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NORTH HYKEHAM RELIEF ROAD
WATER FRAMEWORK DIRECTIVE ASSESSMENT

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Checked by	**Wendy Furgusson**
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Ramboll
2nd Floor, The Exchange
St. John Street
Chester
CH1 1DA
Unite Kingdom

T +44 1244 311855
https://uk.ramboll.com

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Ramboll UK Limited
Registered in England & Wales
Company No: 03659970
Registered office:
240 Blackfriars Road
London
SE1 8NW

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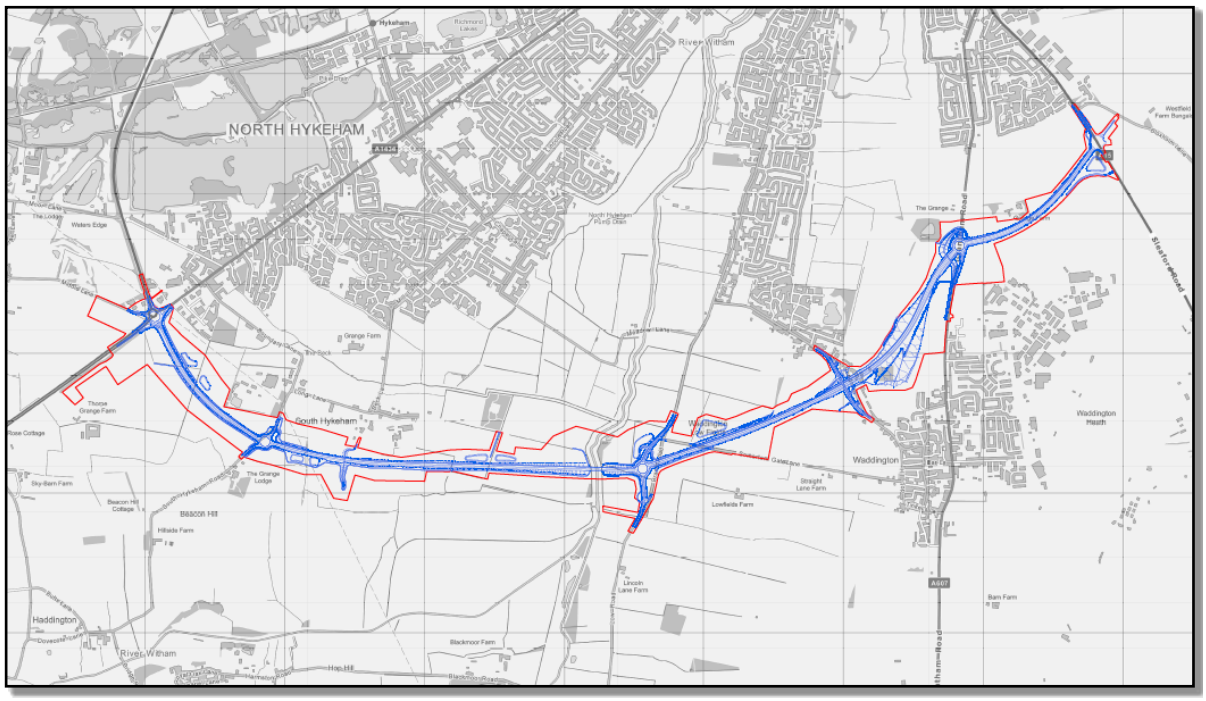
1. INTRODUCTION

1.1 Brief

1.1.1 Ramboll UK Limited (Ramboll) has been appointed by Balfour Beatty Construction to undertake a Water Framework Directive (WFD) assessment of the proposed North Hykeham Relief Road Scheme (referred to as the 'proposed scheme') linking the A46 and the A15 to the south of North Hykeham and Lincoln (see Figure 1-1 for the location of the site).

Figure 1-1: Site Location Plan



1.1.2 This WFD assessment has been prepared to support Chapter 14 ('Road Drainage and the Water Environment') of the Environmental Statement (ES) for the proposed scheme.

1.2 Proposals

1.2.1 Full details of the proposed scheme are presented in Chapter 14 of the ES. The proposed scheme design includes the following elements that are associated with water or have an interaction with the water environment:

a) A new bridge crossing of the River Witham;

b) Diversion and realignment of Internal Drainage Board (IDB) watercourses along the proposed scheme route; and

c) Discharge of drainage from the new road structure either to ground or to adjacent watercourses.

2. BASELINE ENVIRONMENT

2.1 The Site

2.1.1 The proposed scheme site lies to the south of the village of North Hykeham, and to the south of the city of Lincoln and is approximately 8 km in length, with a total site area of approximately 240 hectares (ha) within the red line planning boundary. Approximately 95% of the site area passes through agricultural land, bypassing the villages of North Hykeham, South Hykeham, Bracebridge Heath, and Waddington. The exception is a small amount of area on Station Road just northwest of Waddington.

2.2 Hydrology

2.2.1 The proposed scheme crosses the River Witham, a main river, at approximately the scheme centre, with the river flowing from south to north. A sluice gate on the River Witham used for flood control is located approximately 100 m south of the proposed crossing location.

2.2.2 No other main rivers are crossed by the proposed scheme. The River Brant, a main river, joins with the River Witham approximately 300 m south of the proposed scheme. Another main river known as 'the Beck' in Ordnance Survey mapping is located approximately 100 m north of the proposed scheme and flows in a west to east direction, also joining the River Witham.

