

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

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Lake Lothing  
**THIRD  
CROSSING**

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## **Document SCC/LLTC/EX/168: Environmental Statement Volume 3 Appendix 18B**

### **Drainage Strategy and Plans**

### **Revision 3**

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**Planning Act 2008**

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

**The Infrastructure Planning (Examination Procedure) Rule 2010**

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<b>CONTENTS</b>		<b>PAGE No.</b>
<b>Tables</b> .....		<b>iv</b>
<b>Introduction</b> .....		<b>1</b>
1.1 Purpose of the Drainage Strategy .....		1
1.2 Proposed Design Parameters .....		1
1.3 Design Standards to be adopted .....		1
<b>2 Drainage Strategy</b> .....		<b>2</b>
2.1 Drainage Design .....		2
2.2 The New Bridge Deck .....		3
2.3 The Carriageway North of the New Bridge .....		3
2.4 The Carriageway South of the New Bridge .....		3
2.5 The New Access Road .....		4
2.6 Footway/Cycleways .....		5
2.7 Construction Details .....		5
<b>Appendix A - Drawings</b> .....		<b>6</b>

## Tables

Table 1 - Proposed attenuation volumes/outfalls/discharge rates<sup>1</sup>.....2

## Introduction

### 1.1 Purpose of the Drainage Strategy

1.1.1 This document sets out the drainage strategy to be adopted for the Scheme. It sets the framework for the design and build contractor to undertake the detailed design of the drainage for the Scheme.

### 1.2 Proposed Design Parameters

1.2.1 The following design parameters for return periods for drainage from the Scheme must be adopted in the detailed design unless otherwise agreed with the County Planning Authority:

- 1 in 100 years and a 12 hour storm duration for sizing of the storage facilities (84.2mm) to account for the event of the tidal barrier creating a tidal lock preventing drainage discharge into Lake Lothing;
- 1 in 100 years and a 6 hour storm duration for sizing of the pipe networks and storage facilities (63mm);
- 1 in 1 year design period without surcharge; and
- 1 in 5 years without surcharge up to chamber cover level – i.e. no flooding.

1.2.2 The Design will take into account the effects of climate change +40% to account for the increase in peak rainfall intensity – for the run-off from the new highway only.

### 1.3 Design Standards to be adopted

1.3.1 The following Design Standards will be used in developing the drainage strategy into a detailed design:

- Design Manual for Roads and Bridges – Volume 4 Section 2 based on HD33/16 and HD45/09;
- Sewers for Adoption 7th Edition 2012;
- Flood Estimation Handbook; and
- Suffolk County Council Specification for Estate Roads 2007.

## 2 Drainage Strategy

### 2.1 Drainage Design

2.1.1 The document has been split into the following 4 sections, with a brief description of the drainage works:

- The new bridge deck;
- The carriageway north of the new bridge;
- The carriageway south of the new bridge; and
- The New Access Road

2.1.2 The drainage strategy identified in this document is depicted on the drawings Nos. 1069948-WSP-HDG-LL-DR-CD-0001, 0002, 0003 and 0004 included in Appendix A, and identifies the areas of carriageway discharging to either the north or south of the new bridge.

2.1.3 The drainage design ultimately discharges into the Anglian Water network at the agreed discharge rate set out in Table 1 below using a flow control device. Anglian Water has undertaken a detailed assessment and have confirmed that the agreed outfalls have enough capacity to cope with the additional runoff generated by the scheme as shown in Table 1 below. Additional storage has been provided within the proposed drainage design system for the 'High Tide event' (tide lock in).

Outfall (AW Reference)	Outfall (Drawing Reference)	Eastern	Northing	Catchment Areas (m <sup>2</sup> )	Predeveloped Site Discharge rate (l/s)	Proposed Discharge rate (l/s)	Betterment (%)	Attenuation Volume required 12hr - 100year + 40%CC	Attenuation Volume provided 12hr - 100year + 40%CC	Comments
MH-9951S	O1	653910	292973	11439	159.0	65.0	59%	1312	1332	An initial interception of 5mm and a runoff coefficient of 0.6 has been considered for the permeable areas
New chamber	O2	653900	292652	2469	34.3	10.0	71%	286	288	Outfall beside Nexen Attenuation Tank
MH-9954S	O3	653914	292574	5359	74.5	25.0	66%	630	619*	* 11m <sup>3</sup> extra provided by chambers

Table 1 - Proposed attenuation volumes/outfalls/discharge rates<sup>1</sup>

2.1.4 In addition, a non-return flap valve shall be fitted to the discharge point if one is not already fitted.

2.1.5 Vegetated systems will be used to provide storage and a significant degree of treatment of highway runoff and protection to receiving waters. The appropriate vegetation will be designed according to the water level and water supply in line with the requirements of the detailed design, taking into account its integration into the landscape. When the use of vegetated systems is not practical, such as lack of space, appropriate pollution control will be provided to improve the quality of surface water runoff from the carriageway.

