classified Turning Count (MCC) data has been taken from traffic counts provided by Norfolk County Council (NCC) for each of the junctions. For Junctions 1 and 2, 2012 survey flow data was provided; for Junction 3, 2015 survey flow data was provided; and for Junction 4, 2018 survey flow data was provided. Whilst AECOM consider the survey flow data years provided to be acceptable it is to be noted that the surveyed data for junctions 1 and 2 are now over 7 years old. **The results of the models for Junctions 1 and 2 should therefore be treated with an appropriate level of caution.**

2.11. Furthermore it is to be noted that no queue data has been provided. **AECOM recommend that queue data is provided to assess the validity of the queue lengths provided in the modelling outputs, should a base model be provided for review.**

2.12. Growth factors have been provided to calculate the background traffic flows for the assessment year. The derivation of these growth factors has not been provided. **AECOM recommend that**

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**further detail should be provided to support the TEMPro growth factors so that the derivation of the future base flows can be established.**

- 2.13. RHDHV have provided modelling results summary tables in the ES that reflect the network peak hour with the highest traffic flows per junction, rather than showing both the AM and PM peak hours, to represent the worst case scenario at each junction. For Junctions 1, 2 and 3, the PM peak has the highest traffic flows, whereas the AM peak has the highest traffic flows for Junction 4. These tables are replicated below for ease of reference.

### 3. A47 Gapton Hall Junction Assessment

#### Flows

- 3.1. RHDHV was provided with 2012 survey flows from NCC for the AM and PM peak traffic for Junction 1. The growth factors adopted were applied to these surveyed flows to obtain the forecast flows for 2022 and the development traffic tabulated in Table 24.35 of ES Appendix 24 were added to obtain the 'with development' flows. AECOM have checked the traffic flows input into the model and are content that they are accurate.

#### Geometry and Signal Timings

- 3.2. AECOM have reviewed the geometric parameters used in the LinSig model and the signal timing data input into the model and are content that they are reasonable.

#### Results

- 3.3. The impact of wind farm construction traffic on this junction is summarised in the LinSig model results tabulated in Table 2.

**Table 2 - Junction 1 modelling results summary**

Arm	2022 forecast base flows 17:00-18:00			2022 forecast base flows plus development traffic 17:00-18:00		
	DoS (Degree of Saturation)	Delay (s)	MMQ (pcu)	DoS (Degree of Saturation)	Delay (s)	MMQ (pcu)
A47 North - Ahead	78.90%	24.5	13.7	83.5	27.1	16.5
A47 South - Ahead	154.70%	719.7	184.8	162.40%	781	207
Practical Reserve Capacity over all lanes	-71.90%			-80.50%		

- 3.4. The results above show that in the 2022 forecast year without development traffic, the A47 South is predicted to be operating over capacity with the degree of saturation being 154.7%. The inclusion of the development trips aggravates the performance of this arm with the degree of saturation increasing to 162.4% and the mean max queue increasing from 185 to 207 PCUs.
- 3.5. This junction is known to suffer extensive congestion at peak periods already, particularly on the A47 (south) approach to the roundabout. The results quoted for the assessment year base are therefore unsurprising. In the context of a junction which is already significantly over capacity, the

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addition of traffic generated by the construction phase of the proposed Norfolk Vanguard Wind Farm appears to result in a relatively small deterioration in conditions. AECOM are aware of a scheme being developed by Highways England for this junction through the Roads Investment Strategy and the scheme for a third river crossing being promoted by Norfolk County Council which will likely provide relief to this junction.

- 3.6. In this context, it would not be reasonable to require the promoter of the Norfolk Vanguard Wind Farm to bring forward a traffic capacity based mitigation scheme to mitigate the impact of an additional 80 vehicles per hour during the construction phase of the Wind Farm. Instead, **AECOM recommend that the impact of wind farm construction on this junction should be controlled through the Construction Traffic Management Plan (CTMP), which should aim to minimise the number of additional vehicles using this junction during peak periods, for example through the use of an hours of working restriction.**

#### 4. A47/A149 Vauxhall Junction Assessment

##### Flows

- 4.1. RHDHV was provided with 2012 survey flows from NCC for the AM and PM peak traffic for Junction 2. The growth factors adopted were applied to these surveyed flows to obtain the forecast flows for 2022 and the development traffic tabulated in Table 24.35 of ES Appendix 24 were added to obtain the 'with development' flows. AECOM have checked the traffic flows input into the model and are content that they are accurate.

##### Geometry

- 4.2. AECOM have reviewed the geometric parameters used in the ARCADY (Junctions 8) model and are content that they are reasonable.