2.2.3 A number of drainage watercourses are present within the site serving the agricultural land of the surrounding area and several are crossed by the proposed scheme. It is understood that these drain towards the River Witham, both from the east and west and are part of the Upper Witham Internal Drainage Board (IDB) network.

2.3 Geology and Hydrogeology

2.3.1 The hydrogeology beneath the proposed scheme is divided through the northwest of Waddington, at approximate National Grid reference (NGR) SK9765. In the west the proposed scheme is underlain by the Scunthorpe Mudstone Formation, the Charmouth Mudstone Formation, and the Whitby Mudstone Formation. The groundwater within these is classified by the Environment Agency (EA) as the Witham Lias Water Body. To the east the proposed scheme is underlain by the Lower and Upper Lincolnshire Limestone Members (of the Lincolnshire Limestone Formation). The groundwater within these is classified by the EA as the Witham Limestone Unit A Water Body. These two groundwater bodies are designated Secondary B and Principal aquifers respectively in the British Geological Survey (BGS) Aquifer Designation Map. Also crossed by the proposed scheme, at approximately where it is proposed to cross the River Witham, are limited areas of superficial deposits classified by the EA as Secondary A aquifers.

2.3.2 According to a Groundsure report[1] for the proposed scheme there are no licensed groundwater abstractions within 250 m of the red line boundary and there is one within 500 m. This abstraction is located at 491900, 365700 approximately 500 m northwest of the site and is described as active and used for spray irrigation.

[1] Groundsure Location Intelligence, North Hykeham Relief Road, GSIP-2022-12604-10874.

2.3.3 The eastern portion of the proposed scheme is situated within a Groundwater Source Protection Zone (SPZ) II (Outer Protection Zone) and SPZ 3 (Total Catchment). These SPZs are defined by the EA as follows:

Zone 2 (Outer Protection Zone): the 400-day travel time from a point below the water table. Additionally, this zone has a minimum radius of 250 or 500 metres, depending on the size of the abstraction. The travel time is derived from consideration of the minimum time required to provide delay, dilution, and attenuation of slowly degrading pollutants.

Zone 3: (Total Catchment): the total area needed to support the abstraction or discharge from the protected groundwater source.

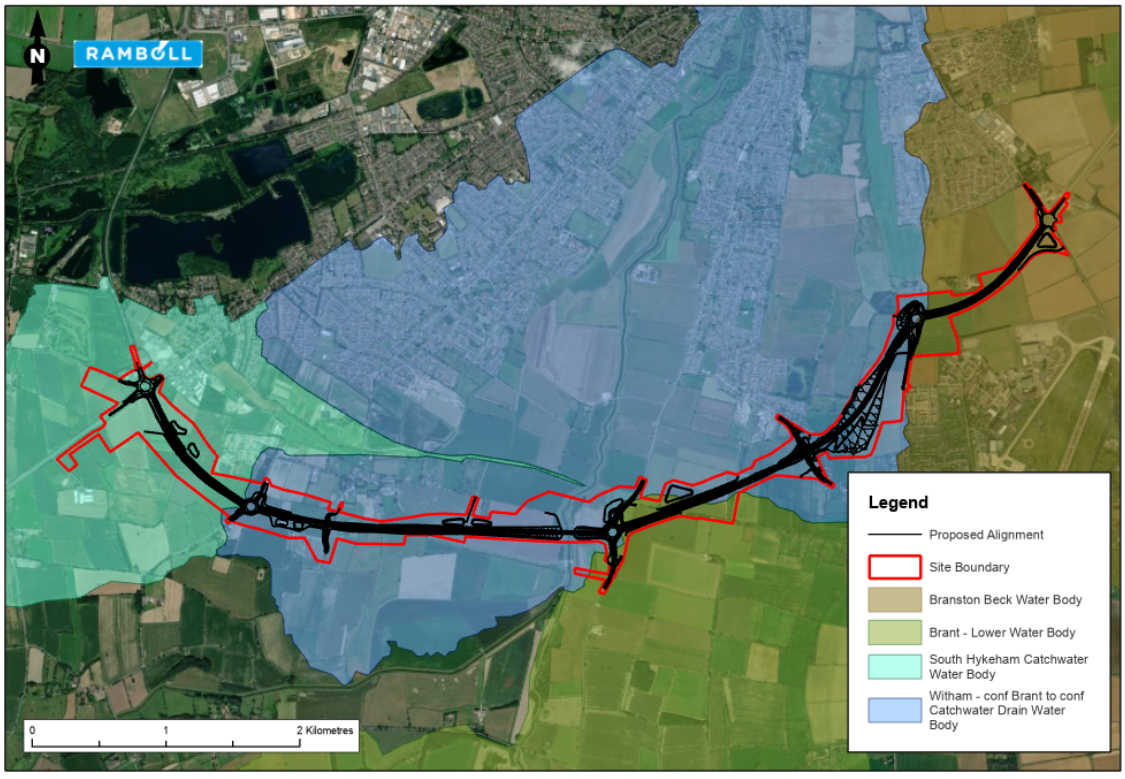
2.4 WFD Surface Water Environment

2.4.1 The proposed scheme is situated wholly within the Anglian River Basin District and the Witham Management Catchment.