1. A runoff coefficient of 0.6 has been introduced to consider the landscaping area surrounding the detention basins

## 2.2 The New Bridge Deck

2.2.1 Drainage of the carriageway will be accomplished through a combination of the crossfall on the highway which will drain water laterally towards the kerb line, and the vertical profile of the deck which will drain water longitudinally from the lifting section on to the adjacent fixed spans. The lifting section of the new bridge will not feature any positive drainage as reliable pipework connections between the lifting section and the static crossing sections cannot be achieved. Provision will be made to collect the run-off that does not flow over the joints via a grating in the kerb line which will discharge into the positive drainage systems provided as part of the fixed sections of the crossing each side of the lifting section.

## 2.3 The Carriageway North of the New Bridge

2.3.1 The segregated footway/cycleway, combined footway/cycleway and strip for street furniture to each side of the bascule bridge will drain towards the carriageway.

2.3.2 Run off from the carriageway including the moveable bridge deck will be collected by a combined kerb drainage system for the majority of the crossing as far as the northern junction.

2.3.3 The run-off from the main carriageway and associated footways/cycleways will discharge into a suitably sized pond(s)/storage facility(ies), before it is discharged into the existing Anglian Water system in Peto Way/Denmark Road. A flow control device will be incorporated into the layout to restrict the discharge to a rate agreed with Anglian Water. The existing system will need take into account for the effects of climate change on the network, but only for the area of new highway.

2.3.4 A separate system with another pond facility will be provided between Denmark Road and the new bridge to store run-off from the Rotterdam Road area prior to discharge into the existing Anglian Water system in Peto Way/Denmark Road. A flow control device will be incorporated into the layout to restrict the discharge to a rate agreed with Anglian Water. The existing system will need take into account the effects of Climate change on the network, but only for the area of new carriageway.

2.3.5 The individual ponds will be lined to prevent any historic ground contamination from polluting the water within the ponds themselves, and will be planted to remove hydrocarbons, soluble metals and other sediment bound pollutants from the road drainage. It is anticipated that the junction area itself and the surrounding area will be served by a conventional kerb and gully/manhole and piped system before the run-off is discharged into the drainage pond(s)/storage facilities.

2.3.6 Penstocks and oil interceptors (or equipment of similar performance) shall be incorporated into the outfall design to enable the system to be closed down following an accidental spillage on the network.

## 2.4 The Carriageway South of the New Bridge

2.4.1 The segregated footway/cycleway, combined footway/cycleway and strip for street furniture each side of the crossing will drain to the carriageway.

- 2.4.2 Run off from the carriageway including the bridge deck will be collected by a combined kerb drainage system for the majority of the new bridge south towards the southern junction.
- 2.4.3 The run-off from the main carriageway and associated footways and combined footway/cycleway will be discharged at two separate locations:
- South of main bascule bridge and north of the access serving Nexen, the run-off will be collected into a storage tank situated below the footprint of the bridge. The tank will be sized to store the run-off from a 1 in 100 year storm with a twelve hour duration. Initial calculations indicate that the tank will need to be capable of storing approximately 288m<sup>3</sup> of water. The tank will then discharge into an existing Anglian Water stormwater sewer via appropriate pollution control at an acceptable discharge rate to Anglian Water,
  - South of the access serving Nexen, the drainage run-off will be captured by oversized pipes and attenuation tanks, within the vicinity of the southern roundabout. The storage facilities will be capable, of storing the extra flow in the event of the lock up of the tidal barrier. The run off will be discharged via an existing Anglian Water storm water system, which is currently present in Riverside Road, which appears to collect the existing run-off from the Riverside Road area. Flow control devices will be provided before the agreed outfall which will restrict the discharge to an acceptable rate agreed with Anglian Water.
- 2.4.4 At the southern roundabout the carriageway run-off will be collected by a combination of a conventional gully system for the side roads and a kerb drainage system for the roundabout itself. Storage will be via oversized pipe networks and suitably sized attenuation tank(s), prior to discharge into an existing Anglian Water stormwater sewer, through an appropriate pollution control system and at a discharge rate agreed with Anglian Water. Initial calculations indicate that the oversized pipes and the tanks will need to be capable of storing approximately 630m<sup>3</sup> of water.
- 2.4.5 Penstocks and oil interceptors (or equipment of similar performance) shall be incorporated into the outfall design to enable the system to be closed down following an accidental spillage on the network.

