The Lake Lothing (Lowestoft) Third Crossing Order 201[*]

Lake Lothing THIRD CROSSING

Document 7.5: Design Report

Appendix 1

Author: Suffolk County Council

REPORT N^{O} 1069948-WSP-HGN-LL-RP-CH-0001

LAKE LOTHING THIRD CROSSING

DEPARTURES FROM STANDARD

CONFIDENTIAL

MAY 2018

LAKE LOTHING THIRD CROSSING

DEPARTURES FROM STANDARD

Suffolk County Council

Confidential

Project no: 1064498
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Signature				
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LIMITATIONS

This report is presented to Suffolk County Council in respect of the proposed A12 Lake Lothing Third Crossing and may not be used or relied on by any other person or by the client in relation to any other matters not covered specifically by the scope of this report.

Notwithstanding anything to the contrary contained in the report, WSP is obliged to exercise reasonable skill, care and diligence in the performance of the services required by Suffolk County Council and WSP shall not be liable except to the extent that it has failed to exercise reasonable skill, care and diligence, and this report shall be read and construed accordingly.

This report has been prepared by WSP. No individual is personally liable in connection with the preparation of this report. By receiving this report and acting on it, the client or any other person accepts that no individual is personally liable whether in contract, tort, for breach of statutory duty or otherwise.

1 PROJECT BACKGROUND

1.1 INTRODUCTION

The proposed A12 Lake Lothing Third Crossing is a new road crossing over Lake Lothing, a large saltwater lake which flows into the North Sea. The lake is approximately 180m across at its widest point, and forms the inner harbour of the Port of Lowestoft. This area has suffered greatly from the decline of shipbuilding and traditional industries, and is a key area for regeneration. The scheme will support regeneration by improving access to the lake area and by relieving congestion in, and around, the town centre.

Over the past 35 years, much of Lowestoft's rich and proud industrial heritage has gone. The fishing industry has declined dramatically, industries have closed, and there has been a move away from home-based tourism. There is an urgent need for inward investment and regeneration, but poor infrastructure hampers attempts to attract new businesses to the area.

Lake Lothing divides Lowestoft between north and south. The road crossings in the east and west are inadequate for existing traffic demand. The problem of congestion has blighted the town for years, and Lowestoft's inadequate road network is a serious disincentive to people coming to the town. Congestion causes real problems for business; it discourages existing firms from expanding and discourages new businesses from moving into the area. There have been improvements to local roads in recent years, but the third crossing remains a missing link. Provision of an extra crossing will reduce severance, and allow the road network to operate efficiently, providing vital extra capacity. It will reduce congestion, helping Lowestoft to attract investment and achieve its full potential as a place in which to live and work.

1.2 DESCRIPTION OF THE SCHEME

The proposed scheme is illustrated in Figure 1. It starts at a new roundabout on Denmark Road, east of the existing Peto Way / Denmark Road roundabout, and spans both the railway line and Lake Lothing on a north – south alignment.

On the southern shore, the new crossing follows the line of Riverside Road, initially at a high level, descending to a new roundabout at the junction of Riverside Road and Waveney Drive, west of the Lings Motor showroom.

Improvements between this roundabout and the existing Waveney Road /Tom Crisp Way roundabout will provide access to the A12. Local roads which presently connect directly to Riverside Road will be served in the main from a new connection to Waveney Drive.

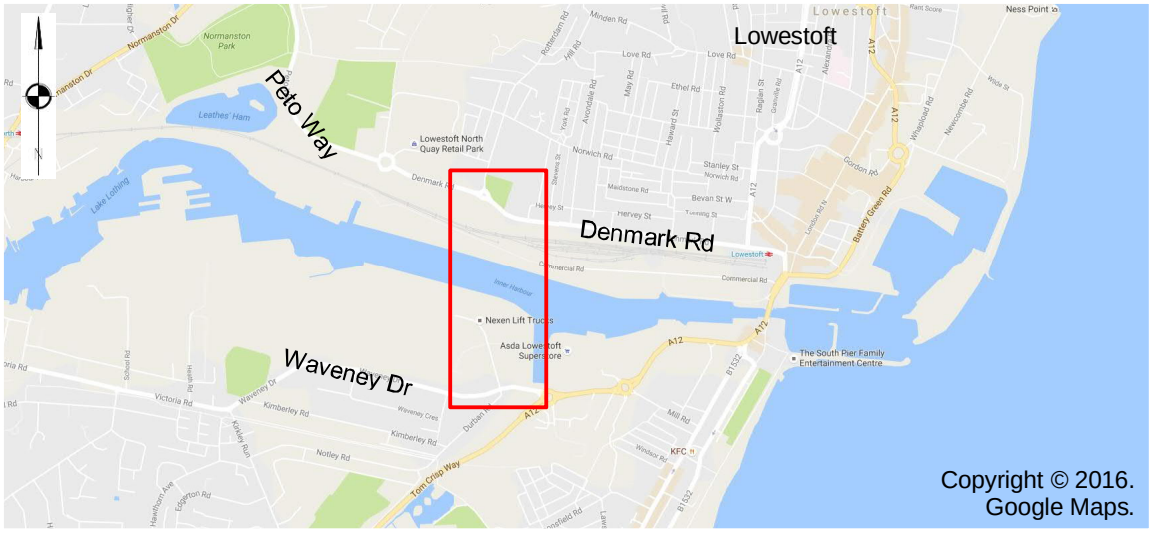

Figure 1 – Lake Lothing Location Plan

A bascule (lifting) bridge will be constructed to allow the passage of shipping within the inner harbour. When closed, the bridge will have a clearance of at least 12m. This will enable smaller boats to pass under the bridge. This, and its location west of some of the docks, means that it will have to open less frequently than the existing Bascule Bridge at the harbour entrance.

The new bridge will be a single carriageway, with separate footways and cycle tracks linked to adjacent networks.

2 DEPARTURES FROM STANDARD

2.1 INTRODUCTION

The A12 Lake Lothing Third Crossing has been designed using the Design Manual for Roads and Bridges (DMRB) as published by the Her Majesty's Stationery Office.

Compliance with the DMRB is mandatory is for all improvements on the Motorway, all Purpose Trunk Roads and for all Purpose roads unless the Overseeing Organisation has approved a Departure from Standard.

Mandatory sections of the DMRB are normally 'black boxed' within the appropriate Standard being used.

In certain circumstances a 'relaxation' may be adopted to the design. A relaxation is a permitted variation from a particular requirements, but adopted within defined limits and in defined situations. Where Relaxations are permissible, the circumstances will be defined in the relevant standard, any further proposed variation beyond these limits requires a "Departure from Standard".

Except where Relaxations are permitted any variation or waiving of a mandatory requirement contained within a DMRB document is considered to be a Departure from Standard. Departures from Standard may be appropriate in a variety of situations; for example:

- Where it can be justified that a requirement is inappropriate in a particular situation;
- Where the application of a document would have unintended adverse consequences;
- Where the Standard, included permitted Relaxations, is not realistically achievable; and
- Where an "Aspect not covered by Standards" is identified.

WSP have been commissioned by Suffolk County Council to provide a Reference Design suitable to apply for planning consent for the A12 Lake Lothing Third Crossing, with the aspiration to have a design that is fully compliant with DMRB. The Scheme design is constrained by existing site conditions, and the need to limit impact on statutory consultees, adjacent landowners, and other affected parties. These constraints create some difficulty with full DMRB compliance in some areas of the Scheme design, where the best solution for the reference design deviates. As part of the design process for the Reference Design WSP have identified a number of Departures from Standard, which are considered to be necessary as part of the design and these have been submitted for consideration using the proforma which is included in Appendix A. There is an opportunity for the Departures from Standard identified below to be reviewed during the detailed design stage.

2.2 HIGHWAYS

The design for the 'Reference design' for the proposed A12 Lake Lothing Third Crossing has been based on the following documents contained within the DMRB;

- TD9/93 – Highway Link Design; and
- TD16/07 Geometric Design of Roundabouts.

The design speed adopted for the crossing is 30mph (60kph) and the mandatory paragraphs included in the above documents are assessed against this.

Copies of the draft Departures from Standard identified are included in Appendix B.

THIRD CROSSING MAINLINE ALIGNMENT

Two Departures from Standard have been identified on the main line as described below:

Departure No.3 Non-permitted combination of horizontal alignment and stopping sight distance (SSD) relaxations on the Third Crossing mainline alignment in the northbound direction (visibility across the inside of the bend). TD9/93 Clause 1.24. See document 1069948-WSP-GEN-LL-DF-CH-0003 and drawing 1069948-WSP-HML-LL-DR-CH-0102.

- Horizontal curvature between Ch. 45 and Ch. 174.5 is two design speed steps below desirable minimum (135m).
- Horizontal curvature relaxation is coincident with a relaxation in SSD which is one design speed step below desirable minimum 90m.
- The departure is required due to the existing constraints of the existing Rotterdam Road/ Denmark Road roundabout, Peto Way land boundary – particularly Wickes and the East Suffolk railway line which has determined the position of the northern roundabout and the connection to/from the Third Crossing.

Departure No.11 Non-permitted relaxation to Stopping Sight Distance (SSD) on the immediate approach to the Northern Roundabout from the Third Crossing Mainline. TD9/93 Clause 1.26. See document 1069948-WSP-GEN-LL-DF-CH-0011 and drawing 1069948-WSP-HML-LL-DR-CH-0102.

- The SSD on approach to the Northern Roundabout from the Third Crossing mainline alignment is one design speed step below the desirable minimum (minimum SSD 83.8m).
- The Departure is necessary due to the position of the proposed Vehicle Restraint system obstructing the SSD on the approach to the give way line (TD9/93). Visibility to the give way line is required in accordance with Figure 8/1 of TD16/07.

NORTHERN ROUNDABOUT

Two Departures from Standard have been identified at the A12 Lake Lothing Third Crossing northern roundabout as described below:

Departure No.2 Non-permitted excessive entry path radius from the northbound Third Crossing mainline alignment to the proposed northern roundabout. TD16/07 Clause 7.56. See document 1069948-WSP-GEN-LL-DF-CH-0002 and drawing 1069948-WSP-HML-LL-DR-CH-0103.

- The entry path radius varies between 105m to 123m at this location.
- The departure is necessary due to existing site constraints. The location of the roundabout has been determined due to the existing constraints such as Wickes, the necessary connections to the Rotterdam Road/Denmark Road roundabout and Peto Way and the Lake Lothing Third Crossing itself.

- The proposed roundabout has an inscribed circle diameter of 50m which caters for the predicted traffic flows in the design year. The option of a 55m inscribed circle diameter roundabout design was investigated which removed the Departure, however this layout proved to be unworkable as the tie-in to the existing Rotterdam Road/Denmark Road roundabout was not possible due to the vertical differences.

Departure No.1 Non-permitted combination of horizontal alignment relaxation and stopping sight distance relaxation on the exit from the proposed northern roundabout onto Peto Way (visibility on the inside of the bend past Wickes). TD9/93 Clause 1.24. See document 1069948-WSP-GEN-LL-DF-CH-0001 and drawing 1069948-WSP-HSR-LL-DR-CH-0111.

- The horizontal curvature between Ch. 53.2m and Ch. 90m is three design speed steps below desirable minimum (90m).
- The horizontal curvature relaxation is coincident with a relaxation in SSD which is one design speed step below desirable minimum 90m (minimum SSD 81m).
- The Departure is required due to the existing boundary constraints present at the current Wickes' site which has resulted in the proposed horizontal alignment. This Departure is considered low risk due to the low speed being developed by traffic leaving the northern roundabout, would be less than the adopted design speed.

ROTTERDAM ROAD/DENMARK ROAD ROUNDABOUT

Two Departures from Standard have also been identified to the small conventional roundabout proposed at the junction of Rotterdam Road and Denmark Road as described below:

Departure No.4 Non-permitted excessive entry path radius from Denmark Road to the Rotterdam Road/Denmark Road roundabout. TD16/07 Clause 7.56. See document 1069948-WSP-GEN-LL-DF-CH-0004 and drawing 1069948-WSP-HML-LL-DR-CH-0103.

- Entry path radius varies between 90m to 145m at this location.
- The Departure is required due to the existing site constraints. The current roundabout has an existing non-standard entry path radius.