2.4.2 Within the Witham Management Catchment, the proposed scheme site area falls within two surface water body operational catchments, the Witham Upper and the Witham Lower. Within the Witham Upper Operational Catchment three WFD surface water bodies fall within the site red line boundary and within the Witham Lower Operational Catchment one WFD surface water body falls within the site red line boundary.

2.4.3 These four surface water body catchments are shown in relation to the site red line boundary and proposed scheme alignment in Figure 2-1.

Figure 2-1: Surface Water Body Catchments



South Hykeham Catchwater

2.4.4 The South Hykeham Catchwater catchment has an area of 4.82 km^2 and overlaps with the westernmost portion of the proposed scheme. The surface water body has a 'Moderate' ecological classification and 'Fail' chemical classification.

Witham - conf Brant to conf Catchwater Drain Water Body

2.4.5 The Witham - conf Brant to conf Catchwater Drain Water Body catchment has an area of 17.86 km^2 and overlaps with the proposed scheme both west and east of the River Witham. The surface water body has a 'Moderate' ecological classification and 'Fail' chemical classification.

Brant - Lower Water Body

2.4.6 The Brant Lower Water Body catchment has an area of 88.90 km^2 and overlaps with the centre of the proposed scheme. The surface water body has a 'Moderate' ecological classification and 'Fail' chemical classification.

Branston Beck Water Body

2.4.7 The Branston Beck Water Body catchment has an area of 27.81 km^2 and overlaps with the east of the proposed scheme. The surface water body has a 'Poor' ecological classification and 'Fail' chemical classification.

2.4.8 The whole site lies within a Nitrate Vulnerable Zone[2] (Lower Witham NVZ). A Drinking Water Protected Area (Surface Water)[3] is located to the south of the site where the River Brant joins the River Witham. There are no Special Protection Areas (SPAs), or other environmental designations located within the site boundary or the 1 km ES study area.

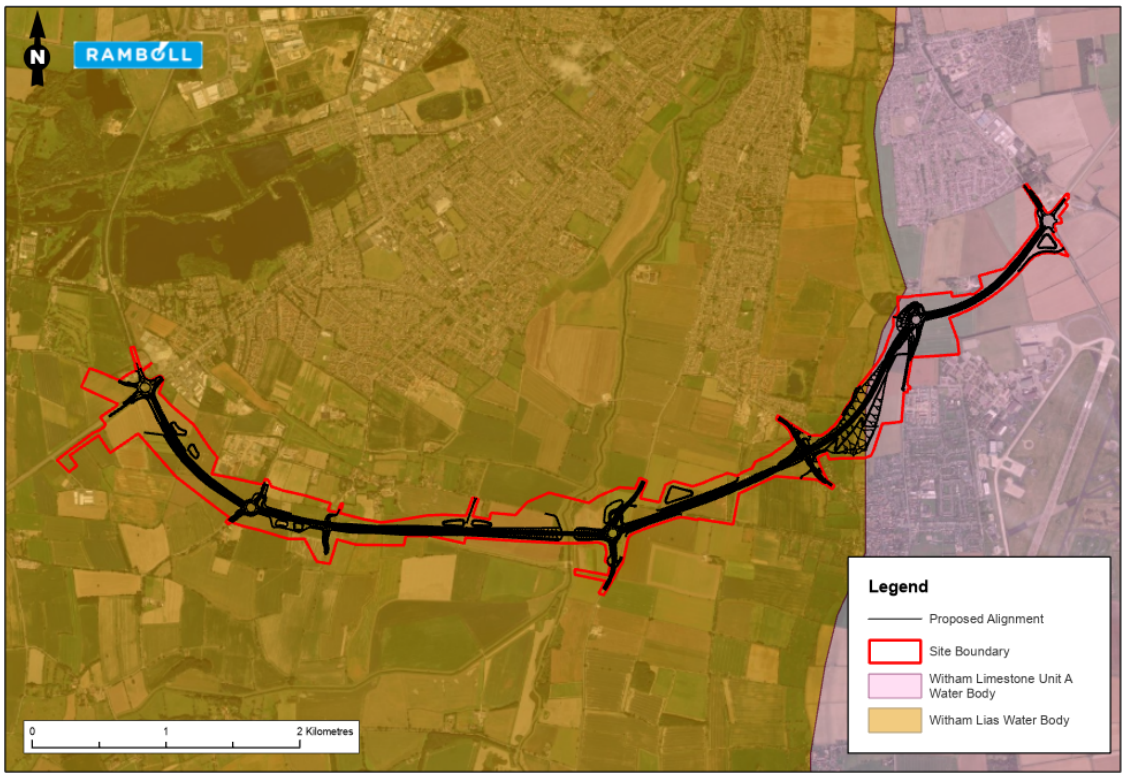
[2] Nitrate Vulnerable Zones (NVZs) are areas designated as being at risk from agricultural nitrate pollution. The designations are made in accordance with the Nitrate Pollution Prevention Regulations 2015.

[3] Drinking Water Protected Areas (Surface Water) are defined as locations where raw water is abstracted for human consumption providing, on average, more than 10 cubic metres per day, or serving more than 50 persons, or is intended for such future use.

2.5 WFD Groundwater Environment

2.5.1 The proposed scheme overlies two WFD groundwater bodies. These are shown in relation to the site red line boundary and proposed scheme alignment in Figure 2-2.