## 2.5 The New Access Road

- 2.5.1 The drainage for the New Access Road from Waveney Drive to the Riverside Road employment area, and from Riverside Road to Canning Road, will be a conventional manhole, piped network and gully system. These new systems will outfall into the existing Anglian Water storm sewers in either Waveney Drive, and/or the Canning Road/Riverside Road area west of the A12 Lake Lothing Third Crossing or into the existing drainage present within the land west of the access road, subject to the approval of Anglian Water.
- 2.5.2 Manholes will be situated in the verge at a maximum spacing of 80m.



2.5.3 Penstocks and oil interceptors (or equipment of similar performance) shall be incorporated into the outfall design to enable the system to be closed down following an accidental spillage on the network.

## 2.6 Footway/Cycleways

2.6.1 Footways and cycleways which are provided as part of the works, will either:

- Drain towards the carriageway, or
- Drain into a separate system within the footways, which will be collected prior to discharge into the main drainage system.

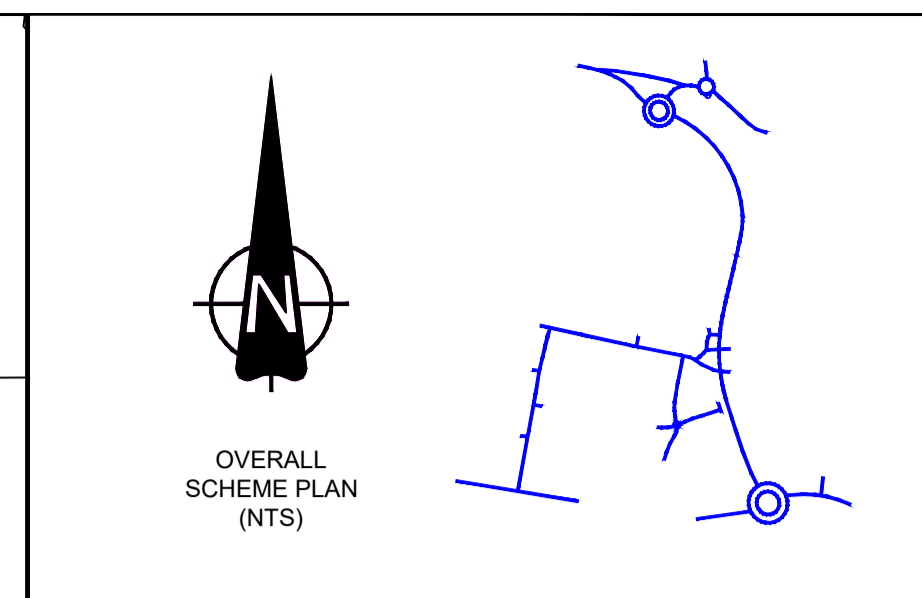
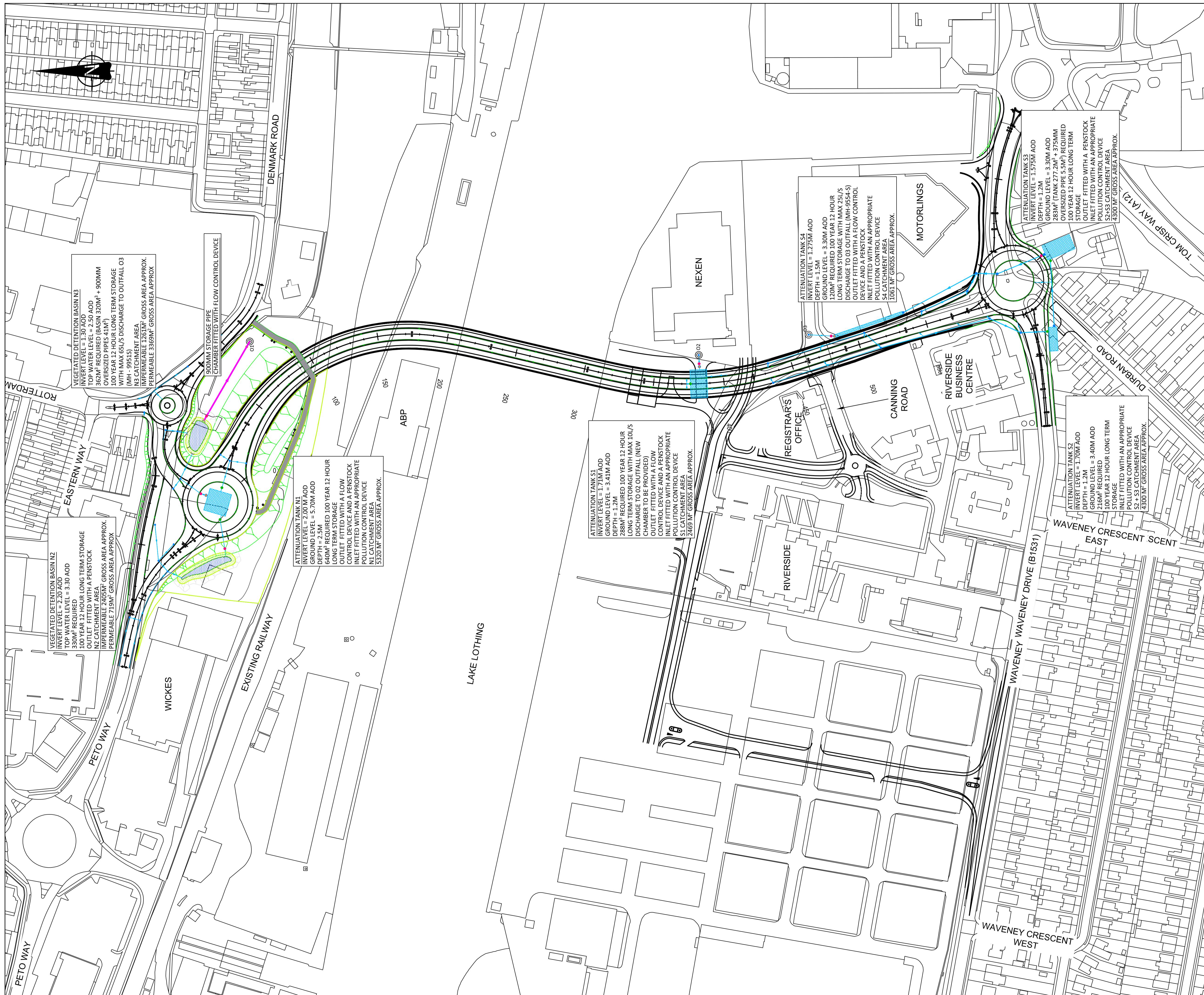
## 2.7 Construction Details