##### Results

- 4.3. Two assessment scenarios were assessed for Junction 2 by RHDHV. The first scenario (scenario 1) represents the impact of Great Yarmouth port as the origin for development traffic whilst Scenario 2 had Lowestoft port as its origin.
- 4.4. The Junctions 8 models are summarised in the tables below for both scenarios. Results where the RFC exceeds the 0.85 threshold are highlighted in red.

**Table 3 - Junction 2 modelling results summary - Scenario 1**

Arm	2022 forecast base flows 17:00-18:00			2022 forecast base flows plus development traffic 17:00-18:00		
	RFC	Delay (s)	Queue (PCU)	RFC	Delay (s)	Queue (PCU)
A47 West	0.81	13.17	4.26	0.86	17.37	5.93
Runham Road	1.89	768.32	37.46	3.27	3108.22	54.42
A149	1.07	118.94	79.61	1.1	156.1	109.18
A47 South	1.21	410.07	160.23	1.24	480.65	185.54

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Table 4 - Junction 2 modelling results summary- Scenario 2

	2022 forecast base flows 17:00-18:00			2022 forecast base flows plus development traffic 17:00-18:00		
	RFC	Delay (s)	Queue (PCU)	RFC	Delay (s)	Queue (PCU)
A47 West	0.81	13.17	4.26	0.85	16.39	5.5
Runham Road	1.89	768.32	37.46	3.01	2777.07	52.62
A149	1.07	118.94	79.61	1.1	160.03	109.74
A47 South	1.21	410.07	160.23	1.26	529.09	214.51

- 4.5. The tables show that the junction in the forecast year of 2022 without any development traffic is already operating over capacity. There are significant issues on three out of the four arms. Furthermore with the development traffic the junction is again predicted to operate over capacity.
- 4.6. AECOM notes that the development traffic has a significant impact on the Runham Road approach arm, which experiences the biggest exponential growth in RFC and delays for both scenarios. As this section of the road is relatively small in length, the significant increase in delay might push congestion back onto New River Road which runs adjacent to Runham Road, causing issues further along the highway network than the junction alone. Runham Road forms part of the Local Road Network and, as such, is a matter for NCC to comment on.
- 4.7. AECOM note that the flows at Junction 2 will have been affected by the recently implemented scheme to re-open the right turn out of Station Approach on to Acle New Road, which will result in vehicles emerging from the Great Yarmouth railway station and Asda store no longer having to make U-turns at Junction 2 to return to the town centre. The turning flows for Junction 2 include those U turns and may consequently present a worse estimate of congestion in the assessment year than will actually be the case. It would appear un-necessary to require the provision of an updated model with these U-turns removed.
- 4.8. In terms of the SRN, This junction is known to suffer extensive congestion at peak periods already. The results quoted for the assessment year base are therefore unsurprising. In the context of a junction which is already significantly over capacity, the addition of traffic generated by the construction phase of the proposed Norfolk Vanguard Wind Farm appears to result in a relatively small deterioration in conditions. AECOM are aware of a scheme being developed by Highways England for this junction through the Roads Investment Strategy and a scheme for a third river crossing being promoted by Norfolk County Council which will likely provide relief to this junction.
- 4.9. In this context, it would not be reasonable to require the promoter of the Norfolk Vanguard Wind Farm to bring forward a traffic capacity based mitigation scheme to mitigate the impact of an additional 70 - 80 vehicles per hour during the construction phase of the Wind Farm. Instead, **AECOM recommend that the impact of wind farm construction on this junction should be controlled through the Construction Traffic Management Plan (CTMP) which should aim to minimise the number of additional vehicles using this junction during peak periods, for example through the use of an hours of working restriction.**

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## 5. A149/B1141 Fullers Hill Junction

### Flows

- 5.1. RHDHV was provided with 2015 survey flows from NCC for the AM and PM peak traffic for Junction 3. The growth factors adopted were applied to these surveyed flows to obtain the forecast flows for 2022 and the development traffic tabulated in Table 24.35 of ES Appendix 24 were added to obtain the 'with development' flows. AECOM have checked the traffic flows input into the model and are content that they are accurate.

### Geometry

- 5.2. AECOM have reviewed the geometric parameters used in the ARCADY (Junctions 8) model and are content that they are reasonable.

### Results

- 5.3. The Junctions 8 model produced from the models supplied by RHDHV are summarised in the table below. Results where RFC exceeds the 0.85 threshold are highlighted in red.