Figure 2-2: Groundwater Body Catchments



Witham Lias Water Body

2.5.2 The west of the proposed scheme is underlain by the Witham Lias Water Body (covering a total area of 683.567 km^2). The groundwater body has an overall 'Good' classification, with a 'Good' quantitative classification and a 'Good' chemical classification. All status elements within these classification items are also characterised as 'Good'. There are currently no investigations into classification status.

Witham Limestone Unit A Water Body

2.5.3 The east of the proposed scheme is underlain by the Witham Limestone Unit A Water Body (covering a total area of 340.533 km^2). The groundwater body has an overall 'Poor' classification, with a 'Poor' quantitative classification and a 'Poor' chemical classification.

2.5.4 Under the quantitative classification item, reasons for not achieving good (RNAG) include groundwater abstraction affecting the Quantitative Dependent Surface Water Body Status and Quantitative Water Balance classification elements, and poor nutrient management affecting the General Chemical Test classification element.

2.5.5 The groundwater body has an objective of 'Good' quantitative classification by 2027. However, the EA considers this disproportionately expensive due to disproportionate burdens, and to be technically infeasible because practical technical constraints prevent implementation of the measures by an earlier deadline.

2.5.6 The groundwater body has a chemical classification status of 'Poor' as of 2015. This is considered disproportionately expensive to remedy due to an unfavourable balance of costs and benefits.

2.5.7 The reasons for not achieving good (RNAG) and the ecological and chemical objectives for each of the six water bodies are summarised in Table 2-1.

Table 2-1: Reasons for not achieving good (RNAG) for each of the six water bodies and their respective ecological and chemical objectives

WFD Waterbodies	RNAG	Objectives (Ecological)	Objectives (Chemical)
South Hykeham Catchwater	Agriculture and rural land management – Physical modifications; Water Industry – Pollution from waste water; and Local and central government – Physical modifications	Moderate (2019)	Fail (2019)
Witham – conf Brant to conf Catchwater Drain Water Body	Agriculture and rural land management – Physical modifications, Pollution from rural areas; Urban and transport – Pollution from towns, cities and transport; Water Industry – Pollution from waste water; and Local and central government – Physical modifications	Moderate (2019)	Fail (2019)
Brant – Lower Water Body	Agriculture and rural land management – Physical modifications, Changes to the natural flow and level of water, Pollution from rural areas; Water Industry – Pollution from waste water; and Local and central government – Physical modifications	Moderate (2019)	Fail (2019)
Branston Beck Water Body	Agriculture and rural land management – Physical modifications, Pollution from rural areas	Poor (2019)	Fail (2019)

WFD Waterbodies	**RNAG**	**Objectives (Ecological)**	**Objectives (Chemical)**
Witham Lias Water Body	N/A	Good (2019)	Good (2019)
Witham Limestone Unit A Water Body	Agriculture and rural land management – Pollution from rural areas; and Water Industry – Changes to the natural flow and level of water	Poor (2019) (Overall not Ecological)	Poor (2019) (GW)

3. WATER FRAMEWORK DIRECTIVE

3.1 Background

3.1.1 The WFD (2000/60/EC) was published in December 2000 and transposed into law in December 2003 through the Water Environment (Water Framework Directive) (England and Wales) Regulations 2003, later being updated through The Water Environment (WFD) (England and Wales) (Amendment) Regulation 2015 and most recently The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. The intention of the Directive is to provide a more holistic approach to protection of the water environment than had previously been in place, addressing a wide range of aspects of the water environment, including physico-chemical, chemical, hydromorphological and ecological.

3.1.2 The environmental objectives of the WFD, for surface water bodies, are to:

a) Prevent deterioration of the status of each body of surface water;

b) Protect, enhance and restore each body of surface water (other than an artificial or heavily modified water body) with the aim of achieving good ecological status and good surface water chemical status, if not already achieved, by the 22nd of December 2021;

c) Protect and enhance each artificial or heavily modified water body with the aim of achieving good ecological potential and good surface water chemical status, if not already achieved, by the 22nd of December 2021; and

d) Aim progressively to reduce pollution from priority substances and aim to cease or phase out emissions, discharges, and losses of priority hazardous substances.

3.1.3 The environmental objectives of the WFD, for groundwater bodies, are to:

a) Prevent deterioration of the status of each body of groundwater;

b) Prevent or limit the input of pollutants into groundwater;

c) Protect, enhance, and restore each body of groundwater, and ensure a balance between abstraction and recharge of groundwater, with the aim of achieving good groundwater chemical status and good groundwater quantitative status, if not already achieved, by the 22nd of December 2021; and

d) Reverse any significant and sustained upward trend in the concentration of any pollutant resulting from the impact of human activity in order to progressively reduce pollution of groundwater.

3.1.4 The Directive requires that the EA define River Basin Districts and for each of these develop a River Basin Management Plan (RBMP). As part of this process all inland (above or below ground) and coastal waters have been allocated status categories in order to help inform where water bodies are at risk and/or protective/management measures need to be put in place.

3.1.5 The proposed scheme is situated within the area covered by the Anglian Basin District and the Witham River Basin Management Plan (RBMP) catchment and the Anglian Groundwater Management catchment.

3.2 Assessment Process

3.2.1 The aim of WFD assessments is to assist the regulator in assessing:

a) The impact an activity may have on the immediate water body and any linked water bodies; and

b) Whether the activity complies with the relevant RBMP.