2.7.1 Manholes, gullies and pipe networks used for the construction of the Scheme will be constructed in accordance with either:

- Suffolk County Council's standard drawings; or
- The MCHW Highway Construction details; or
- Sewers for Adoption 7th Edition 2012 construction details

## Appendix A - Drawings





- KEY**
- COMBINED KERB DRAIN UNITS
  - 450MM OVERSIZED CARRIER DRAIN PIPES
  - CARRIER DRAIN PIPES
  - PROPOSED HEADWALL
  - PROPOSED OUTFALL
  - INDICATIVE ATTENUATION TANK
  - INDICATIVE DETENTION BASIN
  - FILTER STRIP
  - POLLUTION CONTROL DEVICE
  - FLOW CONTROL DEVICE
  - PENSTOCK
  - PROPOSED CHAMBER

- NOTES**
1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
  2. SIZE, AREAS, LEVELS, LOCATION AND SHAPE OF ATTENUATION TANKS AND DETENTION BASIN SYSTEMS ARE INDICATIVE. TYPE, SIZE, LOCATION AND SHAPE OF STORAGE FACILITIES TO BE CONFIRMED THROUGH DETAIL DESIGN. DRAWINGS ARE TO BE PRINTED IN COLOUR.
  3. THIS DRAWING HAS BEEN PRODUCED BASED ON ANGLIAN WATER RECORDS AND A TOPOGRAPHICAL SURVEY.
  4. THE POSITION AND NATURE OF ALL EXISTING SURFACE WATER DRAINAGE SYSTEMS SHOWN ON THIS DRAWING IS INDICATIVE AND THE ACCURACY OF THIS INFORMATION CANNOT BE GUARANTEED. WSP WILL ACCEPT NO RESPONSIBILITY IN THE EVENT OF ANY INACCURACY OR OMISSION. THE ACTUAL POSITION OF SUCH ASSETS AND SYSTEMS SHALL BE ESTABLISHED ON SITE BY THE CONTRACTOR PRIOR TO WORKS COMMENCING.

