VikingCCS

Viking CCS Pipeline

Environmental Statement Volume IV – Appendix 11-6: Outline Surface Water Management Plan

Document Reference: EN070008/APP/6.4.11.6

Applicant: Chrysaor Production (U.K.) Limited,
a Harbour Energy Company
PINS Reference: EN070008
Planning Act 2008 (as amended)
The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 - Regulation 5(2)(a)
Date: October 2023

Harbour Energy | AECOM

PINS Reference	Document Reference	Document Revision	Date
EN070008	EN070008/APP/6.4.11.6	Revision 1	October 2023

Prepared by		Verified by		Approved by
KB		OT		MW
Water Environment Principal Consultant		Water Environment Associate Director		EIA Technical Director

Prepared by:

AECOM Limited
Exchange Station
Tithebarn Street
Liverpool
Merseyside
L2 2QP

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1 Introduction

1.1 Overview

1.1.1 This Outline Water Management Plan (OWMP) sets out the water management principles and procedures to be applied throughout the construction period of the Viking CCS Pipeline (referred to herein as the 'Proposed Development') to prevent pollution and physical damage to water features. This is in keeping with the requirements of *ES Volume II Chapter 11: Water Environment (Application Document 6.2.11)*.

1.1.2 As an 'outline' management plan it describes the broad principles and mitigation measures that are to be implemented during the construction works to ensure that adverse impacts on water features can be avoided, minimised or reduced, and supports the outcome of the impact assessment reported in *ES Volume II Chapter 11: Water Environment (Application Document 6.2.11)*. Some aspects of this plan remain high level, with the full detail to be provided in the final WMP to be prepared post DCO consent by the Contractor in line with any conditions and requirements of the given consent.

1.1.3 Please note that this OWMP does not deal with the management of the volume of surface water from the construction site, which is something that will be determined by the Contractor at a later stage and during the works themselves in response to changing weather conditions. This will be covered by the Water Efficiency Management Plan post-consent.

1.2 Project Description

1.2.1 The overall Viking CCS Project intends to transport compressed and conditioned CO_2 received at the Immingham Facility to store in depleted gas reservoirs in the Southern North Sea. The Oil and Gas Authority (now known as the North Sea Transition Authority) awarded the Applicant a CO_2 appraisal and storage licence in 2021. The Viking CCS Project aims to transport and store up to 10 million tonnes of CO_2 annually by 2030, rising to 15 million tonnes by 2035.

1.2.2 The main elements of the overall Viking CCS Project comprise of:

- The Viking CCS Pipeline (i.e., the Proposed Development) which consists of the Immingham Facility, an onshore pipeline from Immingham to Theddlethorpe with three Block Valve Sites, the Theddlethorpe Facility (Option 1 and 2), Dune Isolation Valve and an offshore pipeline tie-in and outlet up to Mean Low Water Springs (MLWS); and
- Crossings of over 100 watercourses including Main Rivers, Ordinary Watercourses, and Internal Drainage Board watercourses.

1.2.3 Construction of the Proposed Development will include a wide range of construction activities including, but not limited to, site clearance, setting up of temporary construction compounds, earthworks and excavations, works in and near watercourses, pipeline placement and temporary watercourse crossings.

1.2.4 During works there will need to be the creation of temporary haul roads and temporary crossings. The precise details of the temporary crossing (e.g., flume, Bailey Bridge etc.) has been determined by watercourse importance. Flume pipes are temporary pipes placed in the watercourse to permit the flow of water through the pipe. Flume pipes will be sized to reflect the span width and the estimated flow characteristics of the watercourse under peak flow conditions. Where installation of a flume pipe crossing is not suitable then a temporary

spanned bridge (Bailey type bridge) can be installed and requires the construction of a raised soil platform each side of the watercourse (set back from the watercourse banks) before a temporary bridge structure is lifted onto the spoil platform. Temporary bridges and their supports will be designed specifically to consider the span length and the weight and size of plant and equipment that will cross the bridge.

1.3 Indicative Construction Programme

1.3.1 **Table 1** provides a summary of the broad programme for the construction of the proposed development. From the commencement of the construction activities to completion of commissioning, the construction programme is expected to last approximately 15 months. Main pipe laying works are predominantly planned during late spring, summer and early autumn months.

1.3.2 This programme was correct at the time of writing (August 2023) but is subject to change. Key works with relevance to the potential pollution risk to the water environment have been included. These works include site clearance, earthworks and excavations, construction of bridges and installation of flumes.

Table 1: Summary of Main Works and Indicative Programme

Activity	Sub activity	Start date	End date	Key tasks within activity most relevant to the water environment
Main Construction Works				
Mobilisation / Enabling Works	All works	Sept 2025	Sept 2026	• Establishing Construction Compounds (including pipe storage areas, access and laydown areas. • Setting out Right of Way (RoW) and install all fencing • Removal of hedges and trees • Subsoil grading, benching, and running track installation • Pipeline route marking • Preconstruction drainage
Preparation Works	Section 1	Jan 2026	Apr 2026	• Clear out • Brash processing. • Expose buried utility services
	Section 2	Apr 2026	May 2026	
	Section 3	May 2026	June 2026	
	Section 4	June 2026	July 2026	
	Section 5	Jan 2026	Apr 2026	
Pipeline Construction	Section 1	Jan 2026	May 2026	• Pipe trench excavation • Excavated material stored • Pipe lower and lay • Trench back fill
	Section 2	May 2026	July 2026	
	Section 3	June 2026	Aug 2026	
	Section 4	July	Oct	

Activity	Sub activity	Start date	End date	Key tasks within activity most relevant to the water environment
		2026	2026	
	Section 5	Apr 2026	July 2026	
Trenchless Crossings Constructions	All works	Apr 2026	Aug 2026	
	Horizontal Directional Drilling	April 2026	August 2026	• Digging two pits (launch and reception pits) either side of the crossing section • The pilot hole will be drilled • Drilling will progress utilising the hydraulic cutting action provided by a combination of the tool bits and a drilling fluid • HDD equipment will be disassembled and transported from site • Excavations will be backfilled and compacted using track or wheel-mounted excavators and compaction equipment to a standard that ensures no future subsidence will occur.
	Guided Auger Bore	Apr 2026	June 2026	• Digging two pits (launch and reception pits) either side of the crossing section • A solid base foundation will be installed in the bottom of the launch pit excavation • Drilling will then be carried out • Excavation supports are removed, the excavations will be backfilled and compacted using track or wheel-mounted excavators and compaction equipment
	Auger Bore	Jan 2026	Aug 2026	
Construction of above ground installations	All works	Dec 2025	July 2026	• Construction of drainage measures (where required); • Earthworks to establish foundation levels; • Formation of plant foundation bases, chambers and above ground structures; • Construction of pipework and equipment and associated infrastructure;
	Immingham	Dec 2025	May 2026	
	Theddlethorpe	Dec 2025	July 2026	

Activity	Sub activity	Start date	End date	Key tasks within activity most relevant to the water environment
				• Installation of instrumentation and control (I&C) works and electrical installation; • Testing and quality control; • Installation of permanent security fencing; and • Perimeter reinstatement landscape works
Construction of Block Valve Sites	All works	Mar 2026	Oct 2026	• Civil works • Ground preparation and landscaping • Construction of equipment foundations • Laying of access roads • Paths and drainage • Fencing
	BVS #001	Mar 2026	Aug 2026	
	BVS #002	May 2026	Sept 2026	
	BVS #003	June 2026	Oct 2026	
Hydrostatic testing	All works	Oct 2026	Oct 2026	• Temporary test ends will be welded or bolted to both ends of the pipeline section • Water quality tested • Test ends filled with water and pressurised for 24 hours • Water within the pipeline will be tested again before it is discharged to another pipeline test section to be re-used • Water discharged locally in accordance with discharge permits or emptied into a road tanker to be disposed of
Post-construction works	All works	Apr 2026	Oct 2026	• Sub soil ripping and grading • Top soil re-spread over working width • Top soil harrowing, stone picking and re-planting to make suitable for agricultural use again

1.4 Potential Impacts on the Water Environment

1.4.1 The Proposed Development has the potential to cause adverse impacts to the water environment during construction. These impacts were considered in *ES Volume II Chapter 11: Water Environment (Application Document 6.2.11).* A summary of the activities, receptors and impacts can be found in Annex B. The following sections describe the potential effects of the Proposed Development and provide the context for the mitigation measures referred to later in this OWMP. During the construction phase the following adverse impacts may occur:

Mobilisation of fine sediment affecting water quality through runoff or scour

1.4.2 Construction activities such as earthworks, excavations, site preparation, levelling and grading operations result in the disturbance of soils. Exposed soil is more vulnerable to erosion during rainfall events due to loosening and removal of vegetation to bind it, compaction, and increased runoff rates.

1.4.3 Surface runoff from such areas can contain excessive quantities of fine sediment, which may eventually be transported to watercourses where it can result in adverse impacts on water quality, flora and fauna. Construction works within, along the banks and across watercourses can also be a direct source of fine sediment mobilisation. In addition, dewaters from excavations may also contain suspended solids. When excessive levels of fine sediment enter a watercourse, it may smother macrophytes, invertebrates and substrate important for fish and invertebrates (particularly fish spawning gravels).

1.4.4 Dewatering activities may also generate excessive quantities of fine sediment within the abstracted water. If the abstracted water is not treated and discharged to watercourses properly, it can result in adverse impacts on water quality, flora and fauna.

Impacts to hydromorphology of watercourses

1.4.5 The impacts associated with the flume crossing primarily come from changes in flow dynamics and patterns of erosion. Temporary removal of the bed substrate (that will be stored separately for replacement after completion of the works), and installation of the temporary culverts can encourage material to be deposited upstream of culvert and scour of the bed and / or banks downstream where there is a material deficit (due to changes in flow).

Release of oils and / or other chemicals affecting water quality

1.4.6 Contamination of surface waters and soil could result from leakage and spills of fuels, oils, chemicals, and concrete during construction affecting watercourses indirectly via site runoff or directly where works are close to and within a water feature. Contamination may reduce water quality and impact aquatic fauna and flora.

Increased runoff from an increase in compacted and hardstanding areas

1.4.7 Any construction works that impede on the floodplain have the potential to increase the rate and volume of runoff and increase risk of blockages in watercourses that could lead to flow being impeded, and a potential rise in flood risk. Earthworks may also alter flow pathways and the compaction of the ground and vegetation clearance would also increase the rate and volume of runoff.

1.5 Purpose of the Outline Water Management Plan

1.5.1 The OWMP is designed to ensure that the requirements of relevant environmental legislation, the DCO, the commitments set out in the ES and the CEMP, and any conditions of environmental permits, land drainage consents and other licences (where not disapplied by the DCO) are complied with. It shall be the responsibility of Harbour Energy to ensure that the Proposed Development is executed in a manner that demonstrates its commitment to the care and protection of the aquatic environment.

1.5.2 The OWMP does not provide site specific details of how the Principal Contractor (PC) will manage construction site runoff, chemical spillage risk or ensure that water features are not physically damaged, as the level of risk will constantly be changing and there are many ways in which these risks can be addressed. Instead, the OWMP creates the framework within which the PC and all sub-contractors shall operate on Site for the duration of the works.

1.5.3 This OWMP has been prepared by AECOM on behalf of the applicant, Harbour Energy. The final WMP to be prepared post DCO consent by the Contractor is response to any requirements of the approved DCO.

1.5.4 Construction method statements prepared by the PC will be submitted to the EA or LLFA as part of applications for temporary works environmental permits/land drainage consents. The treatment trains and pollution prevention measures will be in keeping with the objectives, requirements and mitigation measures set out in this plan, including how clean and dirty water will be kept separate, how fine sediment will be trapped and removed from construction run-off, and how spillage risk will be carefully managed.

1.5.5 The PC will implement this plan and in doing so will need to ensure that:

- The WMP is implemented in accordance with the DCO, CEMP (*Construction Environmental Management Plan (for the draft CEMP see ES Volume IV Appendix 3.1).*
- Construction Method Statements are prepared in line with the minimum requirements set out in the WMP and submit these to the EA for approval; and
- The WMP is reviewed regularly and under each of the specific circumstances set out later in this plan.

1.6 Document Control

1.6.1 Any revisions to this plan will be agreed and approved by the Project Manager and recorded in the Change Register. The WMP will be a ‘live’ document, which will be kept under continuous review by the PC. This is to consider any additional environmental information obtained during the detailed design and construction phases, changes in legislation, policy and best practice, and any lessons learned on the Development. It will also allow for the inclusion of any further conditions and amendments that arise from the granting of any temporary works environmental permits, a review of environmental monitoring results or the legitimate concerns of Third Parties.

1.7 Responsibilities

1.7.1 The following responsibility apply:

- All personnel and sub-contractors working on the project will perform their duties in accordance with the requirements of the WMP;

- The Environmental Manager (or other similar title) will report regularly to the Project Manager on the status and effectiveness of its implementation;
- The Environmental Manager and Environmental Clerk of Works (or other similar titles) or other suitably qualified person will be responsible for implementing the 'during works' Water Quality Monitoring Programme described in Section 4; and
- Both the Environmental Manager and Environmental Clerk of Works will have powers to stop or request a change to the method statement of any works they consider are not compliant with this WMP or are causing or are likely to cause pollution.

1.8 Training

1.8.1 The Sites Environmental Manager will provide training to all personnel on Site including subcontractors on water pollution prevention measures. This will include works that have a higher risk of leading to a pollution incident, such as silt/ fuel/ oil storage, refuelling, cement and concrete works, working in watercourses, managing silt in runoff, pumping and over pumping, washing down plant and machinery, and spillage control on Site and emergency procedures. In addition:

- Site notice boards will display incident and emergency procedures details and protocols. These will be updated as and when circumstances dictate;
- Site inductions and toolbox talks will be carried out to highlight emergency and incident procedures to all staff working on Site;
- Flood/ evacuation drills to be carried out;
- Detailed spill drill training will be delivered to all necessary Site personnel with designated spill stations placed at high risk areas;
- ADR training for the transportation of fuel if required;
- Weekly environmental inspections will be carried out on Site by a suitably qualified person on site (e.g., Environmental Clerk of Works, Project Manager or Environmental Manager) to ensure all facilities are being maintained and activities are compliant with company procedures; and
- The latest pollution prevention guidance (e.g., GPP, PPG, CIRIA guidance) will always be followed through incorporation into the PC's Site procedures.

1.9 Relationship with other Plans

1.9.1 A Draft CEMP is being developed by AECOM that will be adopted by the Contractor (*ES Volume IV Appendix 3.1*). The CEMP will cover all aspects of construction works and potential environmental effects during that phase of the project. The CEMP would be reviewed, revised and updated once the project progresses towards construction to ensure all potential impacts and effects are summarised and minimised by proposed mitigation as far as practicable in keeping with best practice at that point in time and compliance with the ES.