3.2.2 The EA guidance for undertaking a WFD assessment adopts a three-stage process as follows:

a) Screening – This excludes any activities that don't need to go through the scoping or impact assessment stages;

b) Scoping – Identifies the receptors that are potentially at risk from your activity and need impact assessment; and

c) Impact assessment – Considers the potential impacts of the activity, identifies ways to avoid or minimise impacts, and shows if the activity may cause deterioration or jeopardise the water body achieving good status.

4. SCREENING AND SCOPING

4.1 Screening

4.1.1 The nature of the project is such that there is the potential for significant effects and adverse risks to the water environment. A WFD Assessment is therefore screened in as it is necessary to support the Environmental Impact Assessment for the proposed scheme.

4.2 Scoping

4.2.1 The scoping exercise is tabulated below, and identifies the potential risks to receptors associated with the project and activities associated with it, and has been used to inform the need and scope of any required detailed impact assessment. The impact assessment has been completed and is discussed in Section 5 of the report.

Table 4-1: Water Framework Directive Assessment Scoping - Baseline

Activity/Characteristic	**Description Notes or More Information**					
Brief description of activity	Construction and operation of a new bypass A-road of approximate length 8 km					
Location of activity (central point XY coordinates or National Grid reference)	495547E, 364191N					
Footprint of activity (ha)	240					
Water body type	Surface Water Body	Surface Water Body	Surface Water Body	Surface Water Body	Groundwater	Groundwater
WFD water body name	Witham - conf Brant to conf Catchwater Drain Water Body	South Hykeham Catchwater	Brant – Lower Water Body	Branston Beck Water Body	Witham Lias	Witham Limestone Unit A
Water body ID	GB105030062370	GB105030062460	GB105030056770	GB105030062415	GB40502G401400	GB40501G444800
River basin district name	Anglian	Anglian	Anglian	Anglian	Anglian	Anglian
Management Catchment	Witham	Witham	Witham	Witham	Anglian Groundwater	Anglian Groundwater
Operational Catchment	Witham Upper	Witham Upper	Witham Upper	Witham Lower		
Water body total area	17.863 km^2	4.823 km^2	88.904 km^2	27.809 km^2	683.567 km^2	340.533 km^2
Overall water body status	N/A	N/A	N/A	N/A	Good (2019)	Poor (2019)
Quantitative Status	N/A	N/A	N/A	N/A	Good (2019)	Poor (2019)
Ecological status	Moderate (2019)	Moderate (2019)	Moderate (2019)	Poor (2019)	N/A	N/A

Activity/Characteristic	Description Notes or More Information					
WFD water body name	Witham – conf Brant to conf Catchwater Drain Water Body	South Hykeham Catchwater	Brant – Lower Water Body	Branston Beck Water Body	Witham Lias	Witham Limestone Unit A
Chemical status	Fail (2019)	Fail (2019)	Fail (2019)	Fail (2019)	Good (2019)	Poor (2019)
Target water body status and deadline	Ecological – Moderate (2015) Chemical – Good (2063)	Ecological – Moderate (2015) Chemical – Good (2063)	Ecological – Good (2027 – Low confidence) Chemical – Good (2063)	Ecological – Moderate (2027 – Low confidence) Chemical – Good (2063)	Good (2015) (Overall)	Poor (2015) (Overall)
Hydromorphology						
Hydromorphology status of water body	Heavily Modified	Heavily Modified	Heavily Modified	Not designated artificial or heavily modified	N/A	N/A
Habitats						
Aquatic habitats within the red line boundary and the footprint of the proposed alignment include multiple areas of standing and running water, and a number of wet and dry ditches. None of these habitats are located within or are part of any national or international designations.						
WFD Protected Areas						
WFD Protected Areas	Whole site situated within a Nitrate Vulnerable Zone Drinking Water Protected Area (Surface Water) located approximately 350 m upstream, to the south of the site No Special Protection Areas (SPAs) are situated within the ES 1 km study area or are in close proximity of the site					

4.2.2 Within each topic presented below, the conclusions as to whether further impact assessment is required or not is indicated in bold text, with the reasoning for that decision in the 'Topic' Risk Issues column to the right.

Table 4-2: Water Framework Directive Assessment Scoping – Specific Risk Information

HYDROMORPHOLOGY			
Assess Further if Activity:	**Yes**	**No**	**Hydromorphology Risk Issue(s)**
Could impact on the hydromorphology of a water body with 'high' status		**Impact assessment not required**	No - All associated water bodies have a status ranging from poor to good.
Could significantly impact the hydromorphology of any water body	**Requires impact assessment**		Yes due to the proposed alignment crossing watercourses and proposed drainage outfalls.
Is in a water body that is heavily modified for the same use as your activity		**Impact assessment not required**	No. It is assumed that the water bodies that have been classified as heavily modified have been done so for purposes related to land drainage, navigation and flood control and not for the purpose of the proposed scheme i.e. road transport.
HABITATS			
Assess further if the Footprint of Activity is:	**Yes**	**No**	**Biology Habitats Risk Issue(s)**
0.5 km^2 or larger	**Yes to one or more – requires impact assessment**		Yes. The scheme lies within a surface water body and the extent of potential effects from discharge of highway drainage are expected to have a footprint of greater than 0.5 km^2.
Covering 1% or more of the water body's area			Yes. The scheme lies within a surface water body.
Within 500 m of any higher sensitivity habitat			Yes. Several higher sensitivity habitats are crossed by the proposed scheme.
Covering 1% or more of any lower sensitivity habitat			Yes. Several lower sensitivity habitats are crossed by the proposed scheme.