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REVISION	DRAWN	CHECKED	APPROVED	DATE



**PROJECT TITLE**  
 Lake Lothing  
**THIRD CROSSING**

**DRAWING TITLE**  
 PROPOSED INDICATIVE DRAINAGE

**DRAWING STATUS**  
 FOR DCO EXAMINATION

DRAWN	CHECKED	APPROVED	AUTHORISED	SUITABILITY
RM	PC	SG	JB	S1
SCALE @ A1 SIZE		DATE	REVISION	
1:2500		01/02/18	P03	

**DRAWING NUMBER**  
 Project: 1069948-WSP-HDG-LL-DR-CD-0003  
 Originator: | Role: | Number: |

ATTENUATION TANK S1  
 INVERT LEVEL = 1.71M AOD  
 GROUND LEVEL = 3.41M AOD  
 DEPTH = 1.2M  
 288M<sup>3</sup> REQUIRED 100 YEAR 12 HOUR  
 LONG TERM STORAGE WITH MAX 10L/S  
 DISCHARGE TO O2 OUTFALL (NEW  
 CHAMBER TO BE PROVIDED)  
 OUTLET FITTED WITH A FLOW  
 CONTROL DEVICE AND A PENSTOCK  
 INLET FITTED WITH AN APPROPRIATE  
 POLLUTION CONTROL DEVICE  
 S1 CATCHMENT AREA  
 2469 M<sup>2</sup> GROSS AREA APPROX.

ATTENUATION TANK N1  
 INVERT LEVEL = 2.00M AOD  
 GROUND LEVEL = 5.70M AOD  
 DEPTH = 2.5M  
 640M<sup>3</sup> REQUIRED 100 YEAR 12 HOUR  
 LONG TERM STORAGE WITH MAX 10L/S  
 DISCHARGE TO O2 OUTFALL (NEW  
 CHAMBER TO BE PROVIDED)  
 OUTLET FITTED WITH A FLOW  
 CONTROL DEVICE AND A PENSTOCK  
 INLET FITTED WITH AN APPROPRIATE  
 POLLUTION CONTROL DEVICE  
 N1 CATCHMENT AREA  
 5320 M<sup>2</sup> GROSS AREA APPROX.

ATTENUATION TANK S4  
 INVERT LEVEL = 1.275M AOD  
 DEPTH = 1.5M  
 GROUND LEVEL = 3.30M AOD  
 120M<sup>3</sup> REQUIRED 100 YEAR 12 HOUR  
 LONG TERM STORAGE WITH MAX 25L/S  
 DISCHARGE TO O3 OUTFALL (MH-9554-S)  
 OUTLET FITTED WITH A FLOW CONTROL  
 DEVICE AND A PENSTOCK  
 INLET FITTED WITH AN APPROPRIATE  
 POLLUTION CONTROL DEVICE  
 S4 CATCHMENT AREA  
 1061 M<sup>2</sup> GROSS AREA APPROX.