1.9.2 The CEMP will describe the principles of what would be delivered and the broad approaches that may be adopted by the Contractor to deliver the require protection of the water environment. The WMP compliments the CEMP and will provide site specific information of how the risks to the water environment from potential pollution and the risk of physical damage would be managed. This OWMP has been developed by AECOM, this will be developed further at the FEED stage, which include technical input from the Contractor.

1.9.3 In addition, the WMP will also be supported and complemented by the Emergency Preparedness and Response Plan. The Emergency preparedness and response plan sets out the controls that Harbour Energy and their supply chain will implement to minimise the risk to the health and safety of the workers and environment due to an emergency and to manage and report environmental incidents. This will be developed by the contractor.

1.10 Reviewing the Water Management Plan

1.10.1 As stated in Section 1.3 (under 'Document Control'), the WMP will remain a 'live' document that is continuously kept under review throughout the period of the construction work. In addition to this, the plan will be reviewed to ensure adequacy under the following circumstances:

- Not less than a monthly review from the date of first approval by the Local Planning Authorities (LPAs) and/or the Planning Inspectorate;
- On the granting of any relevant variation of the planning permission;
- On the granting of or any relevant variation to relevant environmental permits or consents required for the authorised development; and
- In light of any significant changes to proposed Works and/ or site-specific activities (including any significant pollution incidents).

1.10.2 Relevant changes to the planning permission, environmental permits or other consents are those where the risk to the water environment from the works may change (i.e., environmental permits or licences from the Environment Agency or consents from the LLFA).

1.10.3 The LPA will be informed in writing within seven days of the completion of a review of any changes that have been proposed or the reasons why changes are not being implemented.

1.10.4 Where, having considered the notice of review the LPA considers that an amendment is required, the LPA may notify the PC within seven working days of receipt of the notice of review.

1.10.5 Where the PC considers that a further amendment is required and/or the relevant LPA serves a notice to the PC that they must submit an amended plan for their written approval, this must be received by the LPA within 4 weeks of the date of the completion of the review (in consultation with the Environment Agency).

2 Legislation and Planning Policy Framework

2.1 Legislation

Legislation

2.1.1 This section outlines the legislation, planning policy and guidance documents relevant to the assessment of impacts of the Proposed Development on the water environment and discussed in greater depth in Chapter 11 of the ES *(ES Volume II Chapter 11: Water Environment (Application Document 6.2.11)*. The objectives of relevant European Directives, among other national obligations, are delivered through the following UK Legislation and are not also listed.

2.1.2 The potential impact of the Proposed Development on the water environment is considered in relation to the following national legislation:

- Environment Act 2021 (Ref 1);
- Water Act 2014 (Ref **2**);
- Flood and Water Management Act, 2010 (Ref **3**);
- Environment Act 1995 (Ref **4**);
- Land Drainage Act 1991 (Ref **5**);
- Water Resources Act 1991 (Ref **6**);
- Environmental Protection Act 1990 (Ref **7**);
- Salmon and Freshwater Fisheries Act 1975 (Ref **8**);
- Control of Pollution Act 1974 (Ref **9**)
- Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (Ref **10**);
- Environmental Permitting (England and Wales) Regulations 2016 (Ref **11**);
- Environmental Damage (Prevention and Remediation) Regulations 2015 (Ref **12**);
- Flood Risk Regulations 2009 (Ref **13**);
- Eels (England and Wales) Regulations 2009 (Ref **14**);
- Groundwater (England and Wales) Regulations 2009 (Ref **15**);
- Control of Substances Hazardous to Health Regulations 2002 (Ref **16**); and
- Control of Pollution (Oil Storage) (England) Regulations 2001 (Ref **17**).

National Planning Policy

2.1.3 National Planning Policy relevant to the water environment is detailed below:

- Overarching NPS for Energy (EN-1) (Ref **18**);
- Revised (draft) Overarching NPS EN-1 (Ref **19**);
- NPS for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (Ref **20**);
- National Planning Policy Framework (NPPF) (Ref **21**);

- Planning Practice Guidance (PPG) Water supply, wastewater and water quality (last updated July 2021) (Ref **22**);
- Flood Risk and Coastal Change NPPG (Ref 23);
- Defra published the 25 Year Environment Plan (updated October 2021) (Ref 24);
- Defra publishes the Environmental Improvement Plan (updated 7 February 2023) (Ref 25);
- Defra publishes the Plan for Water (update 4 April 2023);
- The Government's Future Water Strategy (Ref **26**); and
- Environment Agency River Basin Management Plans (Ref **35**).

Local Planning Policies

2.1.4 Local Planning Policies relevant to the water environment is detailed below:

- North East Lincolnshire Local Plan (March 2018) (Ref **27**);
- East Lindsey Local Plan (July 2018) (Ref **28**); and
- West Lindsey Local Plan (July 2017) (Ref **29**).

3 Summary of Key Receptors

3.1 Study Area and Water Bodies

3.1.1 For the purposes of this assessment, a general study area (zone of Influence) of 500m from the Proposed Development site boundary has been considered in order to identify water features that are hydrologically connected to the Proposed Development and have the potential to be directly impacted by the activities associated with it. This has been extended to 2km to check for hydrological connectivity to any designated sites that may need consideration. Please refer to the figures presented in Annex A.

Table 2: Receptor Importance Values in the Study Area

Pipeline Section	Water feature	Importance		
		Surface Water	Hydromorphology	Flood Risk
Section 1 – 4	Humber Estuary	Very High Importance on the basis of being a WFD designated waterbody; being designated as a SSSI and SAC immediately downstream of the DCO Site Boundary and within the study area.	Low Importance due to the significant modifications of the channel and the flow and tidal conditions.	Not applicable
Section 4 and 5	Lincolnshire Water body (coastal WFD)	High Importance on the basis of being a WFD designated coastal waterbody	Low Importance due to the significant modifications of the channel and the flow and tidal conditions.	Not applicable
Section 1	Skitter Beck / East Halton Beck Waterbody (GB104029067655)	Very high Importance on the basis of being a chalk stream, which is protected under UK habitat legislation.	Medium Importance on the basis of being a chalk stream but is artificial in character and heavily modified.	Medium importance as located within an area with industrial / less vulnerable development
	Internal Drainage Board watercourses (including Harborough Marsh Drain)	As water features which have the potential to support species such as water vole and otters, these are considered to be of Medium Importance surface water.	Low importance, artificial or heavily modified water features with artificial cross-sections.	
	Other permanent watercourses	Medium Importance receptor for water quality on the basis of not having a WFD	Low importance as generally artificial surface water features or have been heavily	

Pipeline Section	Water feature	Importance		
		Surface Water	Hydromorphology	Flood Risk
		classification but is estimated to have a Q95 flow >0.001 m^3/s.	impacted by surrounding land uses (i.e., agriculture, industrial or urban use)	
Section 2	North Beck Drain (GB104029067575)	Very high Importance on the basis of being a chalk stream, which is protected under UK habitat legislation.	Very High Importance on the basis of being a chalk stream and showing evidence of previous modification and realignment, however, shows some natural features.	Medium importance as located within an area with agricultural / less vulnerable development
	Mawnbridge Drain (GB104029067540)	High Importance on the basis of being a WFD designated watercourse but with a Q95 flow of <1.0 m^3/s.	Low Importance receptor for morphology on the basis of being largely artificial in character as a straightened channel.	
	Internal Drainage Board watercourses (including Old Fleet Drain)	As water features which have the potential to support species such as water vole and otters, these are considered to be of Medium Importance surface water.	Low importance, artificial or heavily modified surface water features with artificial cross-sections.	
	Other permanent watercourses	Medium Importance receptor for water quality on the basis of not having a WFD classification but is estimated to have a Q95 >0.001 m^3/s.	Low importance as generally artificial surface water features or have been heavily impacted by surrounding land uses (i.e., agriculture, industrial or urban use)	
Section 3	Laceby Beck / River Freshney (to N Sea) (GB104029067530)	Very high Importance on the basis of being a chalk stream, which is protected under UK habitat legislation.	High Importance on the basis of being a chalk stream and showing signs of previous alteration with minor flow levels.	Medium importance as located within an area with agricultural /

Pipeline Section	Water feature	Importance		
		Surface Water	Hydromorphology	Flood Risk
	Waithe Beck lower (to Tetney Lock) (GB104029062100)	Very high Importance on the basis of being a chalk stream, which is protected under UK habitat legislation.	Very High Importance on the basis of being a chalk stream and showing evidence of previous modification and realignment, however, shows some natural features.	less vulnerable development
	Land Dike Drain to Louth Canal (West) (GB104029062162)	High Importance on the basis of being a WFD designated watercourse but with a Q95 flow of <1.0 m^3/s.	Medium importance on the basis of its Hydromorphological Elements supporting Good Status.	
	Other permanent watercourses	Medium Importance receptor for water quality on the basis of not having a WFD classification but is estimated to have a Q95 >0.001 m^3/s.	Low importance as generally artificial surface water features or have been heavily impacted by surrounding land uses (i.e., agriculture, industrial or urban use)	
Section 4	Covenham Reservoir Water Body (GB30432209)	Very High Importance on the basis of being a WFD designated waterbody and having a critical social or economic use (e.g., public water)	Low Importance for morphology as an artificial waterbody – however over 1 km from Order Limits therefore scoped out of the assessment.	Low importance as a water compatible feature.
	Poulton Drain (trib of Louth Canal) (GB104029062010)	High Importance on the basis of being a WFD designated watercourse but with a Q95 flow of <1.0 m^3/s	Medium Importance on the basis of showing evidence of substantial modification and realignment, but still retaining some natural features	Medium importance as located within an area with agricultural / less vulnerable development
	Black Dyke (trib of Louth Canal) (GB104029062000)	High Importance on the basis of being a WFD designated watercourse and a Q95 flow of <1.0 m^3/s	Low Importance on the basis of showing evidence of substantial modification and realignment, being artificially straight with steep, incised banks in places.	

Pipeline Section	Water feature	Importance		
		Surface Water	Hydromorphology	Flood Risk
	Louth Canal (GB104029061990)	High Importance on the basis of being a WFD designated watercourse and with a Q95 flow of <1.0 m^3/s.	Low importance due to being an artificial, straight, channelised watercourse with artificial banks.	
	South Dike and Grayfleet Drain (GB105029061680)	High Importance on the basis of being a WFD designated watercourse but with a Q95 flow of <1.0 m^3/s	Low Importance on the basis of showing evidence of substantial modification and realignment, being artificially straight with steep, incised banks in places.	
	Internal Drainage Board watercourses	As water features which have the potential to support species such as water vole and otters, these are considered to be of Medium Importance surface water.	Low importance, artificial or heavily modified surface water features with artificial cross-sections.	
	Other permanent watercourses	Medium Importance receptor for water quality on the basis of not having a WFD classification but is estimated to have a Q95 >0.001 m^3/s.	Low importance as generally artificial surface water features or have been heavily impacted by surrounding land uses (i.e., agriculture, industrial or urban use)	
Section 5	Long Eau (GB105029061670)	High Importance on the basis of being a WFD designated watercourse and with a Q95 flow of <1.0 m^3/s	Low Importance on the basis of showing evidence of substantial modification and realignment, being artificially straight with steep, incised banks in places.	Medium importance as located within an area with agricultural / less vulnerable development
	Great Eau (d/s of South Thoresby) (GB105029061660)	High Importance on the basis of being a WFD designated watercourse and with	Medium Importance on the basis of showing signs of previous alteration but	

Pipeline Section	Water feature	Importance		
		Surface Water	Hydromorphology	Flood Risk
		a Q95 flow of <1.0 m^3/s	still retaining some natural features.	
	Internal Drainage Board watercourses: Mills and Harps Drain & Rotten Row Drain	As water features which support species such as water vole and otters, High Importance water features for surface water. watercourses for surface water.	Low importance, artificial or heavily modified surface water features with artificial cross-sections.	
	Internal Drainage Board watercourses	As water features which have the potential to support species such as water vole and otters, these are considered to be of Medium Importance surface water.	Low importance, artificial or heavily modified surface water features with artificial cross-sections.	
	Other permanent watercourses	Medium Importance receptor for water quality on the basis of not having a WFD classification but is estimated to have a Q95 >0.001 m^3/s.	Low importance as generally artificial watercourses or have been heavily impacted by surrounding land uses (i.e., agriculture, industrial or urban use)	
	Saltfleetby – Theddlethorpe Dunes (SSSI, SAC, NNR)	Very High Importance on the basis of being designated as a SSSI and SAC, however dependent upon coastal processes.	Very High Importance on the basis of being near to or pristine conditions, with well-developed and diverse geomorphic forms and processes.	Very High Importance on the basis of being a regional flood defence.
All	Ephemeral and/or artificial drains, ditches	Low Importance water features as industrial, artificial and ephemeral watercourses lacking any protected species (as far as currently known)	Low importance due to likely comprising ephemeral watercourses.	Low importance due to small catchment area and ephemeral nature

Pipeline Section	Water feature	Importance		
		Surface Water	Hydromorphology	Flood Risk
	Other Internal Drainage watercourses	As industrial, artificial watercourses lacking any protected species (as far as is currently known) or designations, these are considered Low Importance watercourses for water quality.	Low importance, artificial or heavily modified watercourses with artificial cross-sections (may change following detailed site visits)	Medium importance as located within agricultural or industrial areas / less vulnerable development

4 Summary of Baseline Water Quality

4.1 Environment Agency Water Quality Data

4.1.1 The Environment Agency's Water Quality Archive website contains surface water quality data for several waterbodies that either lie within the DCO Site Boundary or are hydraulically connected to a waterbody that lies within. Summary water quality data stations for the years 2018 – 2022 are presented in **Table 3** which occur in or near the Study Area. Full results are tabulated in *ES Volume IV Appendix 11-1 Water Environment supporting Baseline Information (Application Document 6.4.11.1)*.

Table 3: Environment Agency Water Quality Monitoring Summary for Laceby Beck, Waithe Beck and Bond Croft Drain 2018 – 2022.

Determinand	Units	Laceby Beck	Waithe Beck	Bond Croft Drain
		Mean	Mean	Mean
Alkalinity to pH 4.5 as CaCO3	mg/l	226.35	214.07	
Ammonia un-ionised as N	mg/l	0.0008	0.0006	
Ammoniacal Nitrogen as N	mg/l	0.05	0.03	
BOD: 5 Day ATU	mg/l	1.25	1.07	8.02
Conductivity at 25 C	us/cm	889.6	656.5	
Nitrate as N	mg/l	10.47	9.02	
Nitrite as N	mg/l	0.022	0.019	
Nitrogen, Total Oxidised as N	mg/l	10.49	9.03	
Orthophosphate, reactive as P	mg/l	0.06	0.08	
Oxygen, Dissolved as O2	mg/l	10.82	11.25	
Oxygen, Dissolved, % Saturation	%	95.41	98.38	
pH	pH units	7.90	8.28	
Solids, non-volatile at 105 C	mg/l		15.03	11.88
Temperature of Water	cel	9.87	9.71	21.70
Turbidity	ntu		11.60	

5 Water Management Plan

5.1 Introduction

5.1.1 To avoid, minimise and reduce potential adverse effects on the water environment, the mitigation measures described in Section 7 will be implemented on site during construction, in accordance with the residual effects predicted in Chapter 11 of the Environmental Statement. As part of the approach to mitigation, a programme of water quality monitoring will also be undertaken throughout the entire construction phase of the authorised development.