Departure No.5 Non-permitted excessive entry path radius from Rotterdam Road to the proposed Rotterdam Road/ Denmark Road roundabout. TD16/07 Clause 7.56. See document 1069948-WSP-GEN-LL-DF-CH-0005 and drawing 1069948-WSP-HML-LL-DR-CH-0103.

- Entry path radius varies between 120m to 150m at this location.
- The Departure is required due to the existing site constraints. The current roundabout has an existing non-standard entry path radius.

SOUTHERN ROUNDABOUT

Three Departures from Standard have been identified at the southern roundabout as described below.

This junction design has proved difficult to obtain the optimum solution balancing the needs of DMRB with site constraints. Various layouts have been considered through an iterative design process. Additional option(s) of maintaining the connection into Durban Road were also investigated as part of the design development, within the DMRB requirements and the need to minimise the effect on adjacent properties/land owners. During the design development it was

acknowledged that there was limited scope within the highway boundary to accommodate the proposed southern roundabout and that additional land would be required. Each option developed was modelled in terms of junction capacity and each were found to be unacceptable in terms of performance in the design year. The smallest roundabout that was put forward although minimising the effect on Motorlings and the residential property did not work in terms of capacity in the design year. To overcome this issue the size of the roundabout had to increase in size. The option finally developed as part of the Reference Design was therefore a compromise, which minimised the impact on Motorlings and the residential properties to the south, based on land availability (and costs) and the geometric requirements of the DMRB, without the vehicular connection to Durban Road.

Departure No.6 Non-permitted excessive entry path radius from the southbound Third Crossing mainline alignment to the A12 Lake Lothing Third Crossing southern roundabout. TD16/07 Clause 7.56. See document 1069948-WSP-GEN-LL-DF-CH-0006 and drawing 1069948-WSP-HML-LL-DR-CH-0104.

- Entry path radius varies between 73m to 115m at this location.
- The Departure is necessary due to the existing site constraints. The location of the roundabout has been chosen due to the constraints comprising to the south the residential housing on Durban Road, to the west the Business Park and to the north east the Motorlings car showroom site.
- The proposed roundabout has an inscribed circle diameter of 50m which caters for the predicted traffic flows in the design year. The option of a 55m inscribed circle diameter design was investigated, which removed the Departure. However, this option required increased land take from the Business Park & Motorlings. This option also affected the access to Motorlings and resulted in an increased level difference between the proposed carriageway/verge level and the showroom forecourt when compared to the current design.

Departure No.7 Non-standard lane entry width from Waveney Drive Eastbound onto the A12 Lake Lothing Third Crossing southern roundabout. TD16/07 Clause 7.24. See document 1069948-WSP-GEN-LL-DF-CH-0007 and drawing 1069948-WSP-HML-LL-DR-CH-0104.

- The entry width for Waveney Drive Eastbound to the southern roundabout is 8m.
- The Departure is required to cater for the predicted traffic flows accessing the roundabout. The increased entry width generates an effective flare length of 34.4m which produced favourable capacity results in the design year.
- A design which included a 7m entry width was modelled and the traffic figures showed that the junction would theoretically be over capacity in the design year with excessive queues forming resulting in excessive delays.

Departure No.8 Obstruction to visibility on approach to the southern roundabout from Waveney Drive East travelling West. TD9/93 Clause 1.26 and TD16/07 Clause 8.3. See document 1069948-WSP-GEN-LL-DF-CH-0008 and drawing 1069948-WSP-HSR-LL-DR-CH-0112.

- The visibility on approach to the southern roundabout from Waveney Drive Westbound is one design speed step below the desirable minimum 70m (minimum SSD 54m).
- The Departure is necessary due to the red line boundary following the existing highway boundary for the majority of the length. The required visibility splay to the give way line crosses the red line boundary occurs over a short length of

approximately 5m as it approaches the give-way line. Before this point minimum SSD is achievable. To remove this Departure it would be necessary to purchase additional land from the development site. The speeds achieved on this section of carriageway are likely to be lower than the design speed, so the risk of accepting this Departure is considered to be low.

- If the SSD was to be assessed against the Manual for Streets, the stopping sight distance for a 50kph design speed would be 45m and would therefore not be a Departure from Standard.

The location of the individual Departures from Standard are shown on drawings included in Appendix C.

2.3 VEHICLE RESTRAINT SYSTEMS (VRS)

For a new highway such as the proposed A12 Lake Lothing Third Crossing with a proposed speed limit of 30mph the use of the RRRAP Risk Assessment process related to TD19/06 Requirement for Road Restraint Systems - as published by Her Majesty's Stationery Office for the design of Vehicle restraint systems is not appropriate. The more appropriate document would be a DfT doc produced with the UK Roads Liaison Group called:

'Design & Maintenance Guidance for Local Authority Roads - Provision of Road Restraint Systems on Local Authority Roads'.

However, the guidance provided in TD19/06 has been used in the assessment of the proposed vehicle parapet for the crossing.

The proposed Third Crossing arrangement introduces gaps into the proposed parapet where the 'rolling leaves' of the bridge are positioned. In accordance with Clause 4.14 of TD19/06 these gaps are considered to be Departures from Standard. The treatment of these gaps will need to be developed as part of the detailed design process in conjunction with a Vehicle Restraint Manufacturer as they will be bespoke to the project.

In addition a larger gap is introduced into the parapet to the south of the bridge where access to the viewing platform provided as part of the control tower is located. This access also introduces a further Departure from Standard in accordance with Clause 3.107 of TD19/06. This gap will need to have additional protection provided as part of the access to the control tower, which will be able to resist the impact of an errant vehicle, especially as it will be adjacent to the proposed stop-line for the wig-wags.

Draft Departures 9 and 10 are included in Appendix B document nos. 1069948-WSP-GEN-LL-DF-CH-0009 and 1069948-WSP-GEN-LL-DF-CH-0010.

3 CONCLUSIONS

The Reference Design for the A12 Lake Lothing Third crossing currently contains highway and Vehicle Restraint System Departures from Standard in relation to the DMRB. This does not mean that the proposed scheme is unsafe and there is other design guidance to support this. Although it was SCC's original intention to comply with DMRB from the outset, this has not been possible due to several reasons explained in this report, and these have been balanced against the recommendations of DMRB. It is not uncommon for highway schemes designed in the urban environment (in contrast to a 'green field' situation) to include Departures due to the constraints of existing features and land boundaries and in this case elsewhere in Lowestoft and SCC considers that it is also appropriate for this scheme.

Although the Reference design contains a number of Departures from Standard, there is an opportunity within the detailed design of the scheme to reconsider some of the Departures and investigate them in more detail to see if they can be removed, within the physical constraints of the project. This work will continue throughout the Detail Design stage of this project.

However, the physical constraints especially land, placed on the alignment will necessitate the acceptance of a number of the Departures as part of the final design.

4 RECOMMENDATIONS

It is recommended that the Departures from Standard that are currently proposed are accepted, and that during the detailed design process the design is developed to investigate whether or not some of the Departures can be removed.

APPENDIX A – DEPARTURES FROM STANDARD TEMPLATE

	Departure from Standard Submission	Departure No.:	000X	Issue No: P01
Scheme Title:	**Lake Lothing Third Crossing**	Scheme Ref No:	**1069948**	
Details of Departure Required:				
Standard:		Clause:		
Location (*Attach drawing(s) as necessary):*				
Description (*incl. Design Speed*)				

Other Relevant Departures / Relaxations in Locality			
Standard:	Clause:	Ref:	Description:

Reason (*as necessary, include added value or cost of compliance, environmental implications or effects, safety implications or effects*):			
Proposed Mitigation Measures:			
Additional Information:			
List of Supporting Documents and Drawings: Drawing number			
Contact for Information:		Telephone No:	
Requested by:	Name: _____ Position:	Signed: _____ Organisation:	Date: _____
Authorised by:	Name: _____ Position:	Signed: _____ Organisation:	Date: _____
Reviewed by:	Name: _____ Position:	Signed: _____ Organisation:	Date: _____
Approved by:	Name: _____ Position:	Signed: _____ Organisation:	Date: _____

APPENDIX B – DRAFT DEPARTURES FROM STANDARD

	Departure from Standard Submission	Departure No.:	0001	Issue No: P01
Scheme Title:	**Lake Lothing Third Crossing**	Scheme Ref No:	**1069948**	

Details of Departure Required:

Non-permitted combination of horizontal alignment relaxation and stopping sight distance relaxation on the exit from the proposed northern roundabout onto Peto Way.

Standard:	TD9/93 Highway Link Design	Clause:	1.24

Location (*Attach drawing(s) as necessary):*

Proposed Northern Roundabout, Northbound exit to Peto Way. See drawing 1069948-WSP-HSR-LL-DR-CH-0111

Description (*incl. Design Speed*)

TD 9/93 Clause 1.24 states that SSD relaxations of up to 1 design speed step may be coincident with horizontal curvature relaxations of up to 1 design speed step below desirable minimum. All other combinations of relaxations are not permitted and shall be treated as departures from standard.

The North West arm (Peto Way) has a design speed of 60kph. The horizontal curvature between Ch.53.2 and Ch.90 is three design speed steps below desirable minimum (255m). This relaxation is coincident with a relaxation in SSD which is two design speed steps below desirable minimum (90m) and is therefore a departure from standard.

Other Relevant Departures / Relaxations in Locality

Standard:	Clause:	Ref:	Description:

Reason (*as necessary, include added value or cost of compliance, environmental implications or effects, safety implications or effects*):

The departure is required due to existing land boundary constraints at the current Wickes' site which has resulted in the proposed horizontal alignment. This has realigned Peto Way a 7.3m single carriageway to connect to the proposed northern roundabout.

The horizontal curvature in the area of the departure has a radius of 90m which is coincident with a relaxation in SSD to a minimum of 81m due to the existing Wickes' boundary which is beyond the scheme extents/limit of works.

This combination of relaxations occurs over a short length (circa 44m), and once vehicles are approaching the boundary of the Wickes' site (at approximate Ch. 47) desirable minimum SSD is achievable. This is shown on drawing 1069948-WSP-HSR-LL-DR-CH-0111 and the accompanying SSD analysis table shown below.

Eye Position	Target Position	Eye Level	Target Level	Sight Distance Achieved
0.000	90.000	7.054	4.614	90.000
1.000	91.000	7.028	4.625	90.000
2.000	91.820	7.005	4.634	89.800
3.000	92.470	6.981	4.641	89.500
4.000	93.120	6.960	4.649	89.100
5.000	93.770	6.942	4.657	88.800
6.000	94.420	6.925	4.664	88.400
7.000	95.420	6.909	4.678	88.400
8.000	96.070	6.873	4.683	88.100
9.000	96.710	6.836	4.690	87.700
10.000	97.360	6.793	4.697	87.400
11.000	98.360	6.748	4.708	87.400
12.000	99.010	6.701	4.715	87.000
13.000	99.660	6.657	4.722	86.700
14.000	99.960	6.613	4.725	86.000
15.000	100.610	6.571	4.731	85.600
16.000	100.900	6.531	4.734	84.900
17.000	101.550	6.492	4.740	84.600
18.000	101.850	6.453	4.743	83.800
19.000	102.500	6.414	4.750	83.500
20.000	103.140	6.375	4.756	83.100
21.000	103.790	6.338	4.762	82.800
22.000	104.090	6.304	4.764	82.100
23.000	105.090	6.271	4.773	82.100
24.000	105.740	6.237	4.779	81.700
25.000	106.390	6.204	4.784	81.400
26.000	107.390	6.171	4.793	81.400
27.000	108.040	6.142	4.798	81.000
28.000	109.040	6.113	4.806	81.000
29.000	110.390	6.085	4.817	81.400
30.000	111.390	6.062	4.824	81.400
31.000	112.740	6.040	4.834	81.700
32.000	114.090	6.017	4.843	82.100
33.000	114.740	5.995	4.848	81.700
34.000	115.740	5.975	4.854	81.700
35.000	116.390	5.955	4.858	81.400
36.000	117.390	5.935	4.863	81.400
37.000	118.390	5.915	4.867	81.400
38.000	119.390	5.894	4.872	81.400
39.000	120.740	5.873	4.877	81.700
40.000	121.740	5.850	4.880	81.700
41.000	123.440	5.827	4.886	82.400
42.000	124.790	5.804	4.892	82.800
43.000	126.500	5.780	4.906	83.500
44.000	128.550	5.755	4.923	84.600

Eye Position	Target Position	Eye Level	Target Level	Sight Distance Achieved
45.000	130.980	5.738	4.944	86.000
46.000	134.070	5.705	4.996	88.100
47.000	137.000	5.681	4.965	90.000
48.000	138.000	5.657	4.960	90.000
49.000	139.000	5.635	4.956	90.000
50.000	140.000	5.613	4.955	90.000
51.000	141.000	5.592	4.958	90.000
52.000	142.000	5.573	4.960	90.000
53.000	143.000	5.553	4.962	90.000
54.000	144.000	5.535	4.964	90.000
55.000	145.000	5.517	4.966	90.000
56.000	146.000	5.501	4.968	90.000
57.000	147.000	5.485	4.968	90.000
58.000	148.000	5.470	4.968	90.000
59.000	149.000	5.456	4.969	90.000
60.000	150.000	5.442	4.969	90.000
61.000	151.000	5.430	4.968	90.000
62.000	152.000	5.418	4.968	90.000
63.000	153.000	5.407	4.968	90.000
64.000	154.000	5.397	4.968	90.000
65.000	155.000	5.387	4.968	90.000
66.000	156.000	5.379	4.970	90.000
67.000	157.000	5.371	4.973	90.000
68.000	158.000	5.364	4.976	90.000
69.000	159.000	5.358	4.981	90.000

In order to provide a compliant design this would result in areas of land-take, and can be undertaken in two ways:

1) Retain the proposed 90m which by itself is a permitted relaxation under TD 9/93 Clause 3.4 and position the highway boundary to achieve an SSD of 90m, this would require an area of 97m^2 with allowance for maintenance strip/berm, or;
2) Amend the horizontal alignment to provide a one-step relaxation in horizontal curvature coincident with a one-step relaxation in SSD, but would still require greater land take from the Wickes' site compared to the option above.