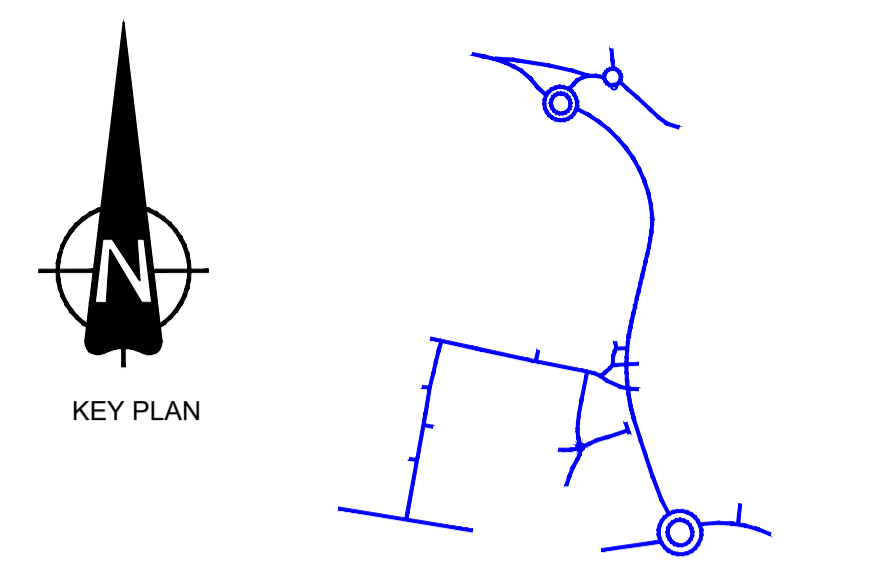
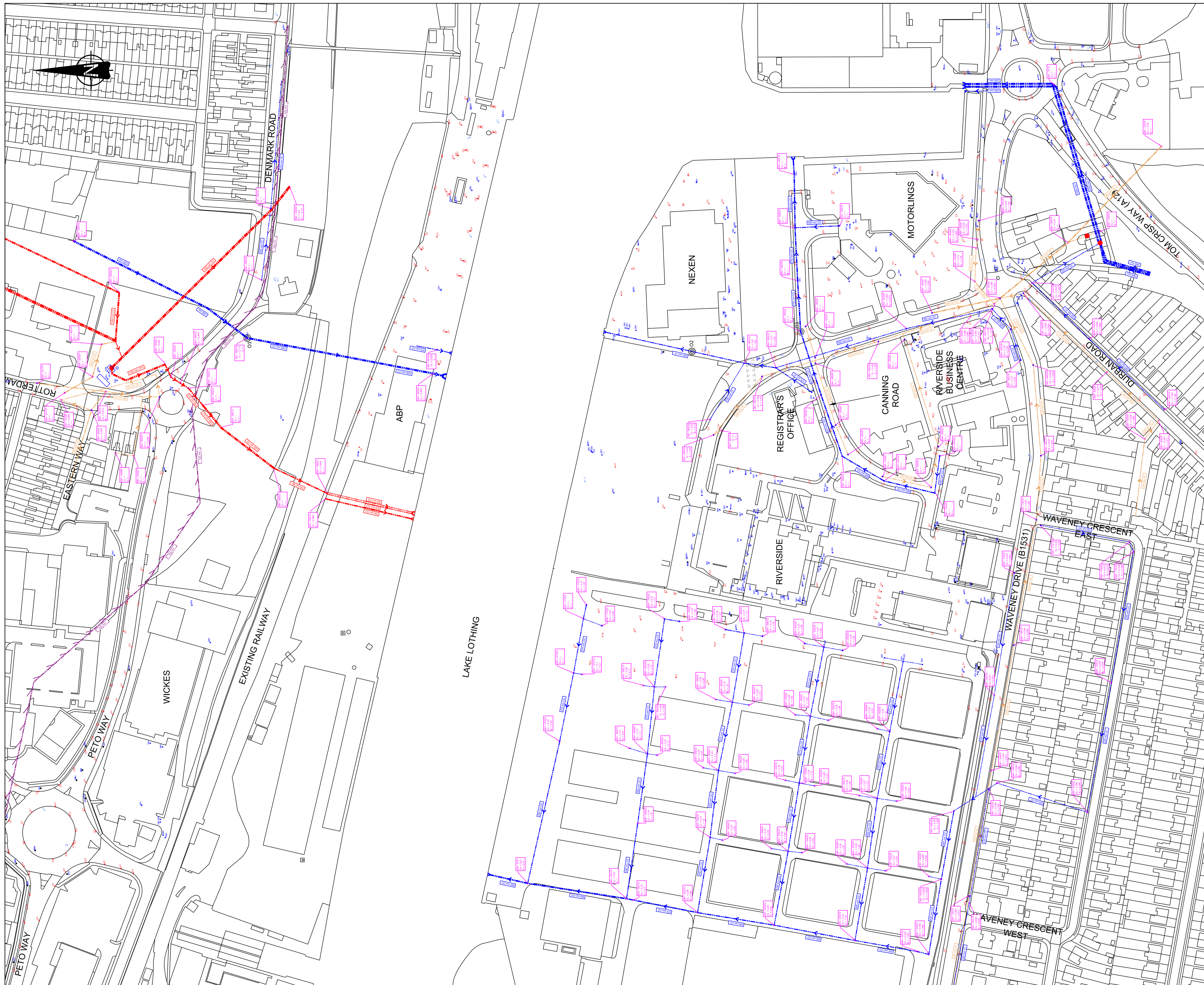
ATTENUATION TANK S2  
 INVERT LEVEL = 1.575M AOD  
 DEPTH = 1.2M  
 GROUND LEVEL = 3.30M AOD  
 283M<sup>3</sup> (TANK 277.2M<sup>3</sup> + 375MM  
 OVERSIZED PIPE 5.5M<sup>3</sup>) REQUIRED  
 100 YEAR 12 HOUR LONG TERM  
 STORAGE  
 OUTLET FITTED WITH A PENSTOCK  
 INLET FITTED WITH AN APPROPRIATE  
 POLLUTION CONTROL DEVICE  
 S2+S3 CATCHMENT AREA  
 4300 M<sup>2</sup> GROSS AREA APPROX.