5.2 Purpose of Water Quality Monitoring

5.2.1 The CEMP requires that water quality monitoring should be undertaken pre, during and post-construction on *all* watercourses.

5.2.2 Monitoring is proposed to ensure that mitigation measures operate as intended and construction works are being undertaken in accordance with any permit and licence conditions. Monitoring also allows environmental problems to be identified and responded to act as early a stage as possible. Finally, monitoring will also help the PC to identify and implement environmental improvements, which will contribute to the overall environmental performance of the project.

5.2.3 The purpose of the WQMP is to gather data on the quality of emissions during construction works to ensure any discharges do not contain contaminants in concentrations that might cause pollution to any received water body, in accordance with conditions of any relevant Environmental Permits obtained from the Environment Agency or other body.

5.2.4 Water quality monitoring will be carried out even if the relevant Water Activity Permits (discharge consents) have not been granted before monitoring begins. If additional analysis is required by the Environment Agency as per permit conditions, the WQMP will be updated in accordance with the new requirements.

5.3 Water Quality Monitoring Plan (WQMP)

5.3.1 Water quality monitoring will consist of a combination of:

- Visual/ olfactory inspections looking for evidence of pollution;
- In situ monitoring using a hand-held water quality meter (to include turbidity, temperature, dissolved oxygen, pH and conductivity); and
- v sampling for laboratory analysis as required or in response to signs of pollution (e.g., as part of an investigation).

5.3.2 The WQMP will include routine sampling for laboratory analysis, however the locations and timings of this routine monitoring has not been defined at this stage. Routine monitoring may be required associated with higher risk activities (e.g., Open cut pipeline activities) and around sensitive watercourses (e.g., Chalk Streams). The routine monitoring locations will be defined during the FEED stage of the project and when the final WMP is prepared post-DCO consent.

5.3.3 Visual/ olfactory inspections of relevant construction works at all watercourses will be undertaken daily by an Environmental Clerk of Works or supervisor adequately trained in water quality monitoring during the construction period where there are works within the vicinity of said watercourses.

5.3.4 The PC will undertake a programme of daily inspections, weekly environmental inspections and monthly environmental audits to record performance and identify any corrective actions required. The Environmental Manager will carry out appropriate environmental inspections and monitoring of every aspect of the contractor's environmental performance in the form of monthly audits. Different components of the Site and works will be monitored at different frequencies. The following will be carried out by the PC at a minimum:

- A weekly site inspection will be carried out by the SHE Manager/Advisor and/or ECoW to identify any breaches and/or environmental incidents and identify suitable corrective measures. A report will be written for each inspection documenting the findings and any corrective measures suggested to be implemented;
- Monthly environmental audits will be undertaken by the SHE Manager or designated auditor. The audit will evaluate compliance with environmental legislation, requirements of the CEMP, best practice and any other NGET or scheme-specific requirements. A report will be written for each audit documenting the findings and any corrective measures suggested to be implemented;
- Daily visual inspections of all water features that may be directly or indirectly affected by the works that are being undertaken at that time (including where there are areas of exposed ground or stockpiles etc. close by or draining to a water body), plus regular in-situ water quality monitoring of the same watercourse (to include turbidity, temperature, dissolved oxygen, pH and conductivity). Where required under the requirements of any permits/ licences, additional parameters can be added;
- Daily inspections will be undertaken of plant using hydraulic oils;
- Cementitious washout – subject to specific risk assessment method statement; and
- Vandalism - Visual inspection/ Shift Reports.

5.3.5 Daily monitoring at upstream and downstream control points of the relevant construction works will be carried out to determine whether the works and associated activities are causing a pollution and/ or compliant with the relevant permits (or whether the quality change is from another third-party source, from upstream, or natural variation in quality). Sampling for laboratory analysis need only be collected from the downstream location as the results from these will be compared with the pre-construction monitoring baseline (i.e. should at any time it be identified that there is another factor present between the baseline and downstream during construction monitoring points that may significantly influence water quality, the Contractor may decide to collect samples from both locations so that any change in water quality can be correctly attributed to the right source).

5.3.6 Monitoring will be risk-based and site/ activity specific to target higher-risk activities which could result in a significant pollution incident. The timescale and frequency of monitoring at each water feature will reflect this and be outlined in the PC's site-specific method statements but will be no less than what is prescribed in this WMP for works that have the potential to result in water pollution of water bodies.

5.3.7 Monitoring during the works will commence in advance of any works starting and will continue throughout the works and could continue up to for three months post-completion of the construction phase were deemed necessary or unless otherwise agreed with relevant statutory consultees (i.e., the EA). Water quality data from during the works can also be compared to water quality data gathered before works commence to highlight if there have been any material changes.

5.3.8 Water quality monitoring will cover all relevant watercourses and water receptors including those outlined in Table 8.

5.4 Water Quality Sampling and Analysis (Laboratory)

5.4.1 Io prevent any adverse impacts from the construction of the Proposed Development on the identified receptors, it is proposed that a regime of water quality monitoring is implemented before, during and after construction works. It is recommended that a minimum of six pre-works monitoring visits are made to all water features that may be directly or indirectly affected by the works, although the more data that is collected the more robust the baseline obtained.

5.4.2 Routine water samples for laboratory analysis will be collected monthly from watercourses and undertaken by accredited laboratories under United Kingdom Accreditation Service (UKAS). It is not expected that all watercourses will be monitored but those considered most sensitive or indicative of larger catchment areas affected by the works. The programme of sampling and laboratory analysis will be linked to the programme to reflect the transitory nature of the works, to ensure that sampling is only carried out when relevant (noting that it will need to cover the pre-works baseline phase, during and potentially post-completion phase).

5.4.3 Water samples will be collected by suitably trained staff in accordance with British Standards (BS) Institution ISO 5667, particularly the following parts:

- BS EN ISO 5667-3:2012 Water quality. Sampling. Preservation and handling of water samples;
- BS EN ISO 5667-4:2016 Water quality. Sampling. Guidance on sampling from lakes, natural and man-made;
- BS EN ISO 5667-6:2014 Water quality. Sampling. Guidance on sampling of rivers and streams; and
- BS EN ISO 5667-14:2014 Water quality. Sampling. Guidance on quality assurance and quality control of environmental water sampling and handling.

5.5 Sampling Protocol

5.5.1 When sampling water features especially surface waters, it is vital to obtain a representative sample of the water feature and avoid any cross-contamination. Therefore, the following sampling protocol will need to be adhered to:

- Weather and flow conditions on the day of the sampling and proceeding few days will be noted and site photographs and videos collected;
- Samples from the watercourses will be collected from suitable and safe bank location;
- Samples from the watercourses will preferentially be collected using an extendable sampling pole or sample bucket to ensure water it is collected from the open water and away from any close bank influences;
- Sample water would be decanted on the bank into sterilised sample bottles (containing any required preservative) provided by the appointed laboratory;
- Where required by the laboratory, any samples requiring filtration (e.g., dissolved metals) will be filtered on site using 0.45 µm filters;
- Dissolved oxygen, water temperature, turbidity, pH and conductivity will be measured in situ using a fully calibrated handheld water quality meter. The use of hand-held water quality meters will be in accordance with the manufacturer's instructions; and
- All sampling and working around water will be undertaken in accordance with the appropriate health and safety requirements.

5.5.2 The use of hand-held water quality meters will be in accordance with the manufacturer's instructions.

5.6 Visual / Olfactory Monitoring

5.6.1 These inspections represent the first screen for water pollution (and in the case of any dewatering, of any potential changes in water quantity). These will consider signs of pollution such as:

- Turbid water or fine sediment deposition (compared to baseline);
- Oily sheens and water decolourisation;
- Chemical smells (i.e., odours);
- Fungus growth;
- Surface scum or litter;
- Stained sediment or flora; and
- Adverse impacts on aquatic organisms including fish mortality etc.

5.7 In-Situ Monitoring

5.7.1 Certain water quality parameters like dissolved oxygen need to be recorded in-situ in the field using handheld water quality meters. At the same time, there are other parameters (i.e., pH, conductivity and turbidity) that can be analysed in the field, and it is beneficial to record these parameters in situ. A multi-parameter water quality meter can be purchased to do this.

5.7.2 Unlike laboratory analysis, in-situ monitoring provides instantaneous results and thus helps to screen water for evidence of pollution during construction. It helps to quantify visual observations and allow conditions to immediately be compared with baseline data ranges.

5.7.3 In-situ monitoring will be undertaken as part of pre-construction baseline water quality monitoring, during the dewatering, and during post-construction monitoring. During construction, in situ water quality monitoring will be undertaken daily alongside visual and olfactory monitoring.

5.7.4 In-situ monitoring can also assist when pollution is suspected (or as part of investigations) and used on an ad hoc basis to check the quality of construction site runoff (using indicator physico-chemical parameters), which may be required depending on the outcome of temporary works environmental permit applications.

5.7.5 The Environmental Clerk or Works and / or Environmental Manager will be responsible for carrying out the in-situ water quality monitoring and ensuring that the sensors / probes are used correctly and stored and calibrated in accordance with the manufacturer's instructions. Monitoring (and the interpretation of data) may be sub-contracted to a suitably qualified person or company or delegated to other members of the site team who have received appropriate training.

5.8 Monitoring Period and Frequency

5.8.1 Visual / Olfactory inspections and in situ monitoring of relevant watercourses will be undertaken daily by the Environmental Clerk of Works and / or Environmental Manager during the construction period or more regularly when specific works are being undertaken to watercourses or during wet weather when there is a greater risk of water pollution occurring.

5.8.2 Routine water samples for laboratory analysis will be collected, from locations to be confirmed, for the following periods as a minimum:

- Be collected monthly throughout the construction programme and (if necessary following consultation with the LPA/EA/LLFA) for a minimum of 3 months post completion (to start from when the PC hands the site over to the operator;
- It may be possible for monitoring of some watercourses to be started later or stopped earlier following completion of meaningful and relevant works within that river catchment (i.e., where it is agreed with statutory consultees that there is no longer any risk of water pollution occurring from construction works);
- When relevant works (i.e., that could result in discharges to local watercourses) have been completed it may be possible to reduce the frequency of sampling. This will be confirmed through undertaking a risk assessment and in accordance with the EA and the local planning authority; and
- Additional monitoring may be required associated with the discharge of any hydrostatic test water that is used.

5.8.3 In addition to the in-situ testing outlined in Section 5.6, water samples taken from natural water features will be tested at an accredited laboratory for the parameters listed in **Table 4** as a minimum.

Table 4: Sampling Parameters to be used for Construction and Post-construction Water Quality Monitoring excluding in-situ measurements from probes

Parameter	Units	Limit of Detection	Accreditation
Conductivity @ 20C	µS/cm	10	UKAS
pH	pH Units	0.05	UKAS
Alkalinity to pH 4.5 as CaC03	mg/l	5	UKAS
Dissolved Organic Carbon	mg/l	0.2	UKAS
Turbidity	FTU	1	UKAS
Total Suspended Solids @ 105C	mg/l	3	UKAS
Total and dissolved metals	mg/l and µg/l	Various	UKAS
Chemical oxygen demand (COD)	mg/l	10	UKAS
Biochemical oxygen demand (BOD) 5 Day ATU	mg/l	1	UKAS
Speciated Polycyclic Aromatic Hydrocarbons (US EPA 16)	µg/l	0.01	UKAS
Extractable / volatile aliphatic & aromatic hydrocarbons (speciated)	mg/l	Various	UKAS
Total Petroleum Hydrocarbons (TPH)	µg/l	100	UKAS
Nitrate	mg/l	0.02	UKAS
Nitrite	mg/l	0.2	UKAS
Orthophosphate (as P)	mg/l	0.03	UKAS
Total phosphorus	ug/l	0.7	UKAS
Total Organic Carbon (TOC)	mg/l	2	UKAS

6 Pollution Prevention

6.1 Introduction

6.1.1 This section describes the water management principles and pollution control techniques that will be implemented throughout the construction of the authorised development.

6.1.2 During construction, and as described in Section 5, it is proposed to undertake water quality monitoring to ensure that mitigation measures are operating as planned and preventing pollution. Despite these measures, there remains a residual risk that water pollution occurs, and so monitoring provides assurance that should this happen, it can be quickly identified, and appropriate action taken in line with the Environmental Emergency Response Plan (EERP), which will be developed by the PC.

6.1.3 Although regular site visits to all water features that may be affected should be continued (as in the pre-construction monitoring), it is proposed that daily observations by the PC will be carried out while works are ongoing that may cause impact, together with any ad hoc sampling as required or in response to signs of pollution (e.g., as part of an investigation). This will enable the PC to identify if the construction works are impacting the receiving watercourses so they can act accordingly.

6.1.4 Anyone on Site should have received the appropriate incident training and be familiar with the EERP.

6.2 Best Practice Guidance

6.2.1 All construction works for the Proposed Development will be undertaken in accordance with best practice techniques to avoid any pollution of waterbodies directly or indirectly and will be delivered through the CEMP and supporting management plans (*ES Volume IV: Appendix 3.1 (Application Document 6.4.3.1*)). Relevant best practice guidance is outlined in **Table 5**. As detailed in ES Chapter 11 Water Environment, mitigation measures will be implemented during the construction phase as based upon those detailed in the NetRegs Guidance for Pollution Prevention (GPP) documents and the Environment Agency's Pollution Prevention Guidelines (PPG), which aim to prevent water resource pollution.

6.2.2 Despite being withdrawn in 2015, PPGs still provide useful information and for some topics there are no corresponding GPP yet. Although they provide useful advice on the management of construction to avoid, minimise and reduce environmental impacts, they should not be relied upon to provide accurate details of the current legal and regulatory requirements and processes. They are referred to in this document alongside other current guidance, and in the context of the Scheme and future site-specific mitigation measures by the PC.

6.2.3 It is also worth noting that although the GPPs have been produced by the Northern Irish, Scottish and Welsh environment agencies only, their core principles of best practice can be applied across the UK.

6.2.4 In addition, *ES Volume II Chapter 10: Agriculture and Soils of this ES (Application Document 6.2.10).* proposes a range of standard control measures to control dust from construction activities. Such measures will be also included in the Air Quality Chapter and Dust Management Plan and are relevant in that they can require the use of water and lead to the formation of construction site runoff containing high levels of fine material.