For a compliant design the additional cost to purchase additional land would need to be agreed with the land owners. Cost to be confirmed.

The environmental benefit with the proposed departure would result in reduced land-take and would allow connection back to the existing Peto Way without the need for further modification to the existing geometry compared to a compliant design.

Proposed Mitigation Measures:

None proposed

Additional Information:

The desirable minimum SSD allows a driver to observe an object 0.26m high and bring the vehicle to a stop with a two second reaction time with a braking force of 0.25g.

In comparison, the highway code assumes a driver reaction time of 0.67 seconds with a braking force of 0.67g as drivers are normally able to stop much more quickly in a response to an emergency. This calculates to a stopping distance of 32.3m in dry conditions, 42.6m in wet conditions (0.45g) and 67.8m in snowy conditions (0.25g).

The minimum available SSD is 81m which is greater than that needed for emergency breaking or during wet or snowy conditions.

The proposed vertical alignment is compliant to 60kph gradients and results in gradients not greater than 2.5% in proximity of the departure location. The risks associated with this departure application are considered to be low.				
List of Supporting Documents and Drawings: Drawing number 1069948-WSP-HSR-LL-DR-CH-0111				
Contact for Information:	Paul Caine	Telephone No: 0121 407 6500		
Requested by:	Name: _____ Position:	Signed: _____ Organisation:	Date: _____	
Authorised by:	Name: _____ Position:	Signed: _____ Organisation:	Date: _____	
Reviewed by:	Name: _____ Position:	Signed: _____ Organisation:	Date: _____	
Approved by:	Name: _____ Position:	Signed: _____ Organisation:	Date: _____	

	Departure from Standard Submission	Departure No.:	0002	Issue No: P01
Scheme Title:	**Lake Lothing Third Crossing**	Scheme Ref No:	**1069948**	

Details of Departure Required:

Non-permitted excessive entry path radius from the northbound Third Crossing mainline alignment to the northern roundabout.

Standard:	TD16/07 Geometric Design of Roundabouts	Clause:	7.56

Location (*Attach drawing(s) as necessary):*

Bascule Bridge arm entry to Northern Roundabout. See drawing 1069948-WSP-HML-LL-DR-CH-0103

Description (*incl. Design Speed*)

TD 16/07 Clause 7.56 states that the entry path radius must be checked for all turning movements and it must not exceed 100m.

The Bascule Bridge mainline alignment has a design speed of 60kph. The entry path radius at this location has been calculated between 105m to 123m and is therefore a departure from standard.

Other Relevant Departures / Relaxations in Locality

Standard:	Clause:	Ref:	Description:
TD9/93	1.24	1069948-WSP-GEN-LL-DF-CH-0003	Non-permitted combination of horizontal alignment and stopping sight distance (SSD) relaxations on the Third Crossing alignment in the northbound direction.
TD9/93	1.26	1069948-WSP-GEN-LL-DF-CH-0011	Non-permitted relaxation to Stopping Sight Distance (SSD) on the immediate approach to the northern roundabout from the Third Crossing mainline

Reason (*as necessary, include added value or cost of compliance, environmental implications or effects, safety implications or effects*):

The departure is necessary due to the existing site constraints. The location of the roundabout has been chosen due to constraints such as existing buildings, nearby railway line and carriageway connections to Rotterdam Road/Denmark Road & Peto Way.

The roundabout has an inscribed circle diameter of 50m and the bascule bridge mainline arm which connects to the roundabout has three entry lanes. This caters for the predicted traffic flows in the design year.

Investigations into other roundabout layouts have been considered. A 55m inscribed circle diameter design was undertaken which lowered the entry path radius to approximately 96.3m and removed the Departure. This layout provided to be unworkable as the tie into the existing Rotterdam Road/Denmark Road roundabout was not possible due to the vertical differences. Furthermore, the larger roundabout would have also affected the alignment of Peto Way and would have required a smaller radius within its alignment.

Reducing the number of entry lanes from three to two from the Bascule Bridge mainline alignment was also considered however this was not sufficient for the predicted traffic capacity required.

Proposed Mitigation Measures:

Additional Information:

The entry path radius has been checked by four engineers in accordance to TD16/07 clause 7.54 which states the construction of the path is a matter of personal judgement and results should be checked by more than one designer for comparison.

Two Departures from Standard have been identified on the Third Crossing mainline alignment on the approach to the northern junction:

1. 1069948-WSP-GEN-LL-DF-CH-0003 Non-permitted combination of horizontal alignment and stopping sight distance (SSD) relaxations on the Third Crossing mainline alignment in the Northbound direction (visibility across the inside of the bend). TD9/93 Clause 1.24.
    - Horizontal curvature between Ch. 45 and Ch. 174.5 is two design speed steps below desirable minimum (135m).
    - Horizontal curvature relaxation is coincident with a relaxation in SSD which is one design speed step below desirable minimum 90m.
    - The departure is required due to the existing constraints of the existing Rotterdam Road/ Denmark Road roundabout, Peto Way land boundary – particularly Wickes and the East Suffolk railway line which has determined the position of the northern roundabout and the connection to/from the Third Crossing.
2. 1069948-WSP-GEN-LL-DF-CH-0011 Non-permitted relaxation to Stopping Sight Distance (SSD) on the immediate approach to the Northern Roundabout from the Third Crossing Mainline. TD9/93 Clause 1.26.
    - The SSD on approach to the Northern Roundabout from the Third Crossing mainline alignment is one design speed step below the desirable minimum (minimum SSD 83.8m).
    - The Departure is necessary due to the position of the proposed Vehicle Restraint system obstructing the SSD on the approach to the give way line (TD9/93). Visibility to the give way line is required in accordance with Figure 8/1 of TD16/07.

List of Supporting Documents and Drawings:

Drawing number 1069948-WSP-HML-LL-DR-CH-0103

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	Departure from Standard Submission	Departure No.:	0003	Issue No: P01
Scheme Title:	**Lake Lothing Third Crossing**	Scheme Ref No:	**1069948**	

Details of Departure Required:

Non-permitted combination of horizontal alignment and stopping sight distance (SSD) relaxations on the Third Crossing mainline alignment in the northbound direction.

Standard:	TD9/93 Highway Link Design	Clause:	1.24

Location (*Attach drawing(s) as necessary):*

Bascule Bridge mainline, Northbound approach to Proposed Northern Roundabout. See drawing 1069948-WSP-HML-LL-DR-CH-0102

Description (*incl. Design Speed*)

TD 9/93 Clause 1.24 states that SSD relaxations of up to 1 design speed step may be coincident with horizontal curvature relaxations of up to 1 design speed step below desirable minimum. All other combinations of relaxations are not permitted and shall be treated as departures from standard.

The Bascule Bridge mainline alignment has a design speed of 60kph and spans over Lake Lothing and the adjacent railway track. The horizontal curvature between Ch.45 and Ch.174.5 is two design speed steps below desirable minimum (135m). This relaxation is coincident with a relaxation in SSD which is one design speed step below desirable minimum (90m) and is therefore a departure from standard.

Other Relevant Departures / Relaxations in Locality

Standard:	Clause:	Ref:	Description:
TD9/93	2.8		Relaxation - Stopping sight distance one step below desirable minimum on the Southbound carriageway on the Bascule Bridge Mainline between Ch. 235 to Ch.240.
TD9/93 TD16/07	1.26 8.3	1069948-WSP-GEN-LL-DF-0011	Departure - Stopping sight distance is one step below desirable minimum on approach to the Proposed Northern Roundabout entry from the Bascule Bridge Mainline.

Reason (*as necessary, include added value or cost of compliance, environmental implications or effects, safety implications or effects*):

The departure is necessary due to the existing Rotterdam Road/Denmark Road roundabout, Peto Way, land boundary – particularly Wickes and the East Suffolk railway line constraints which has resulted in the position of the northern roundabout and the connection to/from the Third Crossing.

The horizontal curvature in the area of the departure has a radius of 135m which is coincident with a relaxation in SSD to a minimum of 82.8m due to the design constraints.

The vertical alignment on the approach to the northern roundabout is compliant to 60kph gradients and consists of a gradient of -6% fall into a 60kph desirable minimum sag radius of 1300m, following which a 15m length of a gradient of -2% is provided. Throughout the 135m radius, the crossfall transitions from 0.25% to 5%.

The combination of relaxations occurs over a short length (circa 40m), and once vehicles reach Ch.190 desirable minimum SSD is achievable. This section is not within the immediate approach to the junction. This is shown on drawing 1069948-WSP-HML-LL-DR-CH-0102 and the accompanying SSD analysis table shown below.

Eye Position	Target Position	Eye Level	Target Level	Sight Distance Achieved
365.000	275.000	13.581	15.193	90.000
360.000	270.000	13.756	15.227	90.000
355.000	265.000	13.931	15.246	90.000
350.000	260.000	14.106	15.250	90.000
345.000	255.000	14.281	15.240	90.000
340.000	250.000	14.453	15.214	90.000
335.000	245.000	14.616	15.174	90.000
330.000	240.000	14.772	15.122	90.000
325.000	235.000	14.924	15.069	90.000
320.000	230.000	15.074	15.015	90.000
315.000	225.000	15.217	14.960	90.000
310.000	220.000	15.349	14.903	90.000
305.000	215.000	15.474	14.845	90.000
300.000	210.000	15.594	14.786	90.000
295.000	205.000	15.702	14.717	90.000
290.000	200.000	15.794	14.633	90.000
285.000	195.000	15.872	14.535	90.000
280.000	190.000	15.935	14.423	90.000
275.000	185.000	15.983	14.296	90.000
270.000	180.000	16.017	14.157	90.000
265.000	175.000	16.036	14.004	90.000
260.000	170.000	16.040	13.838	90.000
255.000	165.000	16.030	13.658	90.000
250.000	160.000	16.004	13.462	90.000
245.000	155.000	15.964	13.252	90.000
240.000	150.000	15.912	13.027	90.000
235.000	146.580	15.859	12.864	88.400
230.000	143.340	15.805	12.704	86.700
225.000	139.750	15.750	12.519	85.300
220.000	135.800	15.693	12.308	84.200
215.000	131.860	15.635	12.096	83.100
210.000	127.210	15.576	11.816	82.800
205.000	121.860	15.507	11.495	83.100
200.000	115.800	15.423	11.132	84.200
195.000	107.990	15.325	10.662	87.000
190.000	100.000	15.213	10.183	90.000
185.000	95.000	15.086	9.881	90.000

The sub-standard SSD is a result of horizontal alignment and the change in carriageway verge/footway cycleway cross fall.

In order to provide a compliant design would result in amending either the vertical or horizontal alignment:

1) Increasing the vertical alignment crest that is located above the rail track from 1700m radius to 2150m radius, or;
2) Increase the horizontal alignment from 135m radius to 180m radius which would constitute as a one step below desirable minimum.