ATTENUATION TANK S2  
 INVERT LEVEL = 1.70M AOD  
 DEPTH = 1.2M  
 GROUND LEVEL = 3.40M AOD  
 216M<sup>3</sup> REQUIRED  
 100 YEAR 12 HOUR LONG TERM  
 STORAGE  
 OUTLET FITTED WITH AN APPROPRIATE  
 POLLUTION CONTROL DEVICE  
 S2+S3 CATCHMENT AREA  
 4300 M<sup>2</sup> GROSS AREA APPROX.

VEGETATED DETENTION BASIN N3  
 INVERT LEVEL = 1.30 AOD  
 TOP WATER LEVEL = 2.50 AOD  
 362M<sup>3</sup> REQUIRED (BASIN 320M<sup>3</sup> + 900MM  
 OVERSIZED PIPES 41M<sup>3</sup>)  
 100 YEAR 12 HOUR LONG TERM STORAGE  
 WITH MAX 65L/S DISCHARGE TO OUTFALL O3  
 (MH - 9951S)  
 NO CATCHMENT AREA  
 15 CATCHMENT AREA  
 3369M<sup>2</sup> GROSS AREA APPROX.  
 PERMEABLE 3369M<sup>2</sup> GROSS AREA APPROX.

VEGETATED DETENTION BASIN N2  
 INVERT LEVEL = 2.20 AOD  
 TOP WATER LEVEL = 3.30 AOD  
 330M<sup>3</sup> REQUIRED  
 100 YEAR 12 HOUR LONG TERM STORAGE  
 OUTLET FITTED WITH A PENSTOCK  
 N2 CATCHMENT AREA  
 1719M<sup>2</sup> GROSS AREA APPROX.  
 PERMEABLE 719M<sup>2</sup> GROSS AREA APPROX.





- KEY**
- EXISTING SURFACE SEWER (BASED ON ANGLIAN WATER RECORDS AND TOPOGRAPHICAL SURVEY)
  - EXISTING FOUL SEWER (BASED ON ANGLIAN WATER RECORDS AND TOPOGRAPHICAL SURVEY)
  - EXISTING COMBINED SEWER (BASED ON ANGLIAN WATER RECORDS AND TOPOGRAPHICAL SURVEY)
  - EXISTING RISING MAIN (BASED ON ANGLIAN WATER RECORDS)
  - EXISTING OUTFALL (COLOR DENOTES EFFLUENT TYPE) (BASED ON ANGLIAN WATER RECORDS)
  - EXISTING GULLY ASSET (BASED ON TOPOGRAPHICAL SURVEY)
  - EXISTING CHAMBER ASSET (BASED ON TOPOGRAPHICAL SURVEY)
  - EXISTING PUMPING STATION
  - EXISTING SEWER CHAMBER ASSET (BASED ON ANGLIAN WATER RECORDS AND TOPOGRAPHICAL SURVEY)
  - ◎ PROPOSED OUTFALL

- NOTES**
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**DRAWING TITLE**  
 EXISTING DRAINAGE