Table 5: Summary of Relevant Pollution Prevention Guidance Documents

Guidance Title	Document ID (where provided)	Document Year (where provided)
GPP 1 Understanding your environmental responsibilities – good environmental practices (0)	GPP 1	2021
GPP 2 Guidance on Pollution Prevention Above ground oil storage (0)	GPP 2	2021
GPP3 Use and design of oil separators in surface water drainage systems (0)	GPP 3	2022
GPP 5 Works and maintenance in or near water for construction or maintenance works near, in, or over water (0)	GPP 5	2018
GPP 8 Safe storage and disposal of used oils (0)	GPP 8	2017
GPP 13 Vehicle washing and cleaning (0)	GPP 13	2017
GPP 19 Vehicles: Service and Repair (0)	GPP 19	2017
GPP 21 Pollution Incident Response Plans (0)	GPP 21	2021
GPP 22 Dealing with Spills (0)	GPP 22	2018
GPP 26 Safe storage - drums and intermediate bulk containers (0)	GPP 26	2019
PPG 6 Working at Construction and Demolition Sites (0)	PPG 6	2012
PPG 13 Use and Design of Oil Separators in Surface Water Drainage Systems	PPG 13	Not applicable
PPG 15 Pollution Prevention Guidance (PGG) 15 General Guide to the Prevention of Pollution	PPG 15	Not applicable
PPG 18 Control of Spillages and Fire Fighting Runoff (0)	PPG 18	2000
British Standard - Code of Practice for Earth Works (0)	BS6031:2009	2009
British Standard - Code of practice for surface water management for development Sites (0)	BS8582:2013	2013
CIRIA C532 Control of water pollution from construction sites – Guidance for consultants and contractors (0)	C532	2001
CIRIA C609 Sustainable Drainage Systems, hydraulic, structural and water quality advice (0)	C609	2004
CIRIA C624 Development and flood risk – Guidance for the construction industry (0)	C624	2004
CIRIA C648 Control of pollution from linear construction sites – Technical Guidance (0)	C648	2006
Construction Industry Research and Information Association (CIRIA) C741 Environmental good practice on site guide, 4th Edition (0)	C741	2015
CIRIA C753 The SuDS Manual 2nd Edition (0)	C753	2015
Pollution Prevention Pays in England and Wales	Not applicable	2013
Regulatory Position Statement: Temporary Water Discharges from Excavations	Not applicable	2015 (updated April 2020)
Code of Practice for using plant protection products for England and Wales	Not applicable	2006

6.3 Management of Construction Site Runoff Risks

6.3.1 The management of construction site runoff and spillages to water bodies will be carefully managed across the whole Proposed Development to avoid adverse environmental impacts by preventing pollution. There may also be other environmental impacts to take into account in the approach at any one time (e.g., ecological interests in watercourses or the risk of excessive dust generation from exposed earth stockpiles).

6.3.2 Potential adverse impacts may be acute (i.e., very high concentrations of a polluting substance persisting for a short time measured in hours) or chronic (lower concentrations of a polluting substance but still above background and persisting over longer periods of time such as days, weeks and even months etc.).

6.3.3 In **Table 6** measures have been set out that provide an appropriate level of protection and risk management, although it would be for the PC to decide how best to manage construction site runoff and different measures or approaches may be most suitable in different locations and activities across the Site (for example, the measures to manage works in the channel would be different to works that are close to but only adjacent to the channel).

6.3.4 It is important to note that the effectiveness of measures implemented to treat fine sediment in runoff will also reduce with use unless they are maintained (e.g., trapped silt removed). It is therefore important that the PC continually monitors the measures they put in place to manage fine sediment in runoff and that they have a pallet of options to select from (Annex C).

6.3.5 Furthermore, the construction works are not a static operation and will need to evolve and adapt to changing circumstances during the preliminary and main construction phases. These might include changes to the nature of the works being undertaken or the prevailing weather conditions.

6.3.6 To allow excessive fine sediments, chemicals, fuel, other oils and cementitious products or potentially polluting substances to enter the water environment without permission from the Environment Agency would be in breach of the Water Resources Act 1991 (as amended) and the Environmental Permitting (England and Wales) Regulations 2016.

6.3.7 Mitigation requirements related to the management of construction run off, construction site spillage risk and working above or adjacent to water are detailed in **Table 6**. The management of flood risk is included in the FRA (see *ES Volume IV Appendix 11.4 FRA*).

Table 6: Summary of Potential Mitigation Measures During Construction Works

Potential Impacts	Management of Impacts
Site Runoff	
Excessive fine sediment in runoff, either in suspension or deposited directly, can adversely impact the environment and water uses and these are described below: <u>Fish/ Aquatic Fauna</u> Physiological and behaviour effects on fish and other aquatic fauna; Direct mortality (although complex); Reduced reproduction and growth through the degradation of spawning habitat/ redds and smothering of eggs and yolk-sac fry; Gill irritation / trauma / altered blood physiology; Impeded fish movement, altered foraging behaviour and reduced territory; and Lead to trophic effects on fish through changes in invertebrate communities in response to high and persistent sediment loads and effects on food sources. <u>Macrophytes and Invertebrates</u> Smother macrophytes, invertebrates and substrate important for fish/ invertebrates (particularly fish spawning gravels); Reduce water clarity and increase turbidity, exerting a negative effect upon primary production; and Depress oxygen levels by reducing the potential for plants to photosynthesise and exerting a Sediment Oxygen Demand; and have aesthetic effects that discourage or prevent local recreational uses of watercourses or require the temporary, partial or full postponement of water sports events held on the lake. <u>Water Supply</u>	Topsoil stripping should be undertaken outside of the winter period (October to March inclusive) where possible during which wetter weather is more likely. Topsoil and subsoil will not be stored directly adjacent to the watercourse but will be stored a minimum of 20m from the watercourse, with additional mitigation such as silt fences installed if there is a risk of sediment entering the watercourse. No topsoil or subsoil will be stored within a fluvial or surface water flood zone (flood zone 2 and 3) unless supported by a risk assessment (i.e., consideration of weather forecast and duration of storage) and additional mitigation (i.e., drainage bypass channel for overland flow). Where site constraints mean that it is not possible to maintain a 20m buffer from a water body, additional mitigation measures will be implemented to provide an adequate barrier between the potential source of contaminated runoff and the receptor. Smaller stockpiles could be created, reducing the pile height. Short term periods of wet weather will be avoided when undertaking earth moving works, if possible, to minimise the risk of generating runoff contaminated with fine particulates. If there is forecast more than 15 millimetres (mm) of rain over 24hr period then topsoil stripping should cease until the soil is dry or 24 hours has passed, whichever is the sooner or otherwise additional action taken to dry out the working area. This is to avoid working in waterlogged conditions. Where unavoidable, the adequacy of standard mitigation measures should be continuously reviewed. Vegetation clearance and topsoil strip should be limited as much as practicable. Where possible, vegetation clearance across the Proposed Development will be phased to minimise the areas of exposed ground and reduce the potential risk for runoff. The Contractor will prepare a temporary works drainage strategy prior to construction works. This will set out appropriate measures to manage runoff rates and be prepared in accordance with the pollution prevention measures set out in this OWMP. The temporary works drainage strategy will define the installation of pre-construction drainage measures to intercept run-off and

Potential Impacts	Management of Impacts
Reduce quality and aesthetics of water abstracted for Private Water Supplies, as well as reduce the performance of any treatment processes (e.g., UV filters), making it unsuitable as a potable supply. <u>Flood management</u> There is a risk the sediment washed from the works could enter and become deposited in the open channels, decreasing channel capacity and increasing flood risk	ensure that discharge and runoff rates are controlled in quality and volume, in turn causing no degradation to water quality. This may include specific measures to be used in high-risk areas (for example construction along or across steep gradients and water course crossings). A phased approach may be taken to the development of the temporary works drainage strategy to reflect the phasing of the construction programme. Depending on ground conditions and weather conditions a geotextile membrane and stone surface and/or bog-mats may be used in selected areas. The geotextile will need to be regularly monitored and any excessive build-up of fine sediment removed. Please refer to Annex C for examples of measures that can be used (including Installation of cut off trenches/ catchment drains, drain covers, sand bags, earth bunds and lagoons, geotextile silt fences/matting, straw bales, or proprietary treatment (e.g., lamella clarifiers)). In addition: • Turfs removed to be retained for lining haul road drainage; • Early provision of permanent drainage works (e.g., swales); • 'Dirty' site water/ 'clean' site water to be kept separate; and • Operate a permit to pump system. The location and condition of existing land drainage will be established, and a record compiled. A specialist drainage contractor in most instances will carry out the work. Subject to landowner/occupier agreement, existing drains should be restored, or new drains established to help prevent damage to soil structure, maintain work areas in a dry condition and to enable current drainage systems to continue to operate through the construction period. Flumes for haul road crossings will be sized to maintain the current land drainage regime and the existing flow, following a study to understand the hydrology of the watercourse being crossed in order to assess the range of flows likely during the temporary works Watercourse crossing locations will be micro-sited to make the crossing as close to perpendicular to the watercourse as reasonably practicable, ensuring the crossing is as short as possible and for open cut / temporary access crossings reducing the risk of localised scour at the structures. They will also

Potential Impacts	Management of Impacts
	be designed to maintain downstream flows and to allow continued and unobstructed passage for aquatic organisms and mammals (e.g., otter and water vole) using river corridors.
	For water features that are being flumed, a phased approach of flume removal should be undertaken
	Where temporary crossings and open-cut crossings of drains connect to chalk streams downstream, the sediment management approach should also include an additional measure due to the high sensitivity of chalk rivers to fine sediments (e.g., in-channel straw bales, silt matts, bubble curtains) (Annex C).
	The effectiveness of fine sediment control measures must be continually monitored, managed and adapted to the Site-specific needs at any given time (e.g., build-up of silt in temporary construction SuDS or against fabric silt fences, or the decomposition of straw bales).
	Appropriately sized runoff storage areas for the settlement of excessive fine particulates in runoff will be provided. The PC will need to monitor the build-up of fine sediment in temporary construction SuDS and when they become ineffective either remove sediment or provide replacement measures.
	Mud deposits will be controlled at entry and exits to the Site using wheel washing facilities and/ or road sweepers operating during earthworks or other times as considered necessary. The wash down of construction vehicles and equipment should take place in designated washdown areas within construction compounds. Waste wash water should be prevented from passing untreated into watercourses or groundwater. Appropriate measures will include use of sediment traps.
	Tools and heavy plant to be washed down and cleaned in designated areas on Site only. At all wash down locations, the wash down water will be collected for treatment before discharge to surface water drainage under appropriate consent and/ or agreement with Environment Agency and/ or Anglian Water, or otherwise removed from Site for appropriate disposal at a licenced waste facility.

Potential Impacts	Management of Impacts
	Debris and other material will be prevented from entering temporary surface water drainage, through maintenance of a clean and tidy Site, provision of clearly labelled waste receptacles, grid covers and the presence of Site security fencing.
	Any material imported to site, such as for supporting foundations, will be natural quarried stone or, if recycled, the material will undergo chemical testing. The suite of contaminants and site use criteria will be agreed with regulatory authorities, in order to demonstrate that the material is suitable for use on site and does not pose a risk to construction workers or the environment.
	Water quality monitoring regime to be established and recorded. Daily inspections/ watching brief to be carried out, and especially during and after wet weather as detailed in Section 4 above. Works will be stopped immediately and reviewed if silt plumes are identified within the watercourse/ water body as a result of operations involved with the works.
	Soil handling operations will be undertaken in line with the Soil Management Plan and appropriately supervised to ensure that they are suitable for re-use within the Project. Stockpiles will be placed away from watercourse to avoid runoff. Stockpile will be no nearer than 20m from any watercourse and will be either covered, fenced or seeded with grass to prevent wind whipping or runoff from them becoming contaminated with excess fine sediment. Earthworks and exposed areas / soil stockpile should be re-vegetated as soon as practicable to stabilise surface.
Spillage Risk	
Chemicals such as fuels, oils and cementitious products can have a severe impact on water quality, fish and aquatic wildlife as well as humans. These substances may affect several organism functions like respiration, feeding, and thermo-regulation. At the same time, the entire ecosystem can change temporarily	Spill kits will be available on the Site in watertight containers at key locations (such as at compounds, especially next to oil storage or refuelling locations) and locations where there is a risk to a water feature) and carried on all mobile plant. The Environmental Emergency Response Plan will identify these key locations. The SHE Manager/ Advisor is responsible for ensuring that spill kits are checked at least weekly and kept fully stocked and in good repair. Appropriate training will be given to all construction workers in their use.

Potential Impacts	Management of Impacts
because of the chemical components and elements that are toxic to the environment. These substances may also affect impact abstraction for agriculture and / or private / public water supplies making them unsuitable for use/ consumption. As such measures to control the storage, use and disposal of these substances would need to be put in place prior to and during construction.	Storage of fuel / chemicals will be in accordance with The Control of Pollution (Oil Storage) (England) Regulations 2001 & Guidance for Pollution Prevention (GPP) 8: Safe storage and disposal of used oils. Environment Agency guidance on oil storage regulations for business and preventing groundwater pollution from underground fuel storage tanks will be complied with. Within the construction compounds specific areas will be designated for the storage of chemicals, waste oils and fuel and refuelling activities and will be placed on secondary containment e.g., double walled tanks or bunded areas with a capacity of 110% of the maximum stored volume.
During Preliminary Works chemicals stored on Site could range from Line marking spray paint, shutter oil, blackjack, paint, sealants, cement etc. All such materials will be stored in suitable COSHH stores within the Site compounds well away from sensitive areas and a minimum of 10m from controlled waters/ downstream drains.	Surface water drains on local roads or within compound areas will be identified and where there is a risk that fine particulates or spillages could enter them, they will be protected (e.g., covers or sand bags). Alternative road drainage measures may be required. Sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
Fuel will be stored in a bunded tank (preferably with integral bunding) such as the one below – capacity 4,500ltrs. During preliminary work this type of tank is likely to be situated within the three Site compounds.   t **4,500ltr integrally bunded tank, compliant with OFS T200 standard**	Storage and Handling: Oil/ diesel storage (including fixed tanks, IBCs, mobile bowsers and generators) will be placed be at least 10m from any watercourse (including drains) and 50 m from any borehole/ well or within a Source Protection Zone (SPZ) 1 (nominal minimum 50 m provided around all licensed abstractions). Drip trays will be checked and emptied daily and will retain at least 10% of the volume being handled. Daily inspections will be undertaken of plant using hydraulic oils. Storage containers will be correctly labelled. Storage areas will be kept secure to prevent acts of vandalism which may result in leaks/ spills. Appropriate measures will be implemented to ensure that any spillage cannot drain to a nearby water body directly or indirectly.
Water from wheel washing areas can contain oil and diesel, as well as high levels of silt, therefore it is important that water from wheel washing facilities and wash down areas is contained and not allowed to soak	Where practicable, plant to be filled with biodegradable oil, in line with the plant manufacturer's instruction, to reduce the potential for pollution to watercourses in the event of a hydraulic oil pipe failure. Refuelling on the pipeline spread will be undertaken using plant nappies and be at least 20 m away from watercourses and vehicles and plant will not be left unattended during refuelling.