WATER QUALITY/GROUNDWATER			
Assess Further if Activity:	**Yes**	**No**	**Water Quality Risk Issue(s)**
Could affect water clarity, temperature, salinity, oxygen levels, nutrients or microbial patterns	**Requires impact assessment**		Yes – It is proposed to discharge runoff from the proposed scheme to watercourses and to ground. Road runoff has the potential to contain a range of contaminants including the following in the EQSD list: copper, zinc, polyaromatic hydrocarbons (PAHs).
PROTECTED AREAS			
Assess Further if Activity:	**Yes**	**No**	**Protected Areas Risk Issue(s)**
Has the potential to impact any WFD Protected Area		**Impact assessment not required**	No SPAs identified within the 1 km ES study area or as a potential downstream receptor. Nitrate Vulnerable Zones would not be impacted by the proposed scheme due to the unrelated nature of any discharges during either construction or operation. Drinking Water Protected Area located upstream and would not be impacted by the proposed scheme.
INVASIVE NON-NATIVE SPECIES (INNS)			
Assess Further if Activity Could:	**Yes**	**No**	**INNS Risk Issue(s)**
Introduce or spread INNS		**Impact assessment not required**	Several INNS have been identified in proximity of the site. These include Cotoneaster, Montbretia, Variegated Yellow Archangel, and Japanese Knotweed. All these are associated with areas adjacent to Station Road, where no construction works are planned, and are therefore considered far enough away from any WFD water body to require an impact assessment.

4.2.3 Where no risk to potential receptors is identified at scoping stage, impact assessment does not need to be completed. The potential risks to receptors which the scoping exercise concludes need to be taken forward for detailed impact assessment are presented in Table 4-3.

Table 4-3: Potential Risks to be Assessed

Receptor	Potential Risk to Receptor?	Note the Risk Issue(s) for Impact Assessment
Hydromorphology	Yes	The proposed alignment crosses watercourses and proposed drainage outfalls would discharge to watercourses and to ground.
Biology: Habitats	Yes	A number of sensitive habitats are crossed by or are in close proximity to the proposed alignment.
Water Quality	Yes	It is proposed to discharge runoff from the proposed scheme to watercourses and to ground. Road runoff has the potential to contain a range of contaminants.
Protected Areas	No	No SPAs identified within 1km ES study area or as a potential downstream receptor. Nitrate vulnerable zones not considered at risk from proposed scheme. Drinking Water Protected Area located upstream of proposed scheme.
Invasive Non-Native Species	No	No INNS that are likely to impact any of the WFD water bodies present have been identified at the site.
Groundwater	Yes	The drainage strategy proposes to partly discharge runoff to ground which has the potential to contain a range of contaminants related to highway runoff.

5. IMPACT ASSESSMENT

5.1 Embedded Design Mitigation

5.1.1 The impact assessment below is written in the context of the following proposed scheme design and environmental masterplan elements being implemented:

a) Completion of construction works under the management of a Construction Environmental Management Plan (CEMP); for example, management of surface water runoff from exposed earthworks and construction compounds, provision of spill kits and emergency spill procedures; and

b) Inclusion of Sustainable Urban Drainage Systems (SuDS) attenuation measures to limit flow to existing rates for existing areas of road and at greenfield rates for newly constructed highway (including allowances for the predicted effects of climate change over the lifetime of the development in line with EA guidance). This would have the additional benefit of contributing to pollution control.

5.1.2 The following section describes the surface water drainage strategy to be implemented as part of the proposed scheme.

5.2 Proposed Drainage Strategy

5.2.1 It is proposed to divide the proposed scheme surface water drainage into ten catchments, with the A46 Junction forming the first. The catchments have been split based on topography, the proposed scheme alignment, and the locations of existing watercourses to allow natural surface water flow patterns and catchments to be maintained.

5.2.2 The easternmost catchment (catchment 10) is proposed to discharge to an infiltration basin, in line with geology in this area, while the remaining catchments are proposed to discharge to surface watercourses.

