

Viking CCS pipeline

# Preliminary Environmental Information Report Volume IV

Technical Appendices



Appendix 11.3

# Preliminary WFD Assessment



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# 11 Preliminary WFD Assessment

## 11.1 Introduction

### Background

- 11.1.1 This Water Framework Directive Screening and Scoping Appendix has been produced in support of the Preliminary Environmental Information Report (PEIR) for the Viking CCS Pipeline, hereafter referred to as 'the Project'.
- 11.1.2 The Project intends to transport compressed and conditioned CO<sub>2</sub> from the Immingham Facility to store in depleted gas reservoirs in the Southern North Sea. The main element of the Project in relation to the PEIR is the Immingham Facility; onshore pipeline from Immingham to Theddlethorpe, the Theddlethorpe Facility and offshore pipeline tie-in and outlet up to Mean Low Water Spring (MLWS). As such the key components can be condensed as:
- Immingham Facility;
  - Approximately 55.6 km buried pipeline (including cathodic protection);
  - Block Valve Stations;
  - Theddlethorpe Facility;
  - Existing LOGGS Pipeline down to extent of Development Consent Order (DCO) limits at MLWS;
- 11.1.3 Full details of the various Project components are provided in *PEIR Volume II Chapter 3: The Viking CCS Pipeline*.
- 11.1.4 The Project interacts with 13 Water Framework Directive (WFD) water bodies and two groundwater bodies and thus it is necessary to consider the activities and constituent parts of the Project to determine compliance with WFD objectives. This includes assessing the impact of the pipeline crossings and supporting infrastructure on the biological, physico-chemical and hydromorphological quality elements that comprise the WFD to ensure no deterioration and no prevention of future improvement in water body status. Both surface and groundwater bodies are considered.
- 11.1.5 In accordance with the Planning Inspectorate's Advice Note Eighteen<sup>1</sup>, a three-stage approach may be adopted:
- **Stage 1: WFD Screening** - Identification of the proposed work activities that are to be assessed and determination of which WFD water bodies could potentially be affected through identification of a Zone of Influence. This step also provides a rationale for any water bodies screened out of the assessment.
  - **Stage 2: WFD Scoping** - For each water body identified in Stage 1, an assessment is carried out to identify the effects and potential risks to quality elements from all activities. The assessment is made taking into consideration embedded mitigation (measures that can reasonably be incorporated into the design of the proposed works) and good practice mitigation (measures that would occur with or without input from the WFD assessment process).

<sup>1</sup> <https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/>. Last accessed August 2022.

- **Stage 3: WFD Impact Assessment** - A detailed assessment of the water bodies and activities carried forward from the WFD screening and scoping stages.

11.1.6 This report therefore presents the findings of an initial WFD screening and scoping exercise (the first and second stages in the WFD assessment process) which has been undertaken in relation to the Project.

11.1.7 Detailed scoping and full assessment of WFD compliance will be undertaken and submitted with the DCO application.

11.1.8 This chapter provides a description of the various components of the Project for the purposes of identifying and reporting the potential environmental impacts and likely significant effects in this PEIR.

### Study Area

11.1.9 The Project runs between Immingham and Theddlethorpe along the northeast coast of England, over a distance of approximately 55.6km. The Project layout is shown in **Figure 3-2**.

11.1.10 For the purposes of this assessment a general Study Area (Zone of Influence) of approximately 1 km from the Draft Order Limits has been considered in order to identify water bodies that are hydrologically connected to the Project, and potential works associated with the Project, that could cause direct impacts. However, given that impacts may propagate downstream, where relevant the assessment also considers a wider Study Area to as far downstream as a potential impact may influence the quality or quantity of the water body (which in this case is typically for a few kilometres). Professional judgement has been applied to identify the extent to which such features are considered.

11.1.11 The Study Area falls across the following surface water body catchments<sup>2</sup>:

- North Beck Drain (GB104029067575);
- Great Eau (downstream of South Thoresby) (GB105029061660);
- Long Eau (GB105029061670);
- South Dike and Grayfleet Drain (GB105029061680);
- Louth Canal (GB104029061990);
- Black Dyke Catchment (trib of Louth Canal) (GB104029062000);
- Poulton Drain Catchment (trib of Louth Canal) (GB104029062010);
- Waithe Beck Lower Catchment (to Tetney Lock) (GB104029062100); and
- Laceby Beck / River Freshney Catchment (to N Sea) (GB104029067530).
- New Dike Catchment (trib of Louth Canal) (GB104029062030);
- Mawnbridge Drain (GB104029067540);
- Land Dike Drain to Louth Canal (West) (GB104029062162); and
- Trusthorpe Pump Drain (upper end) (GB105029061640).

11.1.12 There are also several tributaries of these water bodies present within the Study Area; these are predominantly unnamed agricultural ditches, drains and springs. It should be noted that

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<sup>2</sup> <https://environment.data.gov.uk/catchment-planning>. Last accessed August 2022

WFD requirements apply equally to all watercourses regardless of whether they are Environment Agency reportable reaches.

11.1.13 The Study Area is also underlain by two WFD groundwater bodies:

- South Lincolnshire Chalk Unit (GB40501G401600); and
- North Lincolnshire Chalk Unit (GB40401G401500).