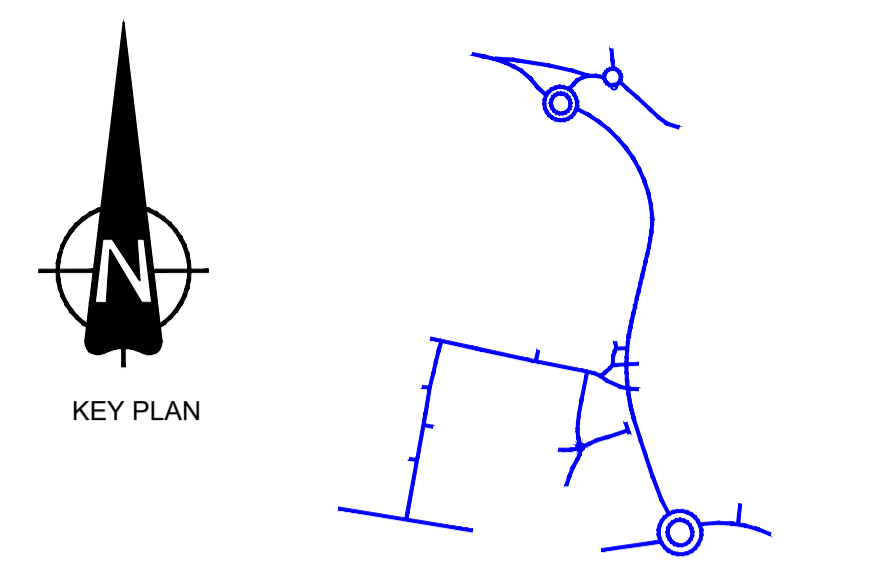
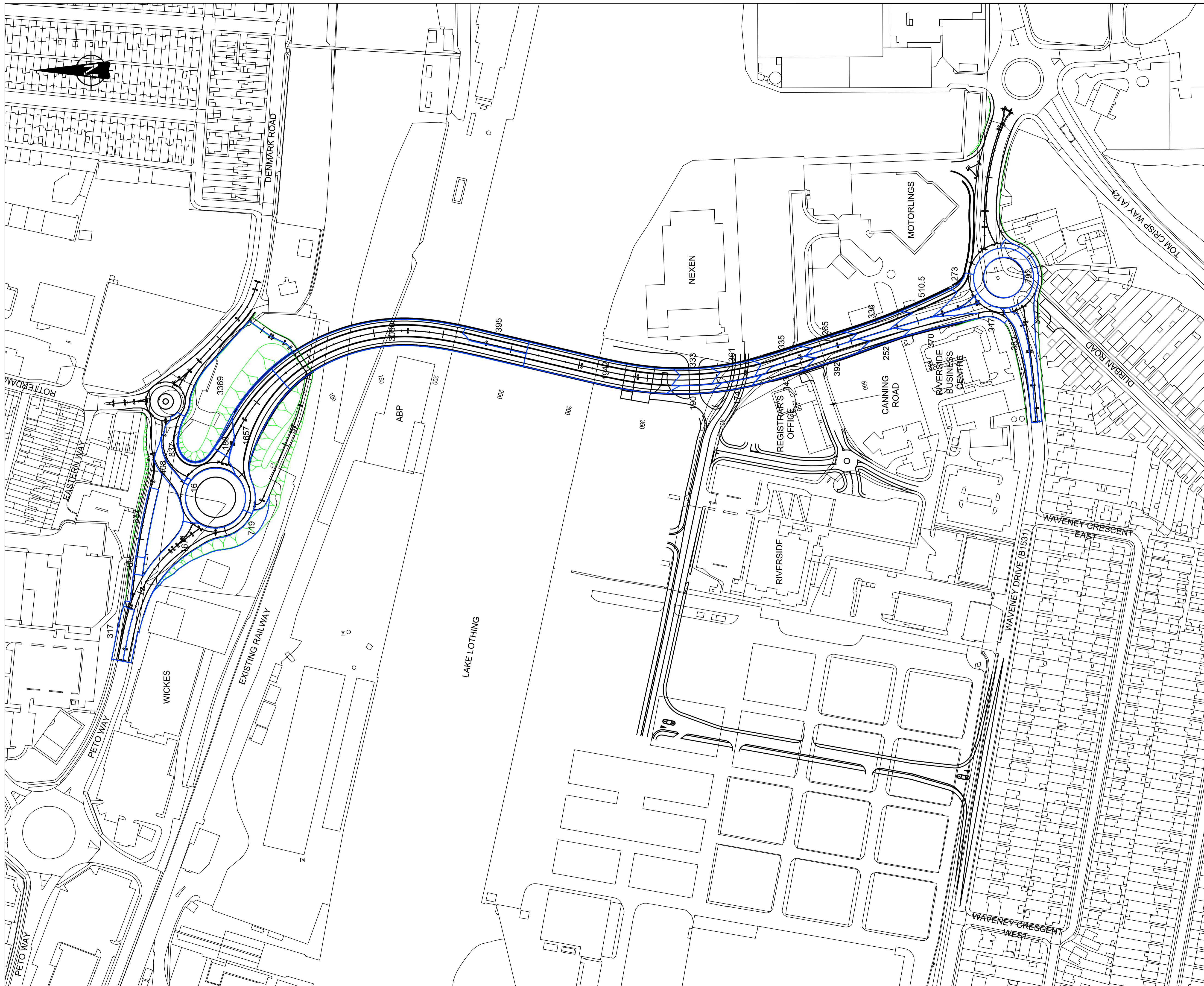
**DRAWING STATUS**  
 FOR DCO EXAMINATION

DRAWN	CHECKED	APPROVED	AUTHORISED	SUITABILITY
RM	PC	SG	JB	S1

SCALE @ A1 SIZE	DATE	REVISION
1:2500	06/11/18	P00

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 1069948-WSP-HDG-LL-DR-CD-0004





**KEY**

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REVISION	DRAWN	CHECKED	APPROVED	DATE



**PROJECT TITLE**  
 Lake Lothing  
**THIRD CROSSING**

**DRAWING TITLE**  
 PROPOSED CATCHMENT AREAS

**DRAWING STATUS**  
 FOR DCO EXAMINATION

DRAWN	CHECKED	APPROVED	AUTHORISED	SUITABILITY
RM	PC	SG	JB	S1
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