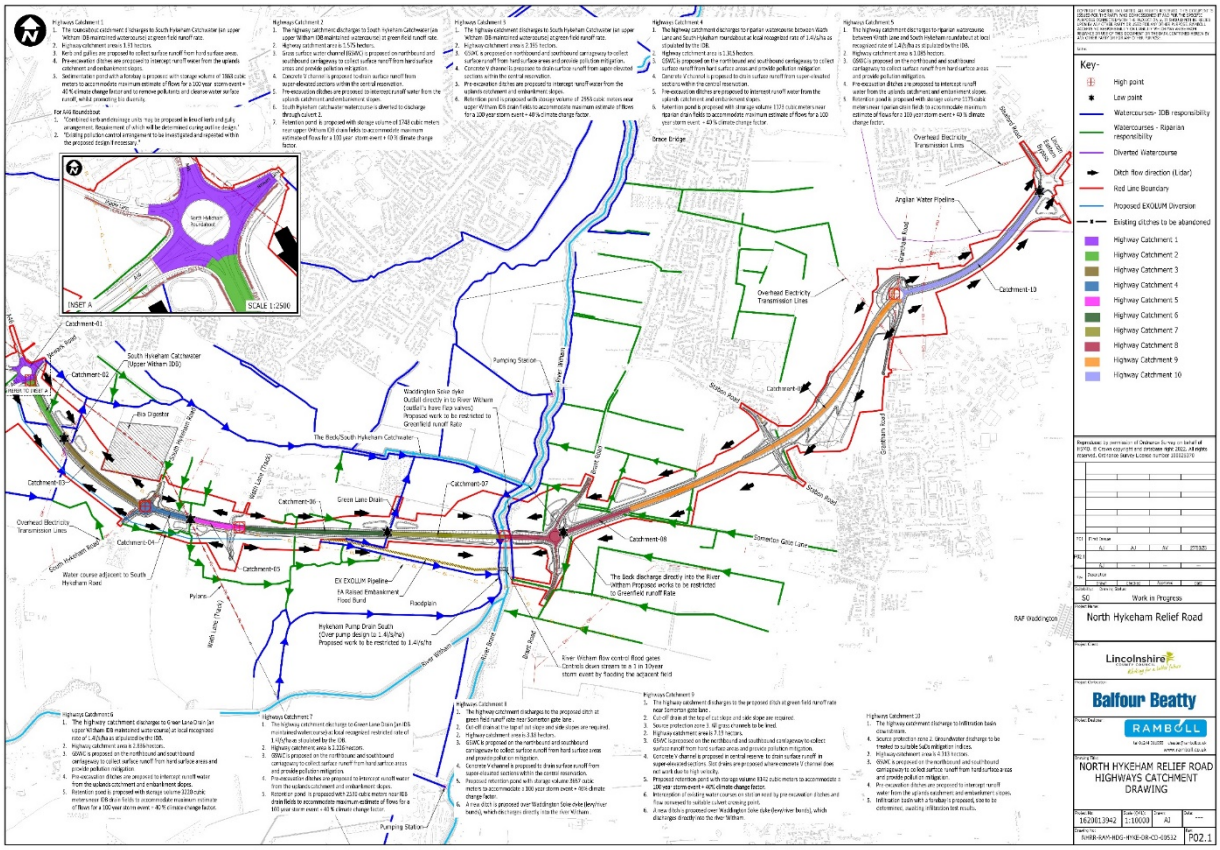
5.2.3 The proposed drainage strategy is shown in Appendix 2 of the Drainage Strategy Report (NHRR-RAM-HDG-HYKE-RP-CD-05003) and in Figure 5-1. The ten catchment outfalls and descriptions are summarised in Table 5-1.

Table 5-1: Drainage Catchments

Outfall Reference	Discharge Location/Water Body	WFD Designated (Y/N)	Drains to WFD Designated Water Body (Y/N, distance downstream/m)
Highways Catchment 1	Discharges to South Hykeham Catchwater	Y	Y – River Witham approximately 2.5 km further downstream
Highways Catchment 2	Discharges to South Hykeham Catchwater	Y	Y – River Witham approximately 2.5 km further downstream
Highways Catchment 3	Discharges to South Hykeham Catchwater	Y	Y – River Witham approximately 2.5 km further downstream
Highways Catchment 4	Discharges to a riparian watercourse between Wath Lane and the South Hykeham roundabout	N	Y – River Witham approximately 2.5 km further downstream

Highways Catchment 5	Discharges to a riparian watercourse between Wath Lane and the South Hykeham roundabout	N	Y – River Witham approximately 2.5 km further downstream
Highways Catchment 6	Discharges to Green Lane Drain	N	Y – South Hykeham Catchwater approximately 440 m further downstream
Highways Catchment 7	Discharges to Green Lane Drain	N	Y – South Hykeham Catchwater approximately 440 m further downstream
Highways Catchment 8	Discharges to a proposed ditch near Somerton Gate Lane	N	Y – River Witham approximately 1 km further downstream
Highways Catchment 9	Discharges to a proposed ditch near Somerton Gate Lane	N	Y – River Witham approximately 1 km further downstream
Highways Catchment 10	Discharges to infiltration basin	Y	Y – Catchment drains to Witham Limestone Unit A water body

Figure 5-1: Proposed Drainage Strategy Concept



5.2.4 Prior to discharge to a watercourse, surface water flows are to be restricted to greenfield rates (or existing rates for existing areas of road) to ensure there is no increase in peak surface water flows to watercourses and therefore no resulting increase in surface water flood risk. To provide this reduction in peak flows from the proposed scheme, attenuation storage is to be provided in the form of detention basins, for up to and including the 1 in 100-year return period including allowances for the predicted effects of climate change over the lifetime of the development.

5.2.5 Similarly, where infiltration of runoff to ground is proposed for catchment 10, the infiltration basin will be designed to store runoff for up to and including the 1 in 100-year return period, including allowances for climate change over the lifetime of the development.

5.2.6 Runoff will be conveyed to storage features (the detention basins and infiltration basin) via ditches in line with existing topography.

5.2.7 In addition to ensuring there is no increase in surface water flood risk following implementation of the proposed scheme, the use of the above SuDS features will also provide water quality treatment in line with Construction Industry Research and Information Association (CIRIA) guidance[4]. Water quality features are discussed further in Section 5.5 below, where the potential impact of the proposed scheme on water quality is discussed in detail.