As the horizontal alignment is fixed due to the location of the proposed roundabout, the amendment to the vertical alignment would be the preferred choice.

Suffolk County Council

Lake Lothing THIRD CROSSING

Proposed Mitigation Measures: Potential mitigation measures could be to provide High Friction Surfacing or an increased PSV of the carriageway surface on the 135m radius bend, but this can increase maintenance liability.
Additional Information: The desirable minimum SSD allows a driver to observe an object 0.26m high and bring the vehicle to a stop with a two second reaction time with a braking force of 0.25g. In comparison, the highway code assumes a driver reaction time of 0.67 seconds with a braking force of 0.67g as drivers are normally able to stop much more quickly in a response to an emergency. Gradients also affect the stopping distances with a 10% gradient will decrease the rate by around 0.1g therefore a 6% gradient should decrease the rate by 0.06. This calculates to a stopping distance of 34.4m in dry conditions, 47.5m in wet conditions and 85.7m in snowy conditions. The minimum available SSD is 82.8m which is greater than that needed for emergency breaking or during wet conditions. The minimum available SSD is 2.9m less than that needed for snowy conditions. Full visibility is achieved for an eye to object height of 1.05m to 1.05m and also for HGV's with an eye to object height of 2m to 0.26m and 2m to 1.05. The risks associated with this departure application are considered to be low.
List of Supporting Documents and Drawings: Drawing number 1069948-WSP-HML-LL-DR-CH-0102

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	Departure from Standard Submission	Departure No.:	0004	Issue No: P01
Scheme Title:	**Lake Lothing Third Crossing**	Scheme Ref No:	**1069948**	

Details of Departure Required:

Non-permitted excessive entry path radius from Denmark Road alignment to the Rotterdam Road/Denmark Road roundabout.

Standard:	TD16/07 Geometric Design of Roundabouts	Clause:	7.56

Location (*Attach drawing(s) as necessary):*

Denmark Road arm entry to Smaller Northern Roundabout. See drawing 1069948-WSP-HML-LL-DR-CH-0103.

Description (*incl. Design Speed*)

TD 16/07 Clause 7.56 states that the entry path radius must be checked for all turning movements and it must not exceed 100m.

Denmark Road and the Northern Roundabout has a design speed of 60kph. The entry path radius at this location has been calculated between 90m to 145m and is therefore a departure from standard.

Other Relevant Departures / Relaxations in Locality

Standard:	Clause:	Ref:	Description:
TD16/07	7.56	1069948-WSP-GEN-LL-DF-CH-0005	Non-permitted excessive entry path radius from Rotterdam Road alignment to the Northern Roundabout

Reason (*as necessary, include added value or cost of compliance, environmental implications or effects, safety implications or effects*):

The departure is necessary due to the existing site constraints. The location of the Rotterdam Road/Denmark Road roundabout has been positioned to enable connections to the proposed Northern Roundabout, realigned Denmark Road and Rotterdam Road.

The inscribed circle diameter of the proposed roundabout is 28m and Denmark Road, a single carriageway road, which connects to the roundabout has two entry lanes. This works well with the predicted traffic capacity of the roundabout. The two lanes are also required to enable manoeuvres of larger vehicles.

The existing entry path radius from Denmark Road to the roundabout has been calculated as approximately 215m and is therefore currently considered not comply to DMRB standard. The re-alignment of Denmark Road has improved the entry path radius at this location thus improving overall safety of the junction.

Proposed Mitigation Measures:

Additional Information:

The entry path radius has been checked by four engineers in accordance to TD16/07 clause 7.54 which states the construction of the path is a matter of personal judgement and results should be checked by more than one designer for comparison.

Data taken from crashmap shows there has been one incident at this location within the last 5 years with a slight severity involving two vehicles. This incident is considered to be a one-off and therefore cannot be compared to the existing sub-standard entry path radius. As the horizontal alignment for Denmark Road has been produced to tie in with the existing carriageway, the smallest radius specified is 60m.			
List of Supporting Documents and Drawings: Drawing number 1069948-WSP-HML-LL-DR-CH-0103.			
Contact for Information:	Paul Caine	Telephone No: 0121 407 6500	
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	Departure from Standard Submission	Departure No.:	0005	Issue No: P01
Scheme Title:	**Lake Lothing Third Crossing**	Scheme Ref No:	**1069948**	

Details of Departure Required:

Non-permitted excessive entry path radius from Rotterdam Road alignment to the Rotterdam Road/Denmark Road Roundabout.

Standard:	TD16/07 Geometric Design of Roundabouts	Clause:	7.56

Location (*Attach drawing(s) as necessary):*

Rotterdam Road arm entry to Smaller Northern Roundabout. See drawing 1069948-WSP-HML-LL-DR-CH-0103.

Description (*incl. Design Speed*)

TD 16/07 Clause 7.56 states that the entry path radius must be checked for all turning movements and it must not exceed 100m.

Rotterdam Road has a design speed of 50kph and the Northern Roundabout has a design speed of 60kph. The entry path radius at this location has been calculated between 120m to 150m and is therefore a departure from standard.

Other Relevant Departures / Relaxations in Locality

Standard:	Clause:	Ref:	Description:
TD16/07	7.56	1069948-WSP-GEN-LL-DF-CH-0004	Non-permitted excessive entry path radius from Denmark Road alignment to the Northern Roundabout

Reason (*as necessary, include added value or cost of compliance, environmental implications or effects, safety implications or effects*):

The departure is necessary due to the existing site constraints. The location of the Rotterdam Road/Denmark Road roundabout has been positioned to enable connections to the proposed northern roundabout, Rotterdam Road and realigned Denmark Road.

The inscribed circle diameter of the proposed roundabout is 28m and Rotterdam Road, a single carriageway road, which connects to the roundabout has two entry lanes. This works well with the predicted traffic capacity of the roundabout. The two lanes are also required to enable manoeuvres of larger vehicles.

Investigations into reducing the entry path radius have been considered. It may be feasible to realign Rotterdam Road on the approach to the roundabout to increase the deflection and reduce the entry path radius however this may require increased land take from the adjacent children's playground. For a compliant design the additional cost to purchase additional land would need to be agreed with the land owners. Cost to be confirmed. The environmental benefit with the proposed departure would result in reduced land-take.

The existing entry path radius from Rotterdam Road to the roundabout has been calculated as approximately 170m and is therefore currently considered not comply to DMRB standard. The re-alignment of Rotterdam Road has improved the entry path radius at this location thus improving overall safety of the junction.

Proposed Mitigation Measures:

Suffolk County Council

Lake Lothing THIRD CROSSING

Additional Information: The entry path radius has been checked by four engineers in accordance to TD16/07 clause 7.54 which states the construction of the path is a matter of personal judgement and results should be checked by more than one designer for comparison. As the horizontal alignment for Rotterdam Road has been produced to tie in with the existing carriageway, the smallest centreline radius specified is 100m. Data taken from crashmap shows that there has been no incidents at this location within the past 5 years.				
List of Supporting Documents and Drawings: Drawing number 1069948-WSP-HML-LL-DR-CH-0103.				
Contact for Information:	Paul Caine	Telephone No: 0121 407 6500		
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	Departure from Standard Submission	Departure No.:	0006	Issue No: P01
Scheme Title:	**Lake Lothing Third Crossing**	Scheme Ref No:	**1069948**	

Details of Departure Required:

Non-permitted excessive entry path radius from the southbound Third Crossing mainline alignment to the A12 Lake Lothing Third Crossing southern roundabout.

Standard:	TD16/07 Geometric Design of Roundabouts	Clause:	7.56

Location (*Attach drawing(s) as necessary):*

Bascule Bridge arm entry to Southern Roundabout. See drawing 1069948-WSP-HML-LL-DR-CH-0104.

Description (*incl. Design Speed*)

TD 16/07 Clause 7.56 states that the entry path radius must be checked for all turning movements and it must not exceed 100m.

The Bascule Bridge mainline alignment has a design speed of 60kph. The entry path radius at this location has been calculated between 73m to 115m and is therefore a departure from standard.

Other Relevant Departures / Relaxations in Locality

Standard:	Clause:	Ref:	Description:
TD9/93			Relaxation – Bascule Bridge Mainline: One step below desirable minimum radius between Ch. 343 to Ch. 421

Reason (*as necessary, include added value or cost of compliance, environmental implications or effects, safety implications or effects*):

The departure is necessary due to the existing site constraints. The location of the roundabout has been chosen due to the surrounding constraints such as the residential housing on Durban Road to the south, the Business Park to the west and the Motorlings car showroom to the northeast.

The roundabout has an inscribed circle diameter of 50m and the Third Crossing mainline arm which connects to the roundabout has three entry lanes. This works well with the predicted traffic capacity of the roundabout.

Investigations into other roundabout layouts have been considered. A 55m inscribed circle diameter design was undertaken which lowered the entry path radius to approximately 95.7m and effectively removing the departure. A disadvantage of the larger roundabout includes requiring increased land take from the Business Park & Motorlings. This affected the Motorlings access and resulted in an increased level difference between the proposed carriageway/verge level and the car forecourt when compared to the current design.

Reducing the number of entry lanes from three to two from the Third Crossing mainline alignment was also considered however this was not sufficient for the predicted traffic capacity required.

Additional option(s) of maintaining the connection into Durban Road were also investigated as part of the design development, within the DMRB requirements and the need to minimise the effect on adjacent properties/land owners. During the design development it was acknowledged that there was limited scope within the highway boundary to accommodate the proposed southern roundabout and that additional land would be required. Each option developed was modelled in terms of junction capacity and each were found to be unacceptable in terms of performance in the design year.

The smallest roundabout that was put forward although minimising the effect on Motorlings and the residential property did not work in terms of capacity in the design year. To overcome this issue the size of the roundabout had to increase in size. The option finally developed as part of the Reference Design was therefore a compromise, which minimised the impact on Motorlings and the residential properties to the south, based on land availability (and costs) and the geometric requirements of the DMRB, without the vehicular connection to Durban Road.			
Proposed Mitigation Measures:			
Additional Information: The entry path radius has been checked by four engineers in accordance to TD16/07 clause 7.54 which states the construction of the path is a matter of personal judgement and results should be checked by more than one designer for comparison. The proposed carriageway level of the Southern Roundabout within the current design has a maximum level difference of 0.5m above the car showroom forecourt level. Increasing the inscribed circle diameter will also increase this level difference.			
List of Supporting Documents and Drawings: Drawing number 1069948-WSP-HML-LL-DR-CH-0104			
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	Departure from Standard Submission	Departure No.:	0007	Issue No: P01
Scheme Title:	**Lake Lothing Third Crossing**	Scheme Ref No:	**1069948**	

Details of Departure Required:

Non-standard lane entry width from Waveney Drive Eastbound onto the A12 Lake Lothing Third Crossing southern roundabout.

Standard:	TD16/07 Geometric Design of Roundabouts	Clause:	7.24

Location (*Attach drawing(s) as necessary):*

On entry to the Southern Roundabout from Waveney Drive Eastbound. See drawing 1069948-WSP-HML-LL-DR-CH-0104.

Description (*incl. Design Speed*)

TD 16/07 Clause 7.24 states that lane widths at the give way line (measured along the normal to the nearside kerb, as for entry width) must be not less than 3m or more than 4.5m, with the 4.5m appropriate at single lane entries and values of 3 to 3.5m appropriate at multilane entries.

Waveney Drive has a design speed of 60kph. Two lanes have been provided at the entry to the Southern Roundabout and both lanes exceed the 3.5m width appropriate at multilane entries. This is therefore a departure from standard.

Other Relevant Departures / Relaxations in Locality

Standard:	Clause:	Ref:	Description:

Reason (*as necessary, include added value or cost of compliance, environmental implications or effects, safety implications or effects*):

The departure is necessary to allow a greater capacity for traffic at the southern roundabout entry from Waveney Drive Eastbound which has resulted in the increased entry width.

The two lanes have been widened to 4m each and allows an effective flare length, l', of 34.4m which produced favourable capacity results in the design year with less queue lengths, delays and a RFC figure of 0.92 (RFC figure should be below 1, ideal is 0.85). This is shown in the subsequent table below.