Potential Impacts	Management of Impacts
into surrounding ground or runoff into surface water bodies.	All plant will have thorough plant examination certificates. Trained and designated refuelling personnel will be appointed for the project. Refuelling will be observed by a banksman, and with a drip tray or plant nappy placed under the refuelling connections. Vehicles and plant will not be left unattended during refuelling. Refuelling will be undertaken in line with project specific procedures.
	All chemicals are to be stored in lockable containers which are double bunded. A designated COSHH co-ordinator will be appointed for the project. A COSHH risk assessment register will be completed before any COSHH is used on Site.
	Only construction equipment and vehicles free of oil/ fuel leaks which could cause material contamination will be permitted on Site. Drip trays will be placed below static mechanical plant. Any plant, machinery or vehicles will be regularly inspected and maintained to ensure they are in good working order and clean for use in a sensitive environment. This maintenance is to take place off site if possible or only at designated areas in the compounds.
	A Remediation Strategy will be devised and discussed with the regulatory authorities (including relevant local authorities and the Environment Agency) prior to any remedial works. Contaminated material that is considered to pose a risk would be remediated in line with the remediation strategy or disposed of appropriately. Earthworks and excavations in areas where ground contamination is known or suspected will be carried out in accordance with the Remediation Strategy.
	A Pollution Incident Response Plan will be implemented. All construction workers will receive spill response training. See Section 7 for further details.
	The Site is to be secure to prevent any vandalism that could lead to a pollution incident.
	Construction waste/ debris are to be prevented from entering any surface water drainage or water body.
	All wash down of vehicles (including wheel washing) and equipment will take place in designated areas, and wash water will be prevented from passing untreated into watercourses (directly or indirectly via drains) and groundwater.

Potential Impacts	Management of Impacts
	It will be adequately contained, prevented from entering any drain, and disposed of off-site at a suitably licenced waste facility using an accredited waste disposal company. It may also be disposed of to the foul sewer only with prior, written consent from the local sewerage undertaker.
	Where practicable, utility supplies will be taken from main supply utility connections, however where this is not possible, utilities will be provided from temporary facilities such as water bowsers, local waste water storage and transport of waste and wastewater to an approved off-site disposal point. Provision of potable water, emptying of effluent and the removal of any waste would be undertaken by a registered contractor on a regular basis.
	Adequately protect the Project area from vandalism, theft and fly-tipping by fencing and locking access gates to discourage unauthorised access. Any occurrence of tipping on the site will be reported to the site management who will then inform the local environmental authority and the police if necessary. Loose materials will be removed/ stored correctly from within the work areas to prevent them being thrown into the watercourse. No plant will be left within the work areas unless within a secure locked steel container and/ or it is fitted with an isolator switch that is lockable. Any plant stored at a works location with risk of flooding will be stored at the highest point possible close to the works area.
Working Adjacent to or Above Water	
Working above water or adjacent to water poses similar risks to the water environment as outlined in Site Runoff and Spillage Risk sections within this table. However, there is also the added risks of direct physical damage to	Create dry working areas using the least intrusive techniques with measures to prevent any silt and chemical spillages propagating downstream. If required, channel flows to be temporarily flumed or over-pumped. Deploy oil booms as required.

Potential Impacts	Management of Impacts
waterbodies and the mobilisation of sediments already present in those waterbodies (that may contain nutrients and chemical substances) that if mobilised could lead to adverse impacts (e.g., toxic effects and reduced dissolved oxygen).	Dewatering of the working area will be done in an appropriate way that avoids any risk of erosion of the receiving watercourse (e.g., discharging to ground, baffles on the discharge).
	Adequate pumps will be used with spares kept available on Site if additional pumping capacity needed.
	Establish and maintain contact with relevant regulators and other 3rd parties, keeping them regularly informed of the progress and pollution control measures used.
	If the construction requires flow along an existing watercourse to be over-pumped (but there are no major earth works to the channel), some flow should be allowed through the working area on completion of the works each day if possible (and following removal of any equipment and materials).
	Ideally, flow should ideally only be allowed back along disturbed channels once banks have been stabilised by vegetation (which typically takes approx. 12 months). This is unlikely to be possible when removing flumes, which will allow the flow along the channel that has been disturbed from open cut. The open-cut watercourse crossings should be stabilised by vegetation as far as possible prior to removal of the flume, if the area is not revegetated then the channel may need to be protected by the use of various sustainable products (e.g., coir matting/ rolls) where deemed necessary. Regular inspections of the open-cut channels will be carried out by the Contractor until 12 months have passed following flume removal. Protection measures are needed where there is a risk of excessive sediment erosion/mobilisation.
	Any works above watercourses will require measures to prevent materials or equipment falling into the channel. Should material fall into the channel, this should be retrieved (whilst complying with any regulatory requirements).
	Works to be carried out under all consents and permissions. Times/tasks to coincide with suitable weather periods noting the construction phase flood risk management measures described in the FRA.
	Where fish may be present, the timing of the works should avoid sensitive periods for fish migration or spawning. Any dewatering should be undertaken

Potential Impacts	Management of Impacts
	only after a fish rescue has been completed by a suitably trained ecologist and complying with any requirements of the Environment Agency. Screens may also be required on the pump inlet.
	Carry out works in accordance with the FRA (e.g., flood warning alerts set up with EA).
	All equipment to be removed from culvert/ brook/ ditch/ pond etc. when works are not being carried out (i.e., end of shift).
Management of Pollution Risks During Flooding	
Should a large fluvial flood event occur during the construction period, out of bank flows may erode bare surfaces that have been stripped of vegetation or earth and other material stockpiles and potentially carry this material back into the watercourse as the flood water recedes. This material may then be re-deposited further downstream within the channel, which may result in an adverse impact. In addition, it is also possible that flood waters will enter excavations and will become trapped and thus will need to be pumped out and discharged with appropriate pollution management measures. Flood risks during Main Works have been considered in detail in the FRA. This WMP considers the additional measures that the PC may need to implement during a large fluvial flood event affecting the site in order to minimise the risk of water pollution. During a flood event, flows within the channel and those that spill out on to the floodplain will typically have a lower water quality than under normal flow conditions. In particular, it would be expected that flood waters will contain higher total suspended solids washed in from the catchment from both natural and unnatural sources. In addition, given that construction works invariably require the removal of vegetation that helps to bind and protect	Earth moving works and excavations should, where possible, be undertaken during the drier months of the year (typically spring to early autumn).
	Areas of vegetation clearance and top-soil strip should be limited as much as practicable. Where possible, vegetation clearance across the Proposed Development will be phased to minimise the areas of exposed ground and reduce the potential risk for runoff.
	The location of earth of other material stockpiles or other potentially higher risk activities (e.g., compounds etc.) are to be located in as low a flood risk area as is possible by the site and works constraints.
	A Pollution Incident Response Plan will be implemented, and further details are provided in Section 7.
	All works are to be carried out in accordance with the FRA (e.g., flood warning alerts set up with Environment Agency). Safety of site workers is to take precedence over implementation of pollution prevention measures should a significant flood event occur.
	Flumes will be sized to maintain the current land drainage regime and the existing flow, following a study to understand the hydrology of the watercourse being crossed in order to assess the range of flows likely during the temporary works.
	Where there are shallow excavations for compounds and above ground infrastructure, and more widespread site clearance, these should be constructed during the drier months of the year where possible and seeded

Potential Impacts	Management of Impacts
soils, as well as excavations, construction of embankments, stockpiles of earth and other materials, and given the potentially widespread nature of flooding in some locations of the site, it is not possible to entirely eliminate the risk that material may be washed downstream during a significant flood event. Nevertheless, it is still important that the works minimise the risk of increasing the suspended solid load being washed downstream by undertaking appropriate measures, and these are considered in this table to the right. To manage the water pollution risks during the Main Works measures to avoid, and measures to manage, the risk of impacts is required. Avoidance measures include planning works accordingly to avoid wetter periods of the year where possible and when flooding is perhaps more likely to occur, as well as minimising the need for clearance of vegetation and locating earth stockpiles in a location that has as low a flood risk as possible. Management measures may include as appropriate regularly monitoring weather reports and flood risk alerts and planning activities accordingly, ensuring a Pollution Incident Response Plan is in place, protecting the surfaces of exposed soils/ stockpiles by seeding them with grass or using biodegradable matting or a geotextile, protecting the base of stockpiles to erosion from flood water, and where possible and appropriate to do so, slowing the flow of flood water from the site to enable fine sediment to either settle out naturally or for the water to be pumped out with treatment by a measure proposed by the PC.	with grass as soon as possible to bind soil and reduce risk of erosion during a flood event.

Potential Impacts	Management of Impacts
Management of Flood Risk from Dewatering	
Dewatering activities during heavy rainfall may increase flood risk as the peak pumped flow rate must be disposed of at the time when surface water bodies and surface water drainage infrastructure are already at high flows. In addition, soils are likely to be fully saturated, further increasing flood risk. To manage the water pollution risks and potential flood risk during the Main Works measures to avoid, and measures to manage, the risk of impacts is required. Avoidance measures include planning works accordingly to cease dewatering during periods of heavy rainfall and when flooding is perhaps more likely to occur. Management measures include regularly monitoring weather reports and flood risk alerts.	Dewatering will not take place during heavy rainfall and/ or high flows and will cease until heavy rainfall has stopped. All dewatering activities will only occur once the appropriate permissions have been obtained from the Environment Agency.
Management of contaminated groundwater and/ or groundwater contamination during Dewatering	
Dewatering activities may result in the contamination of groundwater where the water table is high and/ or in areas where there are freely draining soils and geological formations with high permeability. These activities may also encounter contaminated groundwater from historic diffuse pollution which needs to be carefully managed as part of the dewatering process. To manage the water pollution risks during the Main Works, measures to avoid and manage the risk of adverse impacts are required. Avoidance measures include planning works accordingly to cease dewatering if contaminated groundwater is encountered. Management measures include regularly monitoring groundwater quality and ensuring appropriate pollution prevention measures are implemented.	Groundwater dewatering may be required for the pipeline or auger / HDD pits. Early assessments consider it unlikely that the excavations will encounter the groundwater table, however groundwater ingress from superficial deposits may occur. Groundwater pumped from excavations will be discharged to ground if clean or be subject to additional treatment if needed prior to discharge to ground. A more detailed hydrogeological risk assessment will be undertaken at FEED stage, where trenchless techniques or dewatering is required in high sensitivity groundwater and surface water environments. Where dewatering is required, a dewatering scheme will be developed prior to construction (in consultation with the Environment Agency and appropriate public water abstraction companies) to demonstrate that there is an effective strategy to manage water arising from the operations. Any such assessment will consider the effects of any draw down or impacts on nearby abstractions or resources. Water will not be pumped into a watercourse, be allowed to directly enter a watercourse, or be discharged to ground;

Potential Impacts	Management of Impacts
	If required, a remediation strategy will be devised and discussed with the regulatory authorities (including relevant local authorities and the Environment Agency) prior to any remedial works. Contaminated material that is considered to pose a risk would be remediated in line with the remediation strategy or disposed of appropriately. Furthermore, best practice guidance and pollution prevention measures will be implemented across all excavation sites to ensure groundwater is not contaminated by any dewatering activities.

7 Permits and Consents

7.1.1 The draft Consents and Other Licence Requirements (*Application Document 7.2*) sets out details of all the secondary consents that may be required for the construction and operation of the Proposed Development and whether or not it is intended for each type of secondary consent to be disapplied by the DCO and replaced where applicable with Protected Provisions. However, at the time of writing agreements with all regulators has not yet been completed. Therefore, **Table 8** summarises the main secondary permits and licences which may be required by the Proposed Development, and which are relevant to this WMP, irrespective of whether they may be disapplied or not. The final WMP can review the status of which type of agreement(s) are needed and be adjusted accordingly.

7.1.2 Secondary consents must generally be in place before the associated activities commence, otherwise it may be deemed an illegal activity potentially leading to enforcement action from the respective Statutory Body and/ or Agency.

7.1.3 The PC will consult the relevant authorities to confirm where and what permissions may be required prior to undertaking any works.

7.1.4 For works adjacent to, or within, an Ordinary Watercourse that may affect flow or flood risk, a Land Drainage Consent under Section 23 of the Land Drainage Act 1991, is normally required from the LLFA. Similarly, under Regulation 12 of the Environmental Permitting (England and Wales) Regulations 2016, with reference to Schedule 25, certain works affecting Main Rivers and their floodplains require a Flood Risk Activity Permit (FRAP) from the Environment Agency.

7.1.5 The discharge of construction site runoff, including water from excavations, may require a Water Activity Permit under the Environmental Permitting (England and Wales) Regulations 2016 where it is considered that the water is ‘unclean’ (i.e., it is not substantially composed of just rainwater). Potentially contaminated Site runoff should ideally be treated on Site (e.g., to remove excess fine sediment) and discharged ideally to ground or to drain naturally to watercourses in accordance with a Water Activity Permit from the Environment Agency.

7.1.6 Where construction site runoff is contaminated and cannot be adequately treated on Site for discharge to ground or a watercourse, the contaminated discharge should either be discharged to a local public foul sewers (following consultation with a local sewage undertaker and obtaining a Trade Effluent Discharge Consent under the Water Industry Act 1991 (as amended) or removed from the Site for disposal at a suitable licenced treatment facility.

7.1.7 Due to the nature of the Proposed Development the need for a Water Abstraction Licence, Transfer Licence or Impoundment Licence is unlikely, although these secondary permissions have also been listed in **Table 7**.

Table 7: Summary of Likely Relevant Permissions for Construction Works

Statutory Body	Description of works	Type of Permissions	Legislation	Further Detail
Environment Agency	Discharge of effluent or waste water from construction sites to surface or ground water (including	Water Activity Permit	Environmental Permitting Regulations (England and Wales) Regulations 2016 (as	Environmental Permit may be required by the EA for discharge of surface water run-off to controlled waters (e.g.,

Statutory Body	Description of works	Type of Permissions	Legislation	Further Detail
	potential dewaters from excavations).		amended) (EPR 2016)	ditches, streams, rivers, lakes and to ground).
	Discharge of uncontaminated water from temporary dewatering from excavations to surface water	Regulatory Position Statement 261 (RPS)	Not applicable.	Conditions of the RPS (2023) must be adhered to otherwise the activity will be treated as an unconsented discharge under EPR 2016.
	Any works affecting Main Rivers, their floodplains or near flood defence structures	Flood Risk Activity Permit (FRAP)	Environmental Permitting Regulations (England and Wales) Regulations 2016 (as amended)	Erecting temporary and permanent structures in river such as culverts (flumes), pipe crossings, erosional protection and bridges are all considered to be regulated activities.
	All dewatering / over pumping activities	Water Abstraction Licence	Water Resources Act 1991 (as amended)	Any abstraction / over pumping of watercourse during construction works of more than $20m^3$ of water per day. A temporary licence may be granted to abstract more than $20m^3$ of water a day over a period of less than 28 days.
	Sealing of watercourses to install flumed crossings	Impoundment Licence	Water Resources Act 1991 (as amended)	Creating an impoundment structure such as a sluice, weir or dam that may change water levels.
LLFAs	Temporary and permanent works affecting the flow in Ordinary Watercourses	Land Drainage Consent	Land Drainage Act 1991 Section 23	Required for any temporary or permanent works that may affect the flow of an Ordinary Watercourse (i.e., all watercourses/ ditches that can convey water at times that are not Main Rivers).