[4] CIRIA SuDS Manual 2015, 978-0-86017-760-9

5.3 Impact Assessment

5.3.1 As discussed in Section 4 above and Table 4-3, the following potential risks to receptors have been identified:

- Hydromorphology
- Water Quality/Groundwater
- Biology: Habitats

5.3.2 These risks are discussed in the following sections.

5.4 Hydromorphology

5.4.1 Potential impacts arising from the proposed scheme elements would include those resulting from the introduction of an earth embankment into the floodplain, those resulting from the introduction of piers within the banks of the River Witham, and those resulting from the new surface water storage and outfalls. Significant effects could take place if appropriate mitigation is not carried out. Design measures will include the passive design of bridge piers to minimise risk of scour to the existing bank, the suitable design of all culverts to current standards to ensure sufficient capacity is provided, a surface water drainage design that is cognisant to the existing environment, and a suitable CEMP to manage environmental risks during construction.

5.4.2 All six of the WFD water bodies outlined in Table 4-1 are likely to be impacted by the proposed scheme. With mitigation described in Section 5.4.1 however, no temporary or permanent effects are anticipated.

5.5 Water Quality/Groundwater

5.5.1 HEWRAT assessments completed in order to inform drainage design showed that catchments one, two and three were found to fail without mitigation due to excessive sediment accumulation. Cumulative mitigation measures of 81% were found to be required to pass the assessment. It is proposed this be achieved with the following design measures including grassed surface water channels (GSWCs) adjacent to the carriageway that will outfall at intervals into either a piped system or a carrier ditch, before entering proposed attenuation ponds. These design measures are demonstrated in the drainage strategy to sufficiently reduce the amount of highway-derived sediment reaching the receiving watercourse.

5.5.2 The water quality assessment for catchments four, five, six, seven, eight, and nine passed both individually and cumulatively.

5.5.3 A risk assessment of a serious spillage causing a pollution incident was undertaken using the methodology outlined in LA113. All assessment points passed, with the spillage risk calculated as less than 1% at all locations.

5.5.4 The risk to groundwater from catchment ten was calculated to be medium. With incorporated mitigation, including GSWCs, a sediment forebay for the infiltration basin, and the inclusion of a penstock, the risk to groundwater quality is calculated to be acceptably low.

5.5.5 All six of the WFD water bodies outlined in Table 4-1 are likely to be impacted by the proposed scheme. The impact however is likely to be negligible, as defined in LA113 Road drainage and the water environment[5], due to the water quality treatment measures proposed as part of the Water Quality Assessment (NHRR-RAM-HDG-HYKE-RP-CD-05004).

5.6 Biology: Habitats

5.6.1 The potential pollution and runoff effects of construction will be mitigated through the implementation of a CEMP. The CEMP will deliver avoidance and design measures such as the use of bunds to catch and divert runoff, and the use of drip trays to prevent any oil and fuel spillages spreading. Windblown dust will be minimised by using wheel washing and damping down measures, while net fencing will catch windblown rubbish. Watercourse banks will be protected from damage by construction plant. Further mitigation and enhancement measures, as well as detailed findings with respect to aquatic and other habitats, are detailed in the Biodiversity ES Chapter (NHRR-TEP-EGN-HYKE-RP-LE-30002).

5.6.2 The Drainage design for the proposed scheme will incorporate GSWCs and catchpits to prevent runoff and silt entering the River Witham, as well as retained ditches, new ponds, and SuDS on-site.

5.7 Mitigation Measures Assessment

5.7.1 A heavily modified water body is defined as a body of surface water which as a result of physical alterations by human activity is substantially changed in character[6]. Although three of the six WFD water bodies are classified as heavily modified, they are not considered to be defined as heavily modified for the same purpose as the proposed scheme. Many of the mitigation measures currently in place relate to in-channel river improvements and floodplain restoration and management. No in-channel works are being proposed as part of the scheme and while the proposed alignment would involve construction in the floodplain this would be designed to ensure the floodplain can still function as before (see Flood Risk Assessment - NHRR-RAM-EWE-HYKE-RP-LE-22002). Measures relating to invasive species are not relevant to this scheme given the proximity of identified species in relation to the water bodies at the site. Measures relating to pollution are not relevant to this scheme given the measures included as part of the Water Quality Assessment (NHRR-RAM-HDG-HYKE-RP-CD-05004). The mitigation measures in place for the Anglian River Basin District are not considered to be affected by the proposed scheme. The proposals therefore do not pose a risk to the mitigation measures and therefore a mitigation measures assessment is not required.

5.8 Deterioration and Risk to Good Status Assessment

5.8.1 Based on the findings of the assessments discussed above, the proposed scheme would:

a) Not result in reduction of WFD classification in any water bodies;

b) Not put at risk the good status/potential of any water body; and would

[5] LA113 Road drainage and the water environment, Revision 1 [online]. Available at: https://www.standardsforhighways.co.uk/tses/attachments/d6388f5f-2694-4986-ac46-b17b62c21727?inline=true. Accessed May 2023.

[6] DEFRA, Environment Agency, Water for life and livelihoods, River Basin Management Plan South East River Basin District, Annex I: Designating artificial and heavily modified water bodies [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/289962/geso0910bstj-e-e.pdf. Accessed July 2023.

c) Not inhibit any water body from progressing towards good status/potential.

6. CONCLUSIONS

6.1.1 It is concluded from the above assessment that, with implementation of the noted design measures plus environmental management during construction, the proposed scheme would not have any adverse impact on the surface water and groundwater bodies within and adjacent to the scheme. It is thus in compliance with the requirements of the WFD and supports the Witham RBMP and Anglian Groundwater Management plan.