	AM				PM			
	Queue (PCU)	Delay (s)	RFC	LOS	Queue (PCU)	Delay (s)	RFC	LOS
	A1 - 2022 DS							
Riverside Rd	0.86	4.02	0.46	A	0.41	3.06	0.29	A
Waveney Dr WB	1.58	4.98	0.61	A	1.67	4.61	0.63	A
Waveney Dr EB	1.46	5.06	0.59	A	3.98	11.57	0.80	B
	A1 - 2037 DS							
Riverside Rd	1.36	5.30	0.58	A	0.57	3.49	0.36	A
Waveney Dr WB	2.47	7.00	0.71	A	2.29	5.79	0.70	A
Waveney Dr EB	2.14	6.62	0.68	A	10.52	28.92	0.92	D

A design which included 3.5m lane widths and an effective flare length of 26m was modelled. The modelled traffic figures

showed that the junction would theoretically be over capacity in the design year with excessive queue lengths, delays and a RFC of 1.03. After several design iterations it was proven that widening the entry width and subsequently extending the effective flare length of the alignment allowed a greater capacity for traffic.

In order to provide a compliant design would result in an area of land take. The compliant design included a 9m entry width with three 3m wide lanes. Traffic modelling figures showed that this had lowered the queue lengths and delay times and reduced the RFC figure to 0.94. This design however is constrained by the red line boundary which borders the business park. The area required for the footway and earthworks were outside the red line boundary.

For a compliant design the additional cost to purchase additional land would need to be agreed with the land owners. Cost to be confirmed.

The environmental benefit with the proposed departure would result in reduced land-take.

Proposed Mitigation Measures:

Additional Information:

The proposed design is a single carriageway which connects the existing Waveney Drive alignment to the proposed Southern Roundabout. The carriageway has central hatching which reduces the lane width (entry half width, v) to 3m.

To increase capacity further, TD 16/07 section 7.26 states that if flaring is provided, tapered lanes should have a minimum width of 2.5m. This was used to extend the lanes as much as possible without any further widening to increase vehicle capacity.

It must be noted that the wider entry width does not increase the entry path radius over 100m. The entry path radius at this location is approximately 95m.

The risks associated with this departure application are considered to be low.

List of Supporting Documents and Drawings:

Drawing number 1069948-WSP-HML-LL-DR-CH-0104

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	Departure from Standard Submission	Departure No.:	0008	Issue No: P01
Scheme Title:	**Lake Lothing Third Crossing**	Scheme Ref No:	**1069948**	

Details of Departure Required:

Obstruction to visibility on approach to the southern roundabout from Waveney Drive East travelling West.

Standard:	TD9/93 Highway Link Design TD16/07 Geometric Design of Roundabouts	Clause:	TD9: 1.26 TD16: 8.3

Location (*Attach drawing(s) as necessary):*

Waveney Drive East, Westbound approach to Proposed Southern Roundabout. See drawing 1069948-WSP-HSR-LL-DR-CH-0112.

Description (*incl. Design Speed*)

TD 9/93 Clause 1.26 states that relaxations below Desirable Minimum in stopping sight distance and vertical curvature for crest curves and absolute minimum for sag curves are not permitted on the immediate approaches to junctions, because the majority of accidents occur in the vicinity of junctions. Clause 1.26 (b) defines the limit for roundabouts which states for roundabouts, those lengths of carriageway on the approach to the roundabout between a 1.5 times the Desirable Minimum Stopping Sight Distance from the Give Way line and the Give Way line itself.

TD 16/07 Clause 8.3 states Visibility on the approach (Desirable Minimum Stopping Sight Distance for the design speed of the road) must conform to TD 9 (DMRB 6.1.1) with the position of the object at the give way line indicated in Figure 8/1. Chevron signs on the central island must also be visible to approaching drivers in all lanes from a distance equal to the Desirable Minimum Stopping Sight Distance. Chevron signs should not be stacked. If conspicuity of the signs is a problem, yellow backing boards or larger signs should be used. If the approach to the roundabout is over a crest, a higher mounting height may be used.

Waveney Drive roundabout link alignment has a design speed of 50kph.

The visibility on approach to the southern roundabout is one design speed step below the desirable minimum (70m) and is therefore a departure from standards.

Other Relevant Departures / Relaxations in Locality

Standard:	Clause:	Ref:	Description:

Reason (*as necessary, include added value or cost of compliance, environmental implications or effects, safety implications or effects*):

The red line boundary is positioned parallel to the proposed alignment and follows the existing fence line boundary for the majority of the length. This boundary borders unused land reserved for development and a residential property. The visibility splays cross the red line boundary at the location of the access track of the development land. This results in the stopping sight distance reducing to 54m which is one step below the desirable minimum. This occurs over a short length 5m as it approaches the give-way line, before this point desirable minimum SSD is available. This is shown on drawing 1069948-WSP-HSR-LL-DR-CH-0112 and the accompanying SSD analysis table shown below.

Eye Position	Target Position	Eye Level	Target Level	Sight Distance Achieved
0.000	70.000	3.688	3.294	70.000
1.000	71.000	3.688	3.299	70.000
2.000	72.000	3.689	3.306	70.000
3.000	73.000	3.690	3.311	70.000
4.000	74.000	3.692	3.315	70.000
5.000	75.000	3.693	3.319	70.000
6.000	76.000	3.695	3.325	70.000
7.000	77.000	3.698	3.332	70.000
8.000	78.000	3.700	3.338	70.000
9.000	79.000	3.703	3.343	70.000
10.000	80.000	3.705	3.348	70.000
11.000	81.000	3.708	3.354	70.000
12.000	82.000	3.711	3.359	70.000
13.000	83.000	3.714	3.365	70.000
14.000	84.000	3.717	3.368	70.000
15.000	85.000	3.721	3.371	70.000
16.000	86.000	3.724	3.375	70.000
17.000	87.000	3.728	3.378	70.000
18.000	88.000	3.732	3.381	70.000
19.000	89.000	3.736	3.384	70.000
20.000	89.590	3.741	3.387	69.600
21.000	89.770	3.746	3.388	68.800
22.000	89.950	3.750	3.389	67.900
23.000	90.130	3.755	3.390	67.100
24.000	90.310	3.761	3.391	66.300

To note this shortfall only occurs in Lane 1, Lane 2 has desirable minimum visibility for its entire length.

In order to provide a compliant design an additional area of 14sq metres is required from the development site. The additional cost to purchase additional land would need to be agreed with the land owners. Cost to be confirmed.

Proposed Mitigation Measures:

Potential mitigation measures could be to provide High Friction Surfacing or an increased PSV of the carriageway surface on approach to the give way line, but this can increase maintenance liability.

Additional Information:

The proposal is a 7.3m wide dual carriageway that connects the existing Tom Crisp roundabout to the proposed Southern Roundabout. The horizontal alignment consists of a left hand 32m radius on the exit from Tom Crisp roundabout. The alignment then transitions to a 180m radius before ending via a 40m radius on the entrance to the Proposed Southern roundabout. The existing vertical alignment of Waveney Drive is of a shallow gradient. Both horizontal and vertical alignments are considered compliant to TD 9/93.

The alignment has been produced in line with UK DMRB with varying design speeds specific to the alignment/location. If this SSD was to be assessed against the Manual for Streets guidance, the stopping sight distance for a 50kph design speed would be 45m and therefore would not be a Departure from Standards.

The speeds achieved on this section of carriageway are likely to be lower than the design speed, so the risks associated with this departure application are considered to be low.			
List of Supporting Documents and Drawings: Drawing number 1069948-WSP-HSR-LL-DR-CH-0112			
Contact for Information:	Paul Caine	Telephone No: 0121 407 6500	
Requested by:	Name: _____ Position:	Signed: _____ Organisation:	Date: _____
Authorised by:	Name: _____ Position:	Signed: _____ Organisation:	Date: _____
Reviewed by:	Name: _____ Position:	Signed: _____ Organisation:	Date: _____
Approved by:	Name: _____ Position:	Signed: _____ Organisation:	Date: _____

	Departure from Standard Submission	Departure No.:	0009	Issue No: P01
Scheme Title:	**Lake Lothing Third Crossing**	Scheme Ref No:	**1069948**	

Details of Departure Required:

Short gaps between two separate safety barrier/parapet installations

Standard:	TD19/06 Requirement For Road Restraint Systems	Clause:	3.107

Location (*Attach drawing(s) as necessary):*

At the lifting section of the proposed bascule bridge over Lake Lothing.

Description (*incl. Design Speed*)

The proposed design is a single lane crossing over a large saltwater lake known as Lake Lothing. To provide access for maritime vessels to pass, the crossing incorporates a bascule bridge that can be raised and lowered when required. To allow for the movement of the bridge, the proposed vehicle restraint system along the crossing, contains breaks at certain points.

The proposed arrangement does not comply with the requirements of TD19/06, which stipulates that a short gap of less than 50m between two separate safety barrier systems should be avoided, as the terminal section of a safety barrier presents more of a hazard to vehicles than the length of full height safety barrier used to close the gap.

Other Relevant Departures / Relaxations in Locality

Standard:	Clause:	Ref:	Description:

Reason (*as necessary, include added value or cost of compliance, environmental implications or effects, safety implications or effects*):

To provide a continuous barrier system would require omitting the bascule bridge from the design, and raising the crossing so maritime vessels can pass underneath. This proposal would bear a significantly cost and would have a substantial visual impact on the local area.

Proposed Mitigation Measures:

Additional Information:

List of Supporting Documents and Drawings:

Drawing number

Contact for Information:		Telephone No:		
Requested by:	Name: _____ Position:	Signed: _____ Organisation:		Date: _____
Authorised by:	Name: _____ Position:	Signed: _____ Organisation:		Date: _____

Reviewed by:	Name:		Signed:		Date:
	Position:		Organisation:		
Approved by:	Name:		Signed:		Date:
	Position:		Organisation:		

	Departure from Standard Submission	Departure No.:	0010	Issue No: P01
Scheme Title:	**Lake Lothing Third Crossing**	Scheme Ref No:	**1069948**	

Details of Departure Required:

Short gaps between two separate safety barrier/parapet installations adjacent to the Control Tower

Standard:	TD19/06 Requirement For Road Restraint Systems	Clause:	3.15

Location (*Attach drawing(s) as necessary):*

Control Tower in the Southwest

Description (*incl. Design Speed*)

The proposed design is a single lane crossing over a large saltwater lake known as Lake Lothing. To provide access to the Control Tower that is located adjacent to the crossing in the southwest, a gap is required in the proposed Vehicle Restraint System.

The proposed arrangement does not comply with the requirements of TD19/06, which stipulates where new safety barriers are required and gaps of 50 m or less arise between two separate safety barrier installations, where practicable, the gap must be closed and the safety barrier made continuous. However TD19/06 continues and Clause 3.107 states a short gap is permissible in the safety barrier to provide access.

Other Relevant Departures / Relaxations in Locality

Standard:	Clause:	Ref:	Description:

Reason (*as necessary, include added value or cost of compliance, environmental implications or effects, safety implications or effects*):

A break is required in the vehicle restraint system to provide access for the Control Tower locate adjacent to crossing in the Southwest.

Proposed Mitigation Measures:

Additional Information:

List of Supporting Documents and Drawings:

Drawing number

Contact for Information:	Telephone No:		
Requested by:	Name: _____ Position:	Signed: _____ Organisation:	Date: _____
Authorised by:	Name: _____ Position:	Signed: _____ Organisation:	Date: _____
Reviewed by:	Name: _____	Signed: _____	Date: _____

	Position:		Organisation:		
Approved by:	Name:		Signed:	Date:	
	Position:		Organisation:		

	Departure from Standard Submission	Departure No.:	0011	Issue No: P01
Scheme Title:	**Lake Lothing Third Crossing**	Scheme Ref No:	**1069948**	

Details of Departure Required:

Non-permitted relaxation to stopping sight distance (SSD) on the immediate approach to the Northern Roundabout from the Third Crossing Mainline.

Standard:	TD9/93 Highway Link Design	Clause:	1.26

Location (*Attach drawing(s) as necessary):*

Bascule Bridge mainline, Northbound approach to Proposed Northern Roundabout. See drawing 1069948-WSP-HML-LL-DR-CH-0102.

Description (*incl. Design Speed*)

TD 9/93 Clause 1.26 states that relaxations below Desirable Minimum in stopping sight distance and vertical curvature for crest curves and absolute minimum for sag curves are not permitted on the immediate approaches to junctions, because the majority of accidents occur in the vicinity of junctions. Clause 1.26 (b) defines the limit for roundabouts which states for roundabouts, those lengths of carriageway on the approach to the roundabout between a 1.5 times the Desirable Minimum Stopping Sight Distance from the Give Way line and the Give Way line itself.