Statutory Body	Description of works	Type of Permissions	Legislation	Further Detail
Anglian Water	Possible discharge to public foul sewers.	Trade Effluent Discharge Consent.	Water Industry Act 1991 (as amended)	For discharges over six months duration full consent would be required. At this stage it is considered unlikely to be needed but may be required for the temporary discharge of construction site runoff, should the Contractor decide to drain to a public sewer. As applicable consent would be sought from Severn Trent Water by the contractor.

8 Incidents and Emergencies

8.1 Introduction

8.1.1 The Applicant (Harbour Energy) is to ensure that protection measures to control the risk of pollution are included within the final WMP. This is primarily addressed in the separate Environmental Emergency Response Plan, which also includes a Pollution Incident Response Plan (PIRP). These will both be prepared by the Principal Contractor ahead of any on site works taking place.

Reporting

8.1.2 All environmental incidents shall be reported and investigated and follow the contractor's procedure, will be included in the Environmental Emergency Response Plan.

8.2 Pollution Incident Response Plan

8.2.1 The PIRP presented in the Environmental Emergency Response Plan produced by the PC will be agreed in advance with the Environment Agency and will set out the appropriate actions in the event of an incident and/ or that monitoring identifies unusual or anomalous results. It will be prepared in accordance with advice from the Environment Agency.

8.2.2 Reporting of any potential or actual significant pollution incidents during construction will include as a minimum:

- A description of the pollution incident, including its location and Ordnance Survey (OS) grid reference, the type and quantity of contaminant and the likely receptor(s);
- Details of monitoring undertaken;
- Details of contributory causes;
- Details of any adverse effects that have occurred as a result of the pollution incident;
- A description of the measures implemented to mitigate adverse effects; and
- Any recommendations to reduce the risk of similar events occurring in future on the Site.

8.2.3 The PIRP(s) sets out actions in the event that monitoring identifies anomalous or unusual results when compared to the baseline data and/ or Environmental Quality Standards (see the WFD (Standards and Classification) Directions (England and Wales) 2015). The PIRP(s) will also describe the actions to be followed depending on the level of risk triggered.

9 References

Ref 1 HMSO (2021) Environment Act 2021.

Ref 2 HMSO (2014) Water Act 2014.

Ref 3 HMSO (2010) Floods and Water Management Act 2010.

Ref 4 HMSO (1995) Environment Act 1995.

Ref 5 HMSO (1991) Land Drainage Act 1991 (as amended).

Ref 6 HMSO (1991) Water Resources Act 1991 (as amended).

Ref 7 HMS0 (1990) Environmental Protection Act 1990

Ref 8 HMSO (1975) Salmon and Freshwater Fisheries Act 1975 (as amended).

Ref 9 HMSO (1974) Control of Pollution Act 1974.

Ref 10 The Water Framework Directive (Standards and Classification) Directions 2017

Ref 11 HMSO (2018) Environmental Permitting (England and Wales) Regulations 2016 (as amended 2018).

Ref 12 HMSO (2017) Environmental Damage (Prevention and Remediation) Regulations 2017.

Ref 13 HMSO (2009) The Flood Risk (England and Wales) Regulations 2009.

Ref 14 HMSO (2009) Eels (England and Wales) Regulation 2009.

Ref 15 Environmental Protection, England and Wales. The Groundwater (England and Wales) Regulations 2009

Ref 16 HMSO (2002) The Control of Substances Hazardous to Human Health (COSHH) Regulations 2002.

Ref 17 HMSO (2001) Control of Pollution (Oil Storage) (England) Regulations 2001. Department of Energy and Climate Change (2011).

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Ref 26 DEFRA (2011). Future Water: The Government's Water Strategy for England. London: The Stationery Office.

Ref 27 NELC (2018). North East Lincolnshire Council Local Plan [Online]. Available at: [redacted]

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Ref 29 CLLP (2017). Central Lincolnshire Local Plan [Online]. Available at: https://www.n-kesteven.gov.uk/central-lincolnshire//

Ref 30 The Building Regulations 2010 Approved Document Part H: Drainage and Waste Disposal.

Ref 31 DEFRA (2015). Sustainable Drainage Systems: non-statutory technical standards. London: The Stationery Office.

Ref 32 CIRIA (2015). C753 The SuDS Manual. London: CIRIA.

Ref 33 National Highways (2021). CD 532 Vegetated drainage systems for highway runoff.

Ref 34 Highways Agency (2006). Design Manual for Roads and Bridges HD 33/16, Surface and Subsurface Drainage Systems for Highways. Birmingham: Highways Agency.

Ref 35 Environment Agency (2022) River basin management plans: updated 2022#

Ref 36 NetRegs. Environmental Guidance for your Business in Northern Ireland and Scotland [Online]. Available at: [redacted]

Ref 37 Environment Agency. Pollution Prevention Guidelines. Working at construction and demolition sites: PPG6. Available at: [redacted]

Ref 38 Environment Agency. Pollution Prevention Guidance. Managing Fire Water and Major Spillages: PPG18. Available at: [redacted]

Ref 39 British Standards Institute (2009) BS6031:2009 Code of Practice for Earth Works.

Ref 40 British Standards Institute (2013) BS8582 Code of Practice for Surface Water Management of Development Sites.

Ref 41 C532 (2001) Control of water pollution from construction sites – Guidance for consultants and contractors.

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Annex A Surface Water Features

Figure 1 Surface Water Features and Study Area

Revision: 3 Drawn: LC Checked: KSB Approved: MW Date: 2023-09-14

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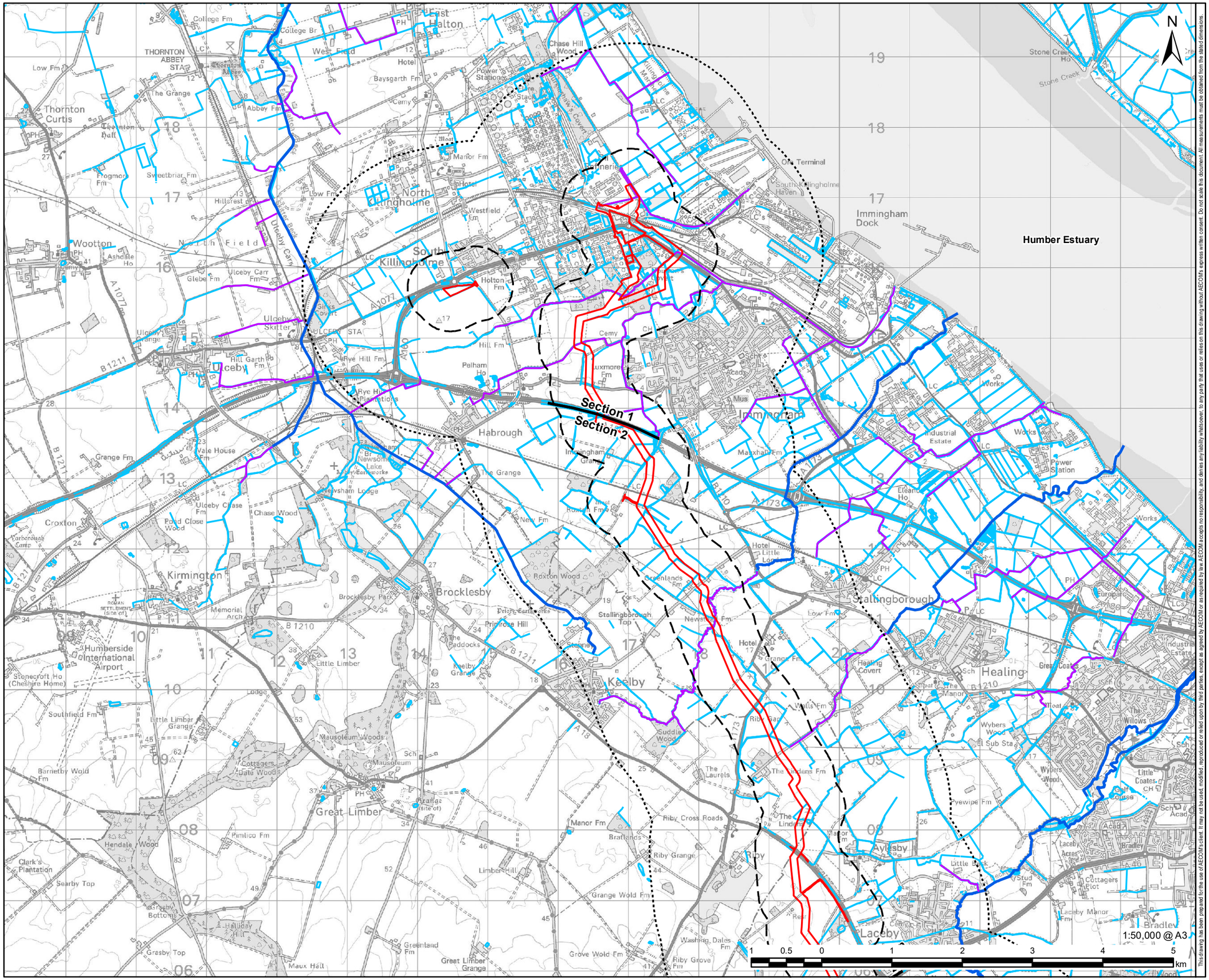

VikingCCS

AECOM

PROJECT

Viking CCS Pipeline

LEGEND

- DCO Site Boundary
- 500m Study Area
- 2km Study Area
- Route Section Break
- IDB Maintained Watercourse
- Ordinary Watercourse
- EA Main River

NOTES:

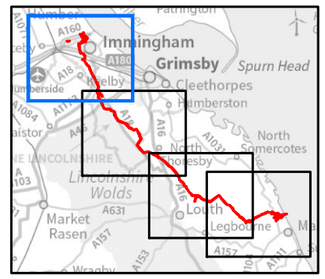

FIGURE TITLE

Figure 11-1 (1 of 4)
Surface Water Features and Study Area

ISSUE PURPOSE

ENVIRONMENTAL STATEMENT

PROJECT NUMBER / REFERENCE

60668955 / VCCS_230914_ES_11-1

Revision: 3 Drawn: LC Checked: KSB Approved: MW Date: 2023-09-14

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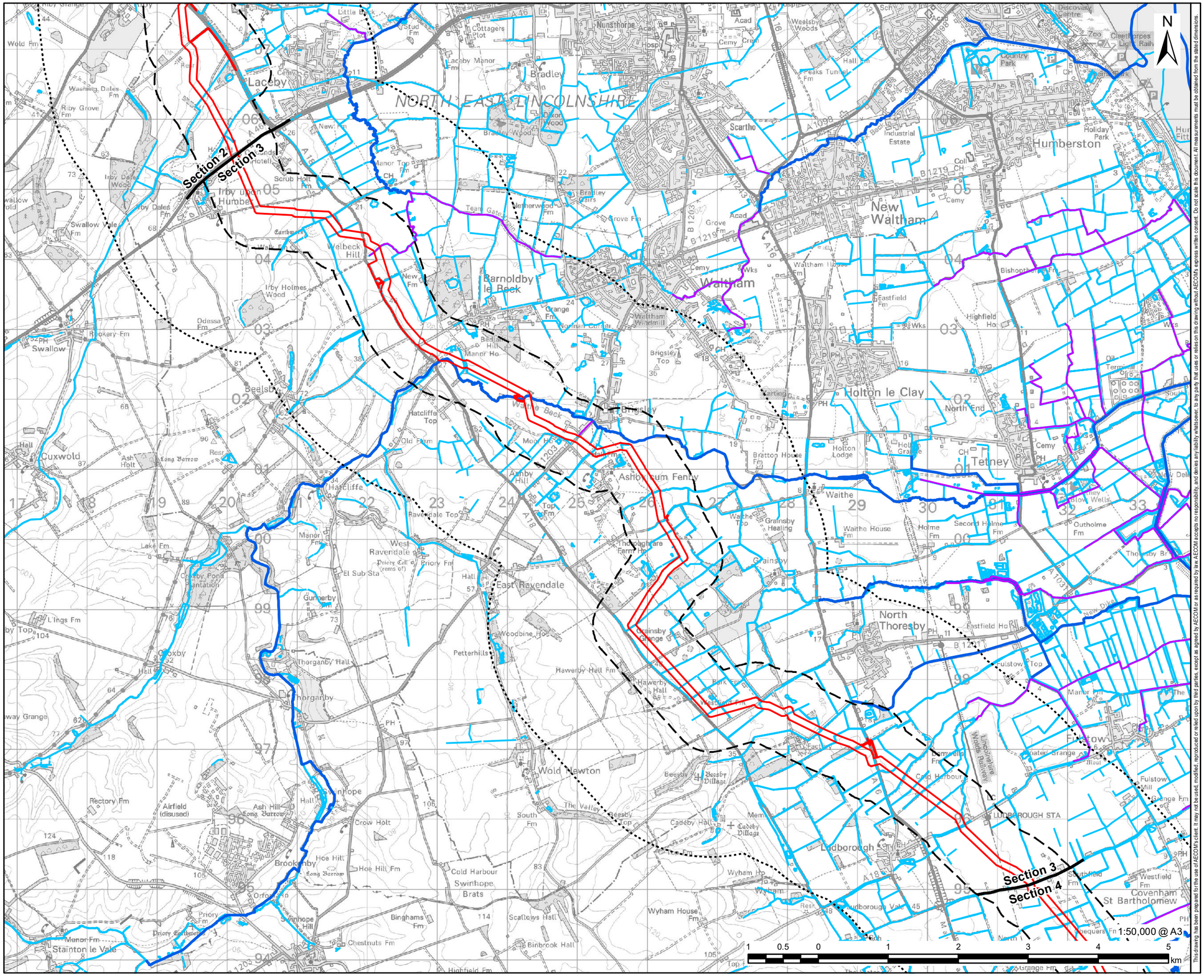

VikingCCS

AECOM

PROJECT

Viking CCS Pipeline

LEGEND

- DCO Site Boundary
- 500m Study Area
- 2km Study Area
- Route Section Break
- IDB Maintained Watercourse
- Ordinary Watercourse
- EA Main River

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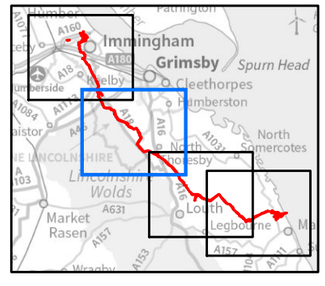