**Table 5 - Junction 3 modelling results summary**

Arm	2022 forecast base flows 16:15-17:15			2022 forecast base flows plus development traffic 16:15-17:15		
	RFC	Delay (s)	Queue (PCU)	RFC	Delay (s)	Queue (PCU)
A149 North Quay (north)	0.56	3.94	1.24	0.59	4.4	1.43
Fuller's Hill	0.35	4.11	0.53	0.37	4.56	0.59
B1141 North Quay (south)	0.84	17.31	5.09	0.94	35.18	11.19
A149 Acle New Road	0.93	26.27	10.4	0.99	54.81	24.19

- 5.4. Table 5 shows that the junction in the 2022 scenario without development traffic is predicted to operate over capacity on one arm (Acle New Road). When the development traffic is added the junction is predicted to operate over capacity on the Acle New Road arm as well as North Quay south. Furthermore the queue length on the Acle New Road is predicted to double when the development traffic is added.
- 5.5. It is noted that Junction 3 completed a junction improvement scheme in March 2017 to mitigate the current and future capacity issues, particularly on the North Quay approach where significant queueing was being experienced. The Junction 8 model represents the layout following implementation of this improvement.
- 5.6. Highways England's main objective in respect of the Fullers Hill junction will be to ensure that there is a minimal risk of the queue back along the Acle New Road approach tailing back to, and affecting the operation of, the A47 Vauxhall roundabout. The predicted queue of 24 PCUs would extend 140m back from the roundabout. The distance to the A47 Vauxhall roundabout is some 475m. AECOM can therefore agree that the Junctions 8 model results, as presented in Chapter 24

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of the ES, indicate a minimal risk of a queue regularly tailing back to the Vauxhall junction as a result of the addition of construction traffic associated with the Norfolk Vanguard Wind Farm.

## 6. A47/A1064 Acle Junction Assessment

### Flows

- 6.1. RHDHV was provided with 2018 survey flows from NCC for the AM and PM peak traffic for Junction 4. The growth factors adopted were applied to these surveyed flows to obtain the forecast flows for 2022 and the development traffic tabulated in Table 24.35 of ES Appendix 24 were added to obtain the 'with development' flows. AECOM have checked the traffic flows input into the model and are content that they are accurate.

### Geometry

- 6.2. AECOM have reviewed the geometric parameters used in the ARCADY (Junctions 8) model and are content that they are reasonable.

### Results

- 6.3. The Junctions 8 model produced from the models supplied by RHDHV are summarised in the table below. Results where RFC exceeds the 0.85 threshold are highlighted in red.

**Table 6 - Junction 4 modelling results summary**

Arm	2022 forecast base flows 07:00-08:00			2022 forecast base flows plus development traffic 07:00-08:00		
	RFC	Delay (s)	Queue (PCU)	RFC	Delay (s)	Queue (PCU)
A1064	0.82	21.1	4.32	0.86	28.41	5.74
A47 (east)	1.00	67.88	24.58	1.07	127.32	54.24
A47 (west)	0.56	3	1.24	0.58	3.2	1.4
New Road	0.55	11.79	1.22	0.59	13.65	1.41

- 6.4. Table 6 shows that the junction is predicted to broadly operate within capacity in the AM peak without development traffic in 2022. However the A47 (east arm) is operating beyond its design capacity with a RFC of 1.0. The addition of development traffic means that two out of the four arms (A1064 and A47 east) of the junction are predicted to operate outside the capacity threshold, reducing the efficiency of the junction.
- 6.5. The A47 (east) approach is predicted to operate over capacity both without and with development traffic. It is predicted to operate at 1.0 RFC, with a predicted queue of 25 vehicles in the 2022 forecast base flows scenario, compared with respective values of 1.07 and 54 vehicles in the "plus development traffic" scenario, showing a significant increase in queues caused by the development traffic. As stated above AECOM recommend queue data to be provided to assess the validity of the queue lengths provided in the modelling outputs. However, from what is presented in the table,

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because of the apparent significant increase in queue length and delay on the A47 (east) approach, AECOM recommend that mitigation measures are identified for this junction. Given the fact that this impact will persist only for the duration of the construction phase of the wind farm, it would be reasonable to require signage-based mitigation measures (rather than additional highway capacity) at this location. **AECOM recommend that consideration be given to the use of variable message signing aimed at alerting westbound drivers on the A47 of the risk of excessive queues at this junction whilst they are still on the Acle Straight.**

## 7. Conclusions

- 7.1. This Technical Note has been produced by AECOM on behalf of Highways England. The note focuses on the review of the Environmental Statement related to the Norfolk Vanguard Offshore Windfarm. Upon reviewing Norfolk Vanguard Offshore Windfarm ES the impacts that the development traffic will have on the four identified junctions as they currently perform were identified.
- 7.2. The review shows that in the future year scenario of 2022 the four junctions will be operating over capacity and this will worsen with any development traffic.
- 7.3. This review has raised a number of comments and recommendations, which AECOM consider should be taken forward and addressed. AECOM's recommendations regarding these concerns are highlighted by the use of bold underlined text throughout this document. Recommendations whereby it is important the issue is addressed within the TA are coloured **red**. Recommendations whereby some more minor errors have been identified and it is recommended that they are rectified within the TA are highlighted in **amber**.

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