The Bascule Bridge mainline alignment has a design speed of 60kph and spans over Lake Lothing and the adjacent railway track. The visibility on the immediate approach to the northern roundabout is one design speed step below desirable minimum (90m) and therefore a departure from standard.

Other Relevant Departures / Relaxations in Locality

Standard:	Clause:	Ref:	Description:
TD9/93	2.8		Relaxation - Stopping sight distance one step below desirable minimum on the Southbound carriageway on the Bascule Bridge Mainline between Ch. 235 to Ch.240.
TD9/93	1.24	1069948-WSP-GEN-LL-DF-0003	Departure – Non-permitted combination of horizontal alignment and SSD relaxations on the Bascule Bridge alignment in the Northbound direction.

Reason (*as necessary, include added value or cost of compliance, environmental implications or effects, safety implications or effects*):

The safety barrier is positioned parallel to the proposed alignment and protects errant vehicles from accessing the embankment as traffic travels from the Third Crossing mainline to the northern roundabout. The visibility splays cross the alignment of the safety barrier within the immediate approach to the roundabout. This results in the stopping sight distance reducing to a minimum of 83.8m which is one step below the desirable minimum. This occurs over a length 70m as it approaches the give-way line, before this point desirable minimum SSD is available. This is shown on drawing 1069948-WSP-HSR-LL-DR-CH-0102 and the accompanying SSD analysis table shown below.

Eye Position	Target Position	Eye Level	Target Level	Sight Distance Achieved
175.000	85.000	14.786	9.180	90.000
170.000	80.000	14.618	8.867	90.000
165.000	75.000	14.435	8.553	90.000
160.000	70.530	14.236	8.271	89.500
155.000	66.230	14.023	8.005	88.800
150.000	62.290	13.794	7.772	87.700
145.000	58.340	13.550	7.549	86.700
140.000	54.040	13.290	7.320	86.000
135.000	50.100	13.016	7.121	84.900
130.000	45.800	12.728	6.921	84.200
125.000	41.150	12.423	6.720	83.800
120.000	36.150	12.119	6.521	83.800
115.000	31.150	11.814	6.342	83.800
110.000	25.800	11.509	6.172	84.200
105.000	20.450	11.204	6.023	84.600
100.000	15.100	10.900	5.896	84.900
95.000	9.750	10.591	5.853	85.300
90.000	5.800	10.282	5.951	84.200

In order to provide a compliant design the verge would need to be widened and the safety barrier to be set back from the kerb line by approximately 1.8m to enable full 90m SSD to the give way line of the northern roundabout.

The repositioned safety barrier and subsequent earthworks will not require and additional land outside of the Red Line boundary.

Proposed Mitigation Measures:

Potential mitigation measures could be to provide High Friction Surfacing or an increased PSV of the carriageway surface on approach to the give way line, but this can increase maintenance liability.

Additional Information:

Full 90m SSD is achievable in accordance to TD16/07 Figure 8/1.

The desirable minimum SSD allows a driver to observe an object 0.26m high and bring the vehicle to a stop with a two second reaction time with a braking force of 0.25g.

In comparison, the highway code assumes a driver reaction time of 0.67 seconds with a braking force of 0.67g as drivers are normally able to stop much more quickly in a response to an emergency. Gradients also affect the stopping distances with a 10% gradient will decrease the rate by around 0.1g therefore a 6% gradient should decrease the rate by 0.06. This calculates to a stopping distance of 34.4m in dry conditions, 47.5m in wet conditions and 85.7m in snowy conditions.

The minimum available SSD is 83.8m which is greater than that needed for emergency breaking or during wet conditions. The minimum available SSD is 1.9m less than that needed for snowy conditions.

Visibility is also obstructed for an eye to object height of 1.05m to 1.05m and also for HGV's with an eye to object height of 2m to 0.26m and 2m to 1.05 where the length of the reduced SSD is shorter for the latter. The eye to object height of 2m to 0.26m has an obstructed length of 60m and full visibility can be achieved at Ch.95. The eye to object height of 2m to 1.05m has an obstructed length of 35m with minimal available SSD reduced to 84.2m and full visibility can be achieved at Ch. 120.

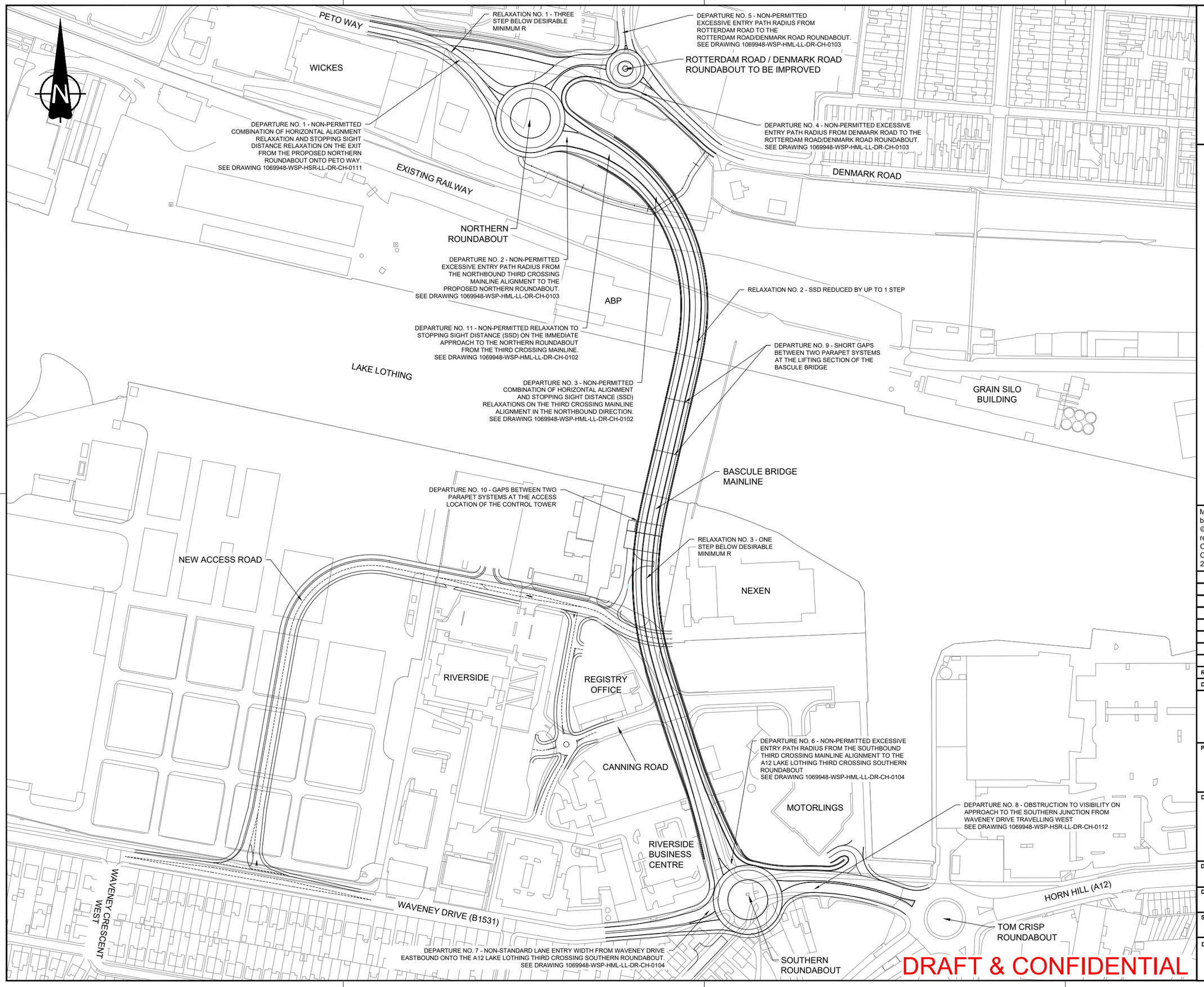
The risks associated with this departure application are considered to be low.

List of Supporting Documents and Drawings:

Drawing number 1069948-WSP-HML-LL-DR-CH-0102

Contact for Information:	Paul Caine	Telephone No: 0121 407 6500		
Requested by:	Name: _____ Position:	Signed: _____ Organisation:		Date: _____
Authorised by:	Name: _____ Position:	Signed: _____ Organisation:		Date: _____
Reviewed by:	Name: _____ Position:	Signed: _____ Organisation:		Date: _____
Approved by:	Name: _____ Position:	Signed: _____ Organisation:		Date: _____

APPENDIX C – DRAWINGS



KEY

NOTES

1. DESIGN AND LOCATION OF ELEMENTS OF THE SCHEME SHOWN HERE FOR ILLUSTRATIVE PURPOSES ONLY.

REVISION	DRAWN	CHECKED	APPROVED	DATE

DESCRIPTION

Suffolk County Council

PROJECT TITLE

Lake Lothing THIRD CROSSING

DRAWING TITLE

DEPARTURE & RELAXATION OVERVIEW DRAWING

DRAWING STATUS

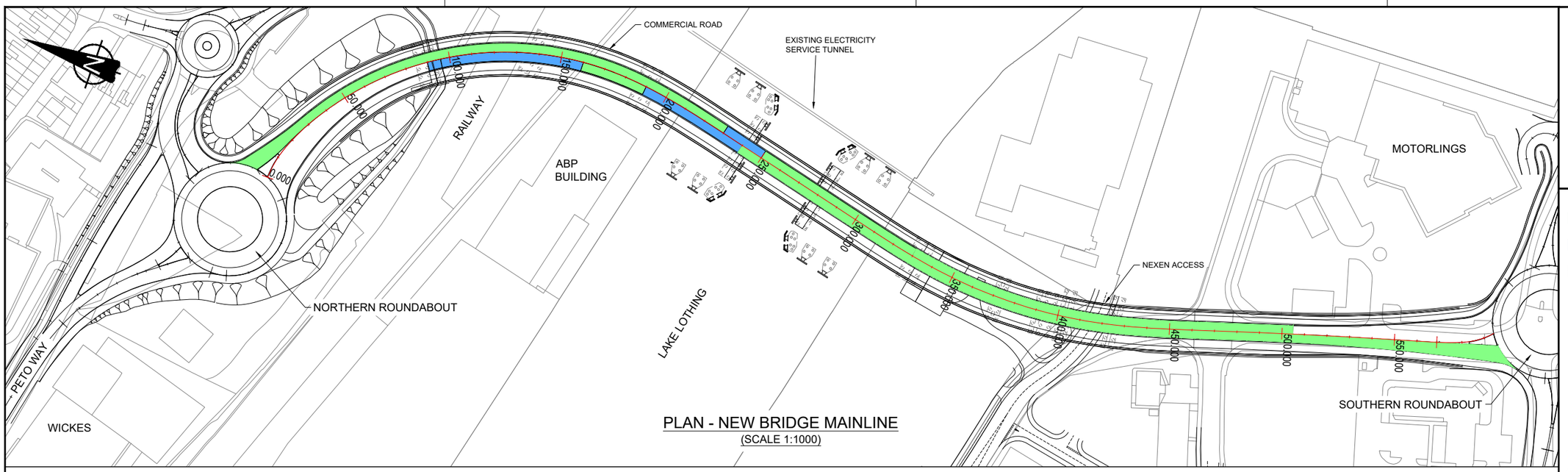
WORK IN PROGRESS

DRAWN	CHECKED	APPROVED	AUTHORISED	SUITABILITY
GA	JC/DM			S0

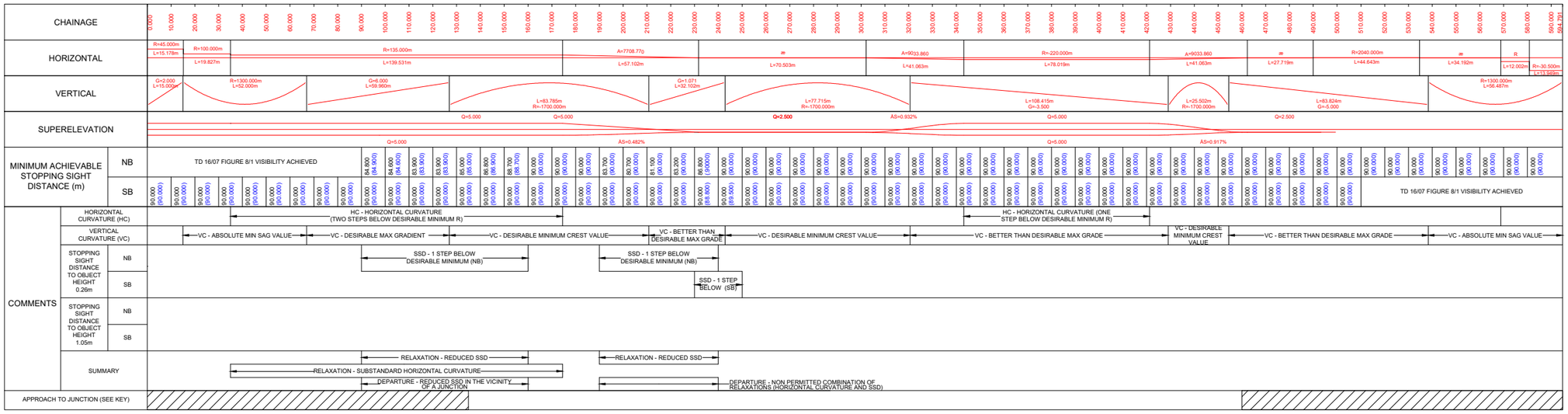
SCALE @ A1 SIZE	DATE	REVISION
1:1250	23/04/18	P01