FIGURE TITLE

Figure 11-1 (2 of 4)
Surface Water Features and Study Area

ISSUE PURPOSE

ENVIRONMENTAL STATEMENT

PROJECT NUMBER / REFERENCE

60668955 / VCCS_230914_ES_11-1

Revision: 3 Drawn: LC Checked: KSB Approved: MW Date: 2023-09-14

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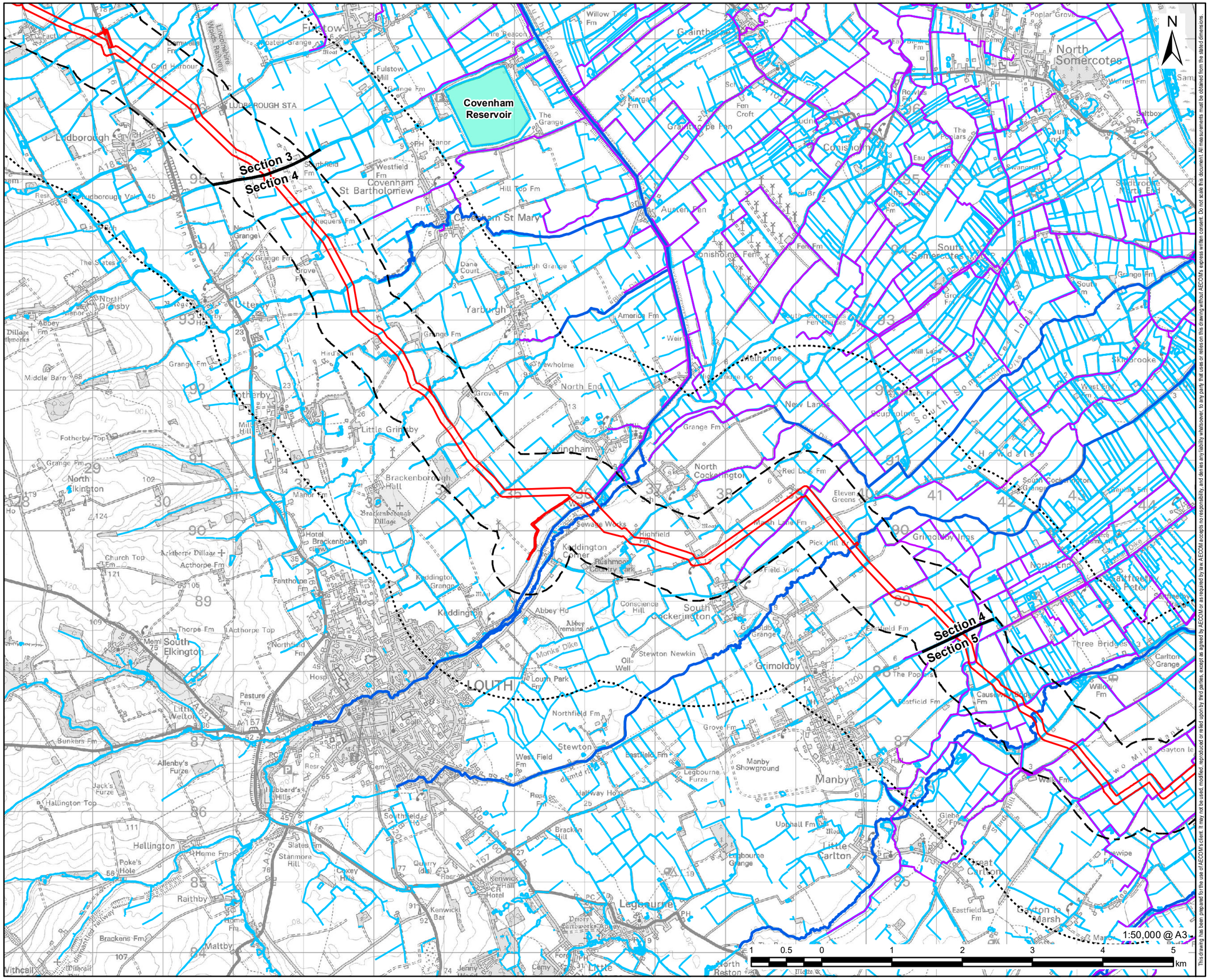

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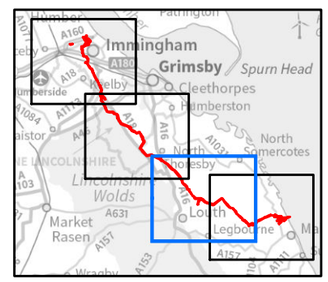


VikingCCS

AECOM

PROJECT

Viking CCS Pipeline

LEGEND

- DCO Site Boundary
- 500m Study Area
- 2km Study Area
- Route Section Break
- IDB Maintained Watercourse
- Ordinary Watercourse
- EA Main River
- Covenham Reservoir

FIGURE TITLE

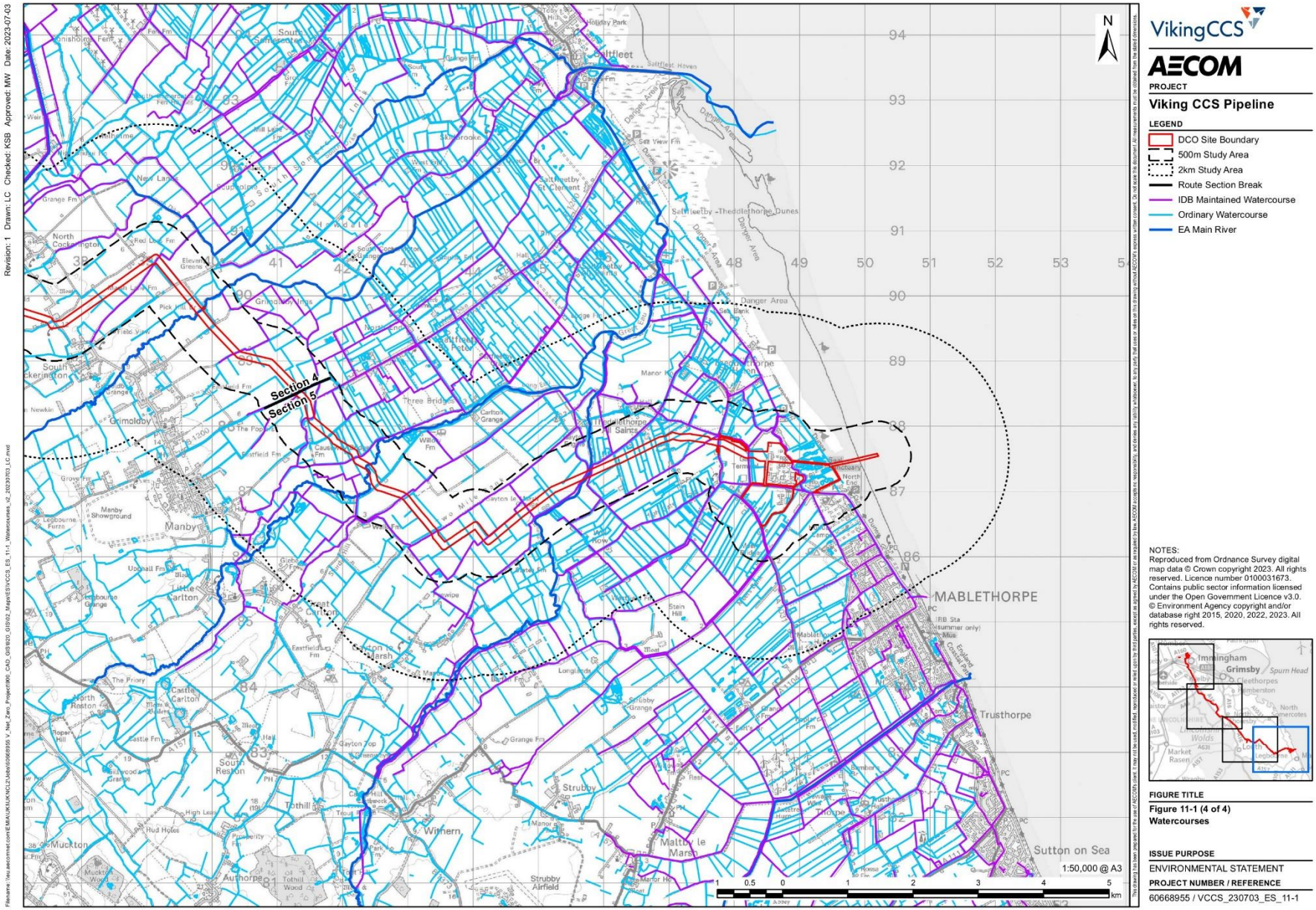
Figure 11-1 (3 of 4)
Surface Water Features and Study Area

ISSUE PURPOSE

ENVIRONMENTAL STATEMENT

PROJECT NUMBER / REFERENCE

60668955 / VCCS_230914_ES_11-1



VikingCCS

AECOM

PROJECT

Viking CCS Pipeline

LEGEND

- DCO Site Boundary
- 500m Study Area
- 2km Study Area
- Route Section Break
- IDB Maintained Watercourse
- Ordinary Watercourse
- EA Main River

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FIGURE TITLE

Figure 11-1 (4 of 4)
Watercourses

ISSUE PURPOSE

ENVIRONMENTAL STATEMENT

PROJECT NUMBER / REFERENCE

60668955 / VCCS_230703_ES_11-1

Annex B Summary of Potential Effects on Water Quality during construction

Receptor	Receptor Importance	Description of impact	Effect Significant	
			Magnitude	Significance
Sector 1				
Skitter Beck / East Halton Beck Water Body (GB104029067655)	Surface Water: High	Northern Construction Compound (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants.	Negligible	Negligible (Not significant)
Internal Drainage Board water features	Surface Water: Medium	Immingham Facility Pollution due to increased sedimentation, fuel spills, oils and lubricants.	Negligible	Negligible (Not significant)
Other permanent water features	Surface Water: Medium	Immingham Facility Pollution due to increased sedimentation, fuel spills, oils and lubricants.	Low	Minor Adverse (Not Significant)
Immingham industrial area	Flood risk: Medium	Immingham Facility An increase the rate and volume of surface water runoff to the industrial area. The risk of displacing floodwater via the storage of materials/plant in the floodplain.	Negligible	Negligible (Not significant)
Sector 2				
North Beck Drain (GB104029067575)	Surface Water: Very High	Pipeline – Haul roads and laydown area (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants.	Negligible	Minor Adverse (Not Significant)
	Surface Water: Very High	Pipeline – Bailey bridge (surface water impact) Bed and bank disturbances which can cause excess fine sediments entering the watercourse.	Negligible	Negligible (Not significant)
	Surface Water: Very High	Pipeline – HDD (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants. may be exacerbated by the impact of low flows from dewatering of trenches.	Negligible	Negligible (Not significant)

Receptor	Receptor Importance	Description of impact	Effect Significant	
			Magnitude	Significance
	Surface water: Very High	Pipeline – Flumed Crossings (surface water impact) Fine sediment deposition within the channel. This may lead to loss of morphological features and spawning habitat.	Negligible	Minor Adverse (Not Significant)
Mawnbridge Drain (GB104029067540)	Surface Water: High	Pipeline – Haul roads and laydown (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants.	Negligible	Negligible (Not significant)
Other permanent water features	Surface Water: Medium	Washingdales Lane Block Valve Station (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants.	Negligible	Negligible (Not significant)
Sector 3				
Laceby Beck / River Freshney (to N Sea) (GB104029067530)	Surface water: Very High	Central Construction Compound (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants.	Negligible	Negligible (Not significant)
	Surface water: Very High	Pipeline – Haul roads and laydown area (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants.	Negligible	Negligible (Not significant)
	Surface water: Very High	Pipeline – Auger bore (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants. may be exacerbated by the impact of low flows from dewatering of trenches.	Negligible	Negligible (Not significant)
	Surface water: Very High	Pipeline – Bailey bridge (surface water impact) Bed and bank disturbances which can cause excess fine sediments entering the watercourse.	Negligible	Negligible (Not significant)
Waithe Beck lower (to Tetney Lock) (GB104029062100)	Surface water: Very High	Pipeline – Haul roads and laydown area (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants.	Negligible	Minor Adverse (Not Significant)

Receptor	Receptor Importance	Description of impact	Effect Significant	
			Magnitude	Significance
	Surface water: Very High	Pipeline – Auger bore (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants. may be exacerbated by the impact of low flows from dewatering of trenches.	Negligible	Negligible (Not significant)
	Surface water: Very High	Pipeline – Bailey bridge (surface water impact) Bed and bank disturbances which can cause excess fine sediments entering the watercourse.	Negligible	Negligible (Not significant)
	Surface water: Very High	Pipeline – Open cut (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants.	Negligible	Minor Adverse (Not Significant)
	Surface water: Very High	Pipeline – Flumed crossings (surface water impact) Fine sediment deposition within the channel. This may lead to loss of morphological features and spawning habitat.	Negligible	Minor Adverse (Not Significant)
Land Dike Drain to Louth Canal (West) (GB104029062162)	Surface Water: High	Pipeline – Haul roads and laydown area Pollution due to increased sedimentation, fuel spills, oils and lubricants.	Negligible	Negligible (Not Significant)
	Surface Water: High	Pipeline – Open cut crossings (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants	Low	Minor Adverse (Not Significant)
	Surface Water: High	Pipeline – Flumed crossings (surface water impact) Fine sediment deposition within the channel. This may lead to loss of morphological features and spawning habitat.	Low	Minor Adverse (Not Significant)
Other permanent water features	Surface Water: Medium	Thoroughfare Block Valve Station (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants.	Low	Minor Adverse (Not significant)
Sector 4				
Poulton Drain (trib of Louth Canal) (GB104029062010)	Surface Water: High	Pipeline – Haul roads and laydown area (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants.	Negligible	Negligible (Not Significant)

Receptor	Receptor Importance	Description of impact	Effect Significant	
			Magnitude	Significance
	Surface Water: High	Pipeline – Auger bore (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants. may be exacerbated by the impact of low flows from dewatering of trenches.	Negligible	Negligible (Not significant)
	Surface Water: High	Pipeline – Bailey bridge (surface water impact) Bed and bank disturbances which can cause excess fine sediments entering the watercourse.	Negligible	Negligible (Not significant)
Black Dyke (trib of Louth Canal) (GB104029062000)	Surface Water: High	Pipeline – Haul roads and laydown area (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants.	Negligible	Negligible (Not Significant)
	Surface Water: High	Pipeline – Auger bore (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants. may be exacerbated by the impact of low flows from dewatering of trenches.	Negligible	Negligible (Not significant)
	Surface Water: High	Pipeline – Open-cut (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants	Low	Minor Adverse (Not Significant)
	Surface Water: High	Pipeline – Flumed access (surface water impact) Fine sediment deposition within the channel. This may lead to loss of morphological features and spawning habitat.	Low	Minor Adverse (Not Significant)
Louth Canal (GB104029061990)	Surface Water: High	Pipeline – Haul roads and laydown area (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants.	Low	Minor Adverse (Not Significant)
	Surface Water: High	Pipeline – HDD (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants. May be exacerbated by the impact of low flows from dewatering of trenches.	Negligible	Negligible (Not significant)