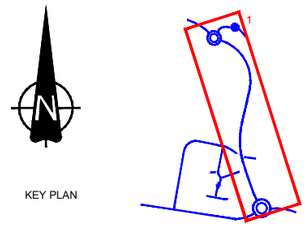
DRAWING NUMBER

Project	Originator	Volume	Location	Type	Role	Number
1069948	WSP	GEN	LL	DR	CH	0103



PLAN - NEW BRIDGE MAINLINE
(SCALE 1:1000)





KEY

- INDICATES AREA WHERE DESIRABLE MINIMUM SSD IS ACHIEVED
- INDICATES AREA WHERE VISIBILITY IS REDUCED BY UP TO 1 STEP
- INDICATES THE IMMEDIATE APPROACH TO A JUNCTION AS DEFINED IN TD9/93 CLAUSE 1.26

NOTES

1. DO NOT SCALE FROM THIS DRAWING.
2. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE STATED.
3. STOPPING SIGHT DISTANCE (SSD) HAS BEEN ASSESSED USING BOTH HORIZONTAL AND VERTICAL ALIGNMENTS FOR 60KPH DESIGN SPEED, WITH THE DRIVER EYE HEIGHT OF 1.05m
   - SSD ACHIEVED TO 0.26m OBJECT HEIGHT SHOWN XXX
   - SSD ACHIEVE TO 1.05m OBJECT HEIGHT SHOWN (XXX)
4. STOPPING SIGHT DISTANCES SHOWN ARE THE AVERAGE BETWEEN EACH OF THE CHAINAGES GIVEN
5. FOR PLAN AND PROFILE REFER TO ENGINEERING SECTION DRAWING 1069948-WSP-HML-LL-DR-CH-0101.

REVISION	DRAWN	CHECKED	APPROVED	DATE

DESCRIPTION

Suffolk County Council

PROJECT TITLE

Lake Lothing THIRD CROSSING

DRAWING TITLE

BASCULE BRIDGE MAINLINE GEOMETRY ANALYSIS

DRAWING STATUS

WORK IN PROGRESS

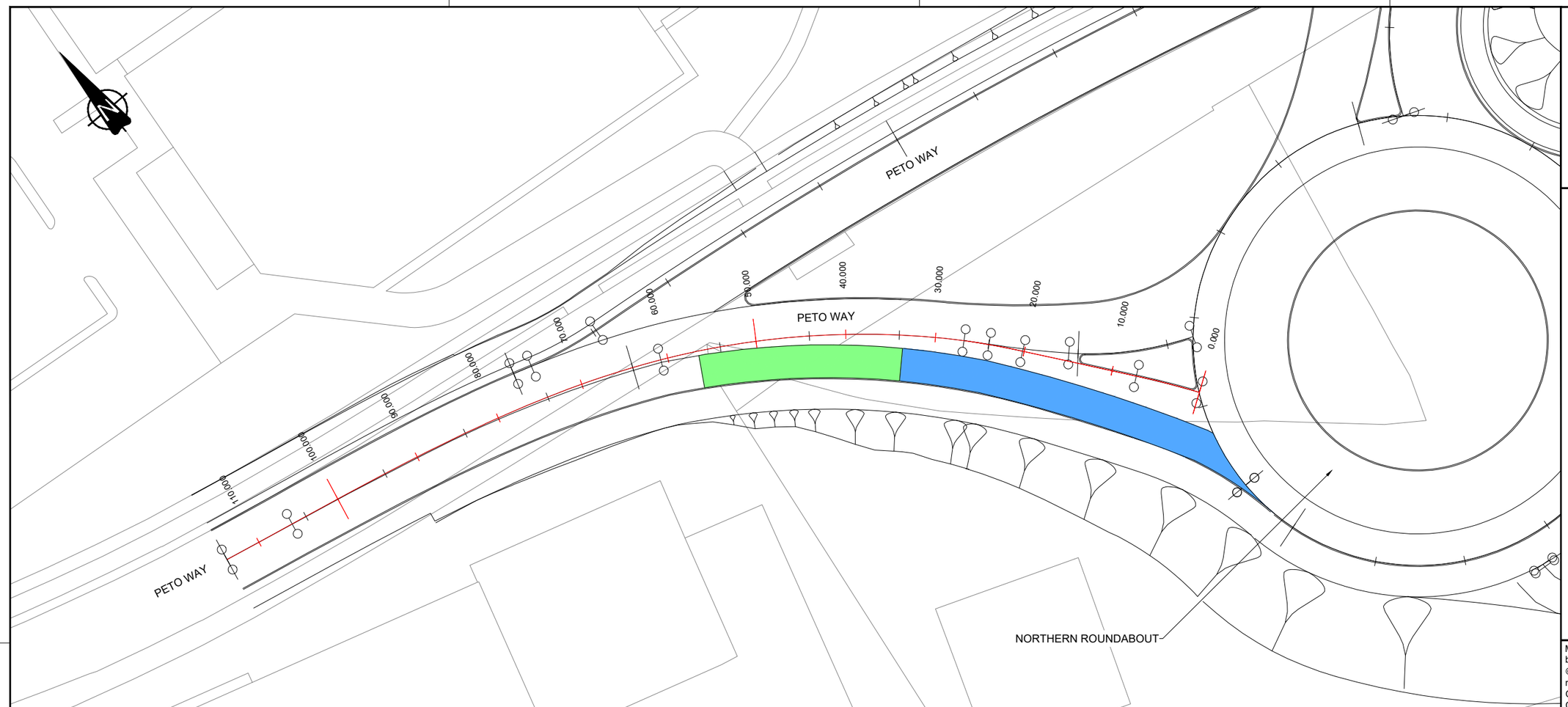
DRAWN	CHECKED	APPROVED	AUTHORISED	SUITABILITY
ES	JC/DM	XX	XX	S0

SCALE @ A1 SIZE	DATE	REVISION
AS SHOWN	14/03/18	P01

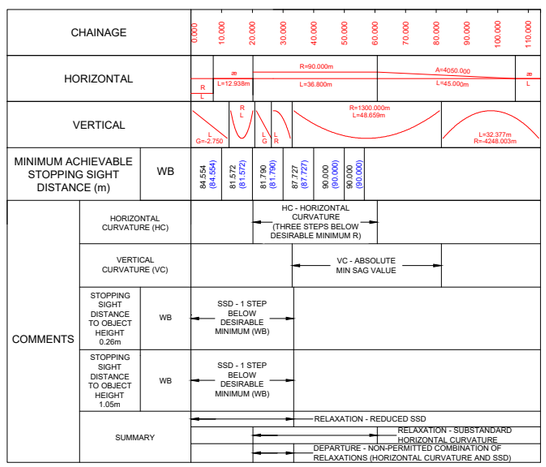
DRAWING NUMBER

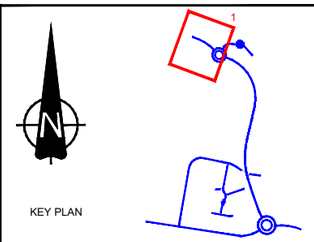
Project	Originator	Volume		
1069948	WSP	HML	LL-DR-CH	0102
Location	Type	Role	Number	

DRAFT & CONFIDENTIAL



PLAN - PETO WAY
(SCALE 1:250)





KEY

INDICATES AREA WHERE DESIRABLE MINIMUM SSD IS ACHIEVED

INDICATES AREA WHERE VISIBILITY IS REDUCED BY UP TO 1 STEP

NOTES

1. DO NOT SCALE FROM THIS DRAWING.
2. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE STATED.
3. STOPPING SIGHT DISTANCE (SSD) HAS BEEN ASSESSED USING BOTH HORIZONTAL AND VERTICAL ALIGNMENTS FOR 60kPh DESIGN SPEED, WITH THE DRIVER EYE HEIGHT OF 1.05m
   - SSD ACHIEVED TO 0.26m OBJECT HEIGHT SHOWN XXX
   - SSD ACHIEVE TO 1.05m OBJECT HEIGHT SHOWN (XXX)
4. STOPPING SIGHT DISTANCES SHOWN ARE THE AVERAGE BETWEEN EACH OF THE CHAINAGES GIVEN
5. FOR PLAN AND PROFILE REFER TO ENGINEERING SECTION DRAWING 1069948-WSP-HSR-LL-DR-CH-0101.

REVISION	DRAWN	CHECKED	APPROVED	DATE

DESCRIPTION

Suffolk County Council

PROJECT TITLE

Lake Lothing THIRD CROSSING

DRAWING TITLE

PETO WAY GEOMETRY ANALYSIS

DRAWING STATUS

WORK IN PROGRESS

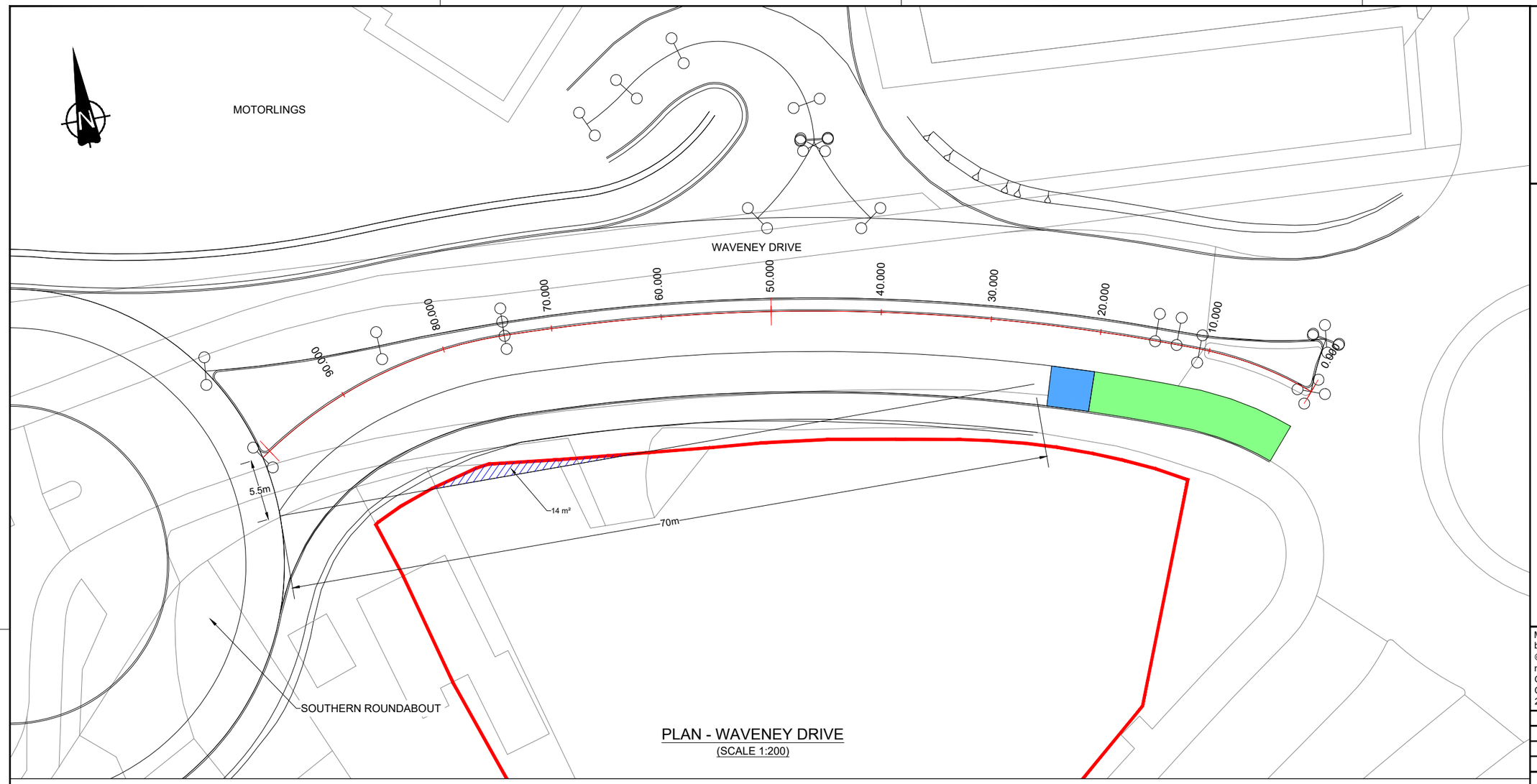
DRAWN	CHECKED	APPROVED	AUTHORISED	SUITABILITY
ES	JC/DM	XX	XX	S0

SCALE @ A1 SIZE	DATE	REVISION
AS SHOWN	19/03/18	P01

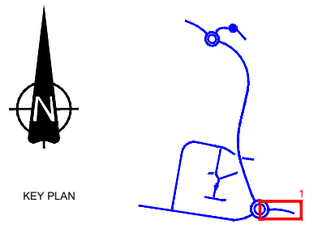
DRAWING NUMBER

Project	Originator	Volume	Location	Type	Role	Number
1069948	WSP	HSR	LL	DR	CH	0111

DRAFT & CONFIDENTIAL



PLAN - WAVENEY DRIVE
(SCALE 1:200)



KEY

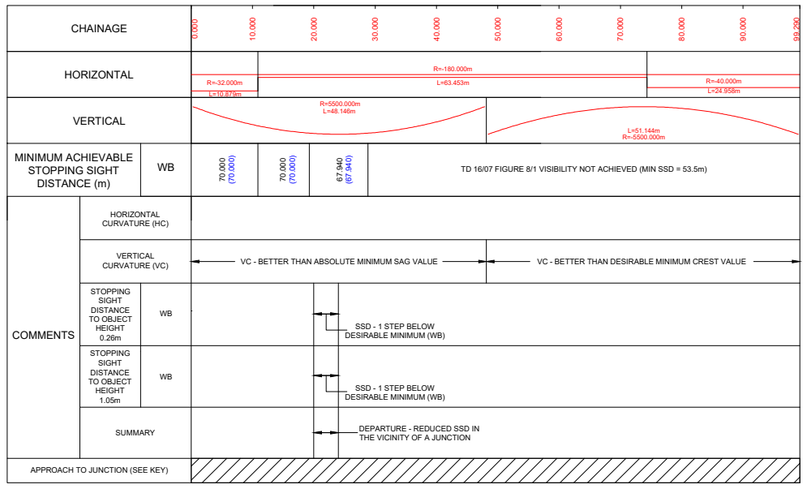
- INDICATES AREA WHERE DESIRABLE MINIMUM SSD IS ACHIEVED
- INDICATES AREA WHERE VISIBILITY IS REDUCED BY UP TO 1 STEP
- INDICATES THE IMMEDIATE APPROACH TO A JUNCTION AS DEFINED IN TD9/93 CLAUSE 1.26
- RED LINE BOUNDARY

NOTES

1. DO NOT SCALE FROM THIS DRAWING.
2. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE STATED.
3. STOPPING SIGHT DISTANCE (SSD) HAS BEEN ASSESSED USING BOTH HORIZONTAL AND VERTICAL ALIGNMENTS FOR 60KPH DESIGN SPEED, WITH THE DRIVER EYE HEIGHT OF 1.05m
   - SSD ACHIEVED TO 0.26m OBJECT HEIGHT SHOWN XXX
   - SSD ACHIEVE TO 1.05m OBJECT HEIGHT SHOWN (XXX)
4. STOPPING SIGHT DISTANCES SHOWN ARE THE AVERAGE BETWEEN EACH OF THE CHAINAGES GIVEN
5. FOR PLAN AND PROFILE REFER TO ENGINEERING SECTION DRAWING 1069948-WSP-HSR-LL-DR-CH-0110.

REVISION	DRAWN	CHECKED	APPROVED	DATE

DESCRIPTION



Suffolk County Council

PROJECT TITLE

Lake Lothing THIRD CROSSING

DRAWING TITLE

WAVENEY DRIVE GEOMETRY ANALYSIS

DRAWING STATUS

WORK IN PROGRESS

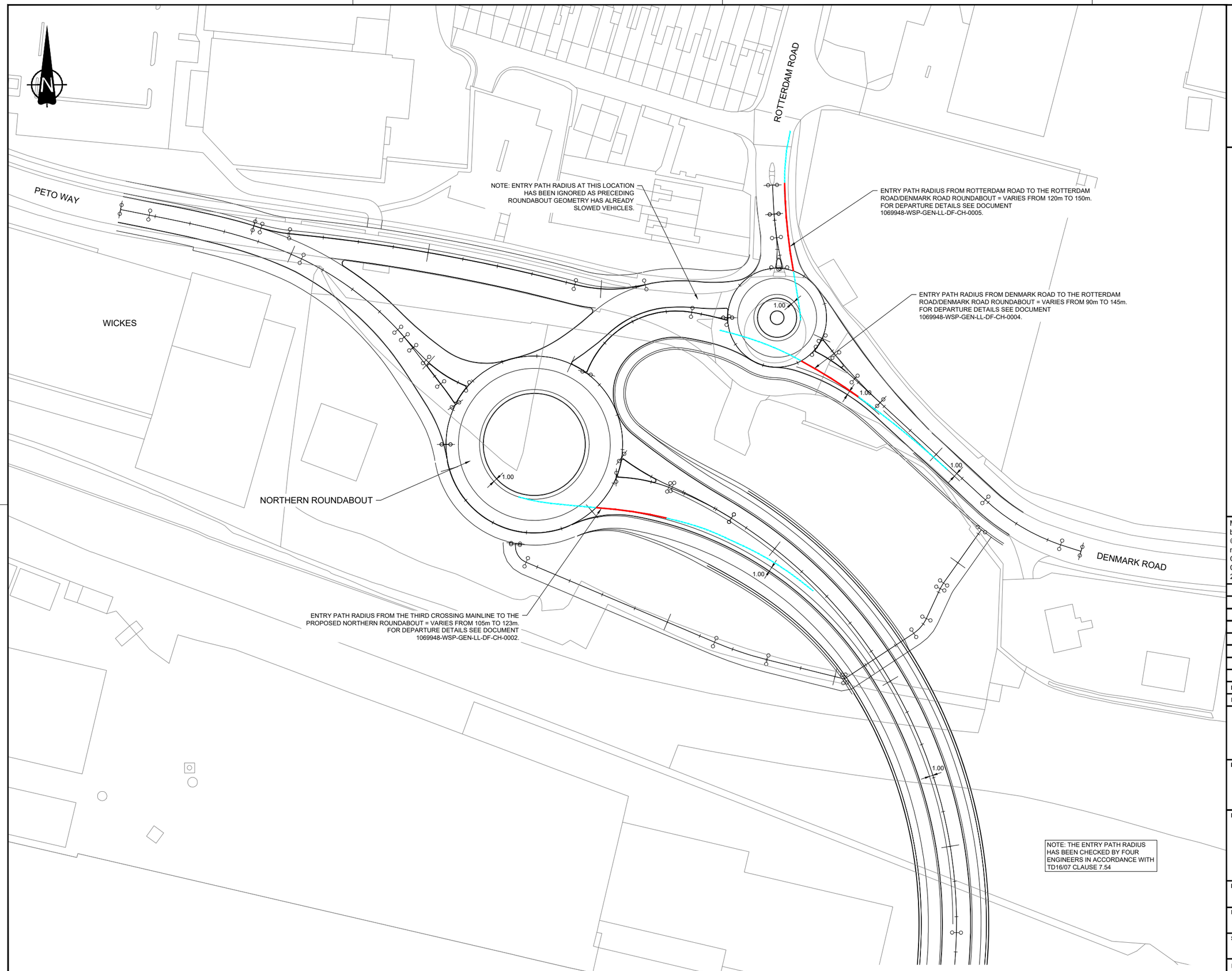
DRAWN	CHECKED	APPROVED	AUTHORISED	SUITABILITY
ES	JC/DM	XX	XX	S0

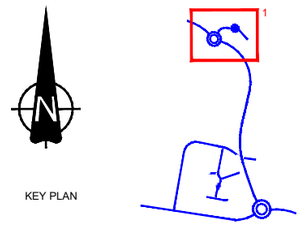
SCALE @ A1 SIZE	DATE	REVISION
AS SHOWN	23/03/18	P01

DRAWING NUMBER

Project | Originator | Volume
1069948-WSP-HSR-LL-DR-CH-0112
Location | Type | Role | Number

DRAFT & CONFIDENTIAL





KEY

ENTRY PATH RADIUS NOT TO STANDARD

ENTRY PATH

NOTES

1. DO NOT SCALE FROM THIS DRAWING.
2. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE STATED.

REVISION	DRAWN	CHECKED	APPROVED	DATE

DESCRIPTION

Suffolk County Council

PROJECT TITLE

Lake Lothing THIRD CROSSING

DRAWING TITLE

NORTHERN ROUNDABOUT
ENTRY PATH RADIUS

DRAWING STATUS

WORK IN PROGRESS

DRAWN	CHECKED	APPROVED	AUTHORISED	SUITABILITY
ES	JC/DM	XX	XX	S0

SCALE @ A1 SIZE	DATE	REVISION
1:500	03/05/18	P01

DRAWING NUMBER

Project	Originator	Volume		
1069948	WSP	HML	LL	DR-CH-0103
Location	Type	Role	Number	

CANNING ROAD

BASCULE BRIDGE MAINLINE

MOTORLINGS

ENTRY PATH RADIUS FROM THE THIRD CROSSING MAINLINE TO THE PROPOSED SOUTHERN ROUNDABOUT = VARIES FROM 73m TO 115m. FOR DEPARTURE DETAILS SEE DOCUMENT 1069948-WSP-GEN-LL-DF-0006.

1.00

1.00

1.00

NON-STANDARD LANE ENTRY WIDTH FROM WAVENEY DRIVE EASTBOUND TO THE PROPOSED SOUTHERN ROUNDABOUT. FOR DEPARTURE DETAILS SEE DOCUMENT 1069948-WSP-GEN-LL-DF-0007.

8.00

WAVENEY DRIVE (B1531)

WAVENEY DRIVE (B1531)

SOUTHERN ROUNDABOUT

DURBAN ROAD

TOM CRISP WAY (A12)

NOTE: THE ENTRY PATH RADIUS HAS BEEN CHECKED BY FOUR ENGINEERS IN ACCORDANCE WITH TD16/07 CLAUSE 7.54

DRAFT AND CONFIDENTIAL

KEY PLAN

KEY

ENTRY PATH RADIUS NOT TO STANDARD

ENTRY PATH

NOTES

1. DO NOT SCALE FROM THIS DRAWING.
2. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE STATED.

REVISION	DRAWN	CHECKED	APPROVED	DATE

DESCRIPTION

Suffolk County Council

PROJECT TITLE

Lake Lothing THIRD CROSSING

DRAWING TITLE

SOUTHERN JUNCTION ROUNDABOUT
ENTRY PATH RADIUS
AND ENTRY WIDTH

DRAWING STATUS

WORK IN PROGRESS

DRAWN	CHECKED	APPROVED	AUTHORISED	SUITABILITY
ES	JC/DM	XX	XX	S0

SCALE @ A1 SIZE	DATE	REVISION
1:500	03/05/18	P01

DRAWING NUMBER

Project | Originator | Volume

1069948-WSP-HML-LL-DR-CH-0104

Location | Type | Role | Number