Receptor	Receptor Importance	Description of impact	Effect Significant	
			Magnitude	Significance
South Dike and Grayfleet Drain (GB105029061680)	Surface Water: High	Pipeline – Haul roads and laydown area (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants.	Negligible	Negligible (Not significant)
	Surface Water: High	Pipeline – HDD (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants. May be exacerbated by the impact of low flows from dewatering of trenches.	Negligible	Negligible (Not significant)
	Surface Water: High	Pipeline – Bailey bridge (surface water impact) Temporary bridge crossings causing bed and bank disturbances which can cause excess fine sediments entering the watercourse.	Negligible	Negligible (Not significant)
Internal Drainage Board water features	Surface water: Low	Louth Road Block Valve Station (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants.	Negligible	Negligible (Not significant)
Other permanent water features	Surface water: Low	Louth Road Block Valve Station (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants.	Low	Minor Adverse (Not Significant)
Potable water supply: Covenham Reservoir Waterbody (Section 4 and 5)	Very High	Risk of receiving suspended fine sediments and chemical spillages from the watercourses that drain into it from open-cut crossings, flumed crossings (insertion and removal) and the haul roads.	Negligible	Negligible (Not Significant)
Sector 5				
Long Eau (GB105029061670)	Surface Water: High	Pipeline – Haul roads and laydown area (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants.	Low	Minor Adverse (Not Significant)
	Surface Water: High	Pipeline – HDD (surface water impact)	Negligible	Negligible (Not Significant)

Receptor	Receptor Importance	Description of impact	Effect Significant	
			Magnitude	Significance
		Pollution due to increased sedimentation, fuel spills, oils and lubricants. May be exacerbated by the impact of low flows from dewatering of trenches.		
Great Eau (d/s of South Thoresby) (GB105029061660)	Surface Water: High	Pipeline – Haul roads and laydown area (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants.	Negligible	Negligible (Not significant)
	Surface Water: High	Pipeline – HDD (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants. May be exacerbated by the impact of low flows from dewatering of trenches.	Negligible	Negligible (Not significant)
Internal Drainage Board watercourses: Mills and Harps Drain & Rotten Row Drain	Surface water: High	Pipeline – Haul roads and laydown areas (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants.	Negligible	Negligible (Not significant)
	Surface water: High	Flumed crossings (surface water impact) Fine sediment deposition within the channel. This may lead to loss of morphological features and spawning habitat.	Low	Minor Adverse (Not Significant)
	Surface water: High	Pipeline – Open cut crossing (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants	Low	Minor Adverse (Not Significant)
	Surface water: High	Pipeline - HDD (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants. may be exacerbated by the impact of low flows from dewatering of trenches.	Negligible	Negligible (Not significant)
Internal Drainage Board water features	Surface Water: Medium	Southern Construction Compound (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants.	Negligible	Negligible (Not significant)

Receptor	Receptor Importance	Description of impact	Effect Significant	
			Magnitude	Significance
	Surface Water: Medium	Theddlethorpe Facility Option 1 (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants.	Low	Minor Adverse (Not significant)
	Surface Water: Medium	Theddlethorpe Facility Option 2 (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants.	Low	Minor Adverse (Not significant)
Other permanent water features	Surface Water: Medium	Theddlethorpe Facility Option 1 (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants.	Low	Minor Adverse (Not significant)
	Surface Water: Medium	Theddlethorpe Facility Option 2 (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants.	Low	Minor Adverse (Not significant)
	Surface Water: Medium	Dune Isolation Valve (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants.	Negligible	Negligible (Not significant)
Saltfleetby - Theddlethorpe Dunes SAC, NNR and SSSI	Surface water: High	Dune Isolation Valve (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants.	Negligible	Negligible (Not significant)
Potable water supply: Covenham Reservoir Waterbody (Section 4 and 5)	Very High	Risk of receiving suspended fine sediments and chemical spillages from the watercourses that drain into it from open-cut crossings, flumed crossings (insertion and removal) and the haul roads.	Negligible	Negligible (Not Significant)
All Sectors				
Internal Drainage Board watercourses	Surface water: Medium	Pipeline – Haul roads and laydown areas (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants.	Negligible	Negligible (Not Significant)
	Surface water: Medium	Flumed crossings (surface water impact) Fine sediment deposition within the channel. This may lead to loss of morphological features and spawning habitat.	Low	Minor Adverse (Not significant)

Receptor	Receptor Importance	Description of impact	Effect Significant	
			Magnitude	Significance
	Hydromorphology: Low	Flumed crossings (hydromorphological impact) Loss of natural banks, loss of bed, change in flow dynamics, erosion patterns and lead to destabilisation of banks resulting in fine sediment deposition within the channel.	Low	Minor Adverse (Not significant)
	Surface water: Medium	Pipeline – Open cut crossing (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants	Low	Minor Adverse (Not significant)
	Hydromorphology: Low	Pipeline – Open cut crossing (hydromorphological impact) Open-cut techniques will result in the loss of natural banks, loss of bed, change in flow dynamics, erosion patterns and lead to destabilisation of banks resulting in fine sediment deposition within the channel.	Low	Minor Adverse (Not significant)
	Surface water: Medium	Pipeline – Auger bore (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants. may be exacerbated by the impact of low flows from dewatering of trenches.	Negligible	Negligible (Not Significant)
	Surface water: Medium	Pipeline – HDD (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants. may be exacerbated by the impact of low flows from dewatering of trenches.	Negligible	Negligible (Not Significant)
Other permanent surface water features	Surface water: Medium	Pipeline – Haul roads and laydown areas (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants.	Negligible	Negligible (Not Significant)
	Surface water: Medium	Flumed crossings (surface water impact) Fine sediment deposition within the channel. This may lead to loss of morphological features and spawning habitat.	Low	Minor Adverse (Not significant)
	Hydromorphology: Medium	Flumed crossings (hydromorphological impact) Loss of natural banks, loss of bed, change in flow dynamics, erosion patterns and lead to destabilisation of banks resulting in fine sediment deposition within the channel.	Low	Minor Adverse (Not significant)

Receptor	Receptor Importance	Description of impact	Effect Significant	
			Magnitude	Significance
	Surface water: Medium	Pipeline – Open cut crossing (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants	Low	Minor Adverse (Not significant)
	Hydromorphology: Medium	Pipeline – Open cut crossing (hydromorphological impact) Open-cut techniques will result in the loss of natural banks, loss of bed, change in flow dynamics, erosion patterns and lead to destabilisation of banks resulting in fine sediment deposition within the channel.	Low	Minor Adverse (Not significant)
	Surface water: Medium	Pipeline – Auger bore (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants. These may be exacerbated by the impact of low flows from dewatering of trenches.	Negligible	Negligible (Not Significant)
	Surface water: Medium	Pipeline – HDD (surface water impact) Pollution due to increased sedimentation, fuel spills, oils and lubricants. These may be exacerbated by the impact of low flows from dewatering of trenches.	Negligible	Negligible (Not Significant)
Ephemeral and /or artificial drainage ditches	Surface water: Low	Surface Water Impact Impacted by uncontrolled site runoff laden with fine sediment or accidental spillages from plant or other construction chemicals.	Negligible	Negligible (Not significant)
Humber Estuary (WFD / SAC) (Section 1 – 4)	Surface water: Very High	Surface Water Impact All construction work associated with these watercourses have the potential to propagate sediments and spillages downstream	Negligible	Negligible (Not significant)
Lincolnshire Waterbody (coastal WFD) (Section 1 – 5)	Surface water: High	Surface Water Impact All construction work associated with these watercourses have the potential to propagate sediments and spillages downstream	Negligible	Negligible (Not significant)
Flood risk: agricultural land	Medium	Installation of temporary culverts included for haul road watercourse crossings and paths caused by haul roads may	Negligible	Negligible (Not Significant)

Receptor	Receptor Importance	Description of impact	Effect Significant	
			Magnitude	Significance
		result in change to the existing flow regime and potential increase of flooding to the surrounding land.		
Flood risk: Construction workers	Very High	The risk to construction workers primarily is flooding from fluvial, tidal, pluvial, groundwater and artificial sources. Fluvial flood risk could be exacerbated during construction works due to temporary increases as the rate and volume of runoff from an increase in impermeable areas, constricted flow from in-channel works and flumes and reduced floodplain storage potential.	Negligible	Negligible (Not Significant)
Flood risk: residential areas	High	Changes to the existing flow regime and potential increase of flooding to the surrounding residential land from temporary culverts for haul roads.	Negligible	Negligible (Not Significant)
Foul drainage: watercourses and/or Anglian water drainage network	Medium – High	Potential increased foul drainage discharge due to construction workers on the laydown areas and construction compounds	Negligible	Negligible (Not Significant)
Potable water supply	Very High	Reduced availability of water for abstraction within surface water bodies due to abstraction for construction activities associated with installation of the pipeline	Negligible	Negligible (Not Significant)
Hydrostatic testing water impact on water supply	Very high	The potential impact on reduced available water for potable supply.	Negligible	Negligible (Not Significant)

Annex C Silt Management Options

Fabric silt fences

These are geotextiles installed in the path of sheet flow runoff to filter out sediment. They are often installed around water bodies, below the toe of a cleared slope or around temporary earth stockpiles. Silt fences detain sediment-laden water and promote settlement and may remove 80-90% sand, 50-80% silty loam, and up to 20% silt-clay loam in runoff (CIRIA 648, 2006).

Measures to control rate of temporary discharge

If the rate and energy of temporary discharges are not controlled there is a risk of eroding the bed and banks of the receiving water body. The use of baffle pads or boulders below the outfall are both ways in which the energy of the outfall can be dispersed to avoid bank and bed erosion.

Silt bubble barriers

Bubble barriers are essentially tubes deployed on the bed of the watercourse which emit bubbles. They can control movement of silt with the additional advantage of delivering an oxygen enriched environment. Without this, silt plumes can raise oxygen demand in the waterbody, thereby causing stress to aquatic organisms. They can also be used for general aeration of lakes and ponds.

Silt mats and silt check dams

Silt mats are used to capture sediment as it drops out of suspension and should be located in areas of natural deposition where water energy is low. They are typically staked to the bed and have a natural fibre matrix to contain sediment effectively and prevent resuspension.

Silt check dams are also available (e.g. wood waste filter media or rocks within netting). They are used to reduce speed of flow in ditches and swales, and distribute flows across the channel.

Earth bunds

These are temporary barriers to conveyance of construction runoff and can be used to create temporary storage lagoons or barriers between construction works and water bodies. Care needed as earth bunds may themselves be a source of fine sediment, although this can be minimised by covering with a suitable geotextile or seeding if they are to be in place for a longer period of time and not part of topsoil storage.

Drainage grips (option to include check dams / sumps)

Drainage grips (otherwise known as cut-off or temporary drains) are temporary drains installed to intercept runoff from slopes above construction works to prevent it entering the site or cleared slopes within the site itself. They are an effective way to temporarily manage surface water runoff and convey flows contaminated with fine sediment to storage and treatment areas. Gravel and straw bale check dams can be created at regular intervals to encourage fine sediments to settle out during conveyance.

Pumps, settlement tanks and lamella clarifiers

Pre-treatment of construction site runoff can be provided by first pumping runoff through a settlement tank. These use gravity to encourage fine particulates to settle out and become trapped at the bottom of the tank. Greater levels of treatment can be achieved by using Lamella Clarifiers that include a series of inclined plates to provide a larger effective settling area for a small footprint. There are a range of products depending on application and flow rates and these can also be deployed in series and with chemical dosing tanks, if required.

Chemical treatments and dosing tanks

Chemical dosing tanks provide a way in which high concentrations of metals in runoff can be precipitated out before the treated water is discharged from the site. Chemical dosing tanks are often containerised, partly to reduce the risk of chemical spillage.

Chemical flocculation treatments are also available, often in block form that slowly release into the water. Flocculation is the process by which negatively charged particulates bind together in the presence of a positively charged flocculant.

Tanker for off-site disposal

Where it has not been possible to adequately treat construction site runoff there remains the option to pump the runoff out to a tanker for disposal off-site at a suitably licensed waste facility.

Sand bags / straw bales

Sand bags provide a flexible way to prevent sediment-laden runoff entering a watercourse by creating temporary dams and barriers to runoff. This is most effective on the face of temporary watercourses crossings and short length land depressions where there are preferential flow pathways.

Like fabric silt fences and sand bags, straw bales are a multipurpose way to manage construction site runoff to prevent untreated ingress to water bodies and to support the filtration of fine particulates from runoff.

Vegetated buffer zone

Vegetated buffer zones protect water bodies by provided a separation between the water body and the area of construction works and a means by which any overland flows can be treated before it drains to the water body. When planning the works a Contractor should minimise the area of vegetation clearance, especially around water bodies to maintain natural buffer zones.

Temporary settlement lagoon

Temporary settlement lagoons are an effective way to remove suspended fine particulates from construction site runoff by storing water and allowing the fine particulates to settle out. Where high concentrations are expected, a long retention time is required for significant settlement (due to the very fine nature of the sediment), or space is limited, a series of lagoons may be required with intervening gravel weirs, or the use of a flocculent could be considered. The storage required depends on site requirements, character of fine sediment, and the duration of works.

Measure: Primary & Secondary Purpose

MEASURE	SOURCE CONTROL	CONVEYANCE	TREATMENT
Fabric silt fences	●	○	○
Earth bunds	●	○	
Sand bags & straw bales	●	○	○
Silt curtains	●		
Temporary discharge control	●	●	
Drainage grips		●	○
Vegetated buffer zones			●
Conveyance swales		●	○
Silt bubble barriers	●		○
Pumps, tanks, lamella clarifiers		●	●
Temporary settlement lagoons			●
Skips in series			●
Silt mats and check dams		○	●
Tanker for off-site disposal	○	○	○
Chemical treatments & dosing tanks			●

● Primary Purpose of Measure
○ Secondary Purpose of Measure

Silt curtains / nets

Floating silt curtains are designed to control and manage sediment flow within standing waters. It consists of a top flotation pocket below which is suspended vertically an impermeable curtain, and then a ballast at set intervals to hold the curtain in place. It is typical for a bespoke curtain to be created for the particular water body (i.e. changes in bathymetry, flow conditions can be taken into account). Similar products exist for use in low river flows, although they are generally less effective than when deployed in calmer water.

Conveyance swale (option to include check dams / sumps)

Similar to drainage grips, conveyance swales provide a way in which construction site runoff can be directed to storage and treatment areas. The wider cross sectional area of a swale when compared to a drain encourages greater settlement of fine particulates. Settlement can be enhanced by the inclusion of check dams and sediment traps, although the build-up of deposited fine material will need to be monitored and regularly cleared out.

Skips in series

Where there are constraints on space that prohibit the use of construction SuDS (i.e. settlement lagoons as described above) an alternative option might be to drain runoff through a series of skips filled with clean aggregate or straw bales to encourage filtration and settlement of suspended fine particulates.

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