### **Introduction of the Water Framework Directive**

11.1.14 An impact assessment of any works/modifications to water bodies in the UK is required under the European Union's Water Framework Directive (2000/60/EC) (WFD). The WFD was transposed into UK law by the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (Ref 11-1). The WFD aims to protect and enhance the water environment.

11.1.15 The WFD takes a holistic approach to sustainable management of the water environment by considering interactions between surface water, groundwater and water-dependent ecosystems. Ecosystem conditions are evaluated according to interactions between classes of biological, chemical, physico-chemical and hydromorphological elements known as 'Quality Elements'.

11.1.16 Under the WFD, 'water bodies' are the basic management units, defined as all or part of a river system or aquifer. Water bodies form part of a larger 'river basin district' (RBD), for which 'River Basin Management Plans' (RBMPs) are used to summarise baseline conditions and set broad improvement objectives. RBMPs are produced every six years, in accordance with the river basin management planning cycle. The current RBMPs at the date of this assessment (September 2022) are the 2015 Cycle 2 plans. The Cycle 3 RBMPs are currently draft, however the baseline will be updated once current.

11.1.17 In England, the Environment Agency (EA) is the competent authority for implementing the WFD, although many objectives are delivered in partnership with other relevant public bodies and private organisations, for example local planning authorities, water companies, rivers trusts, and private landowners and developers.

11.1.18 The EA is also responsible for managing flood risk and other activities on Main Rivers. Local planning authorities or drainage boards are responsible for consenting certain activities on Ordinary Watercourses. Local planning authorities are responsible for highways drains, and landowners are responsible for ditches and watercourses and also piped watercourses and culverts. While the EA is ultimately responsible for the WFD on any water body, local authorities are required to plan and consent WFD related activities on Ordinary Watercourses.

11.1.19 As part of its regulatory and statutory consultee role on planning applications and environmental permitting (under the Environmental Permitting Regulations (England and Wales) 2016) (Ref 11-2), the EA and WFD-partnering organisations, must consider whether proposals for new developments have the potential to:

- Cause a deterioration of any quality element of a water body from its current status or potential; and / or
- Prevent future attainment of good status or potential where not already achieved.

11.1.20 Regulation 17 of the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (i.e. the WFD) states that, like other public bodies, local authorities have a statutory duty to "have regard to the River Basin Management Plan" and "any

supplementary plans” covering proposed activities when exercising its functions. Local authorities must therefore reflect water body improvement priorities as outlined in RBMPs.

- 11.1.21 In determining whether a development is compliant or non-compliant with the WFD objectives for a water body, the EA and partnering organisations must also consider the conservation objectives of any Protected Areas (i.e. water dependent Sites of Special Scientific Interest) and adjacent WFD water bodies, where relevant.

## 11.2 Methodology

- 11.2.1 Guidance on how to undertake WFD assessments can be found in the Environment Agency’s ‘Water Framework Directive risk assessment - How to assess the risk of your activity’<sup>3</sup> (Ref 11-3) and Planning Inspectorate’s ‘Advice note eighteen: The Water Framework Directive’ (Ref 11-4). These guidance documents have informed the approach taken in this screening exercise.

- 11.2.2 A stepwise approach consisting of screening, scoping and impact assessment phases is generally followed in order to: (a) rationalise the levels of WFD assessment and impact mitigation that are required; and (b) verify that proposals meet the requirements of the WFD. The general approach is described by The Planning Inspectorate (Ref 11-4) and briefly summarised below. This WFD assessment comprises the Screening element only.

### Stage 1: Screening

- 11.2.3 Screening identifies the zone of influence of a proposed development, and if proposed activities pose a risk to the water environment. It is used to identify if there are activities that do not require further consideration for WFD objectives, for example activities which have been ongoing since before the current RBMP plan cycle and which have thus formed part of the baseline.

### Stage 2: Scoping

- 11.2.4 Scoping is used to identify any potential impacts of the proposed activities to specific WFD receptors and their water quality elements. This involves review of WFD impact pathways, shortlisting which WFD water bodies and quality elements could or could not be affected by proposed activities, and collecting baseline information from the relevant RBMP on the status and objectives for each water body.

### Stage 3: Impact Assessment

- 11.2.5 This involves rationalised assessment of water bodies and quality elements that could be affected by proposed activities, in order to identify any areas of WFD non-compliance. Proposed activities are reviewed in terms of both positive and negative impacts, and the baseline mitigation measures, enhancements, and contributions to the WFD objectives described in the RBMP. Any proposed activities with potentially deleterious impacts are reviewed simultaneously with their corresponding mitigation proposals, to determine a net effect on WFD objectives.

### Mitigation Commitments

- 11.2.6 Proposed mitigation activities relied upon to demonstrate compliance at any of the stages referred to above must be appropriately defined and sufficiently secured. Mitigation could be secured through requirements within a Development Consent Order, or other legally binding methods.

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<sup>3</sup> <https://www.gov.uk/government/publications/water-framework-directive-how-to-assess-the-risk-of-your-activity>. Last accessed August 2022

## Regulation 19 Derogation

- 11.2.7 Where the potential for deterioration of water bodies is identified, and it is not possible to mitigate the impacts to a level where deterioration can be avoided, additional assessment is needed in the context of Regulation 19 of the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 which covers procedures for WFD derogation.
- 11.2.8 Regulation 19 is a 'last resort' planning and legal process, and it is a matter for the Secretary of State to consider whether derogation under Regulation 19 is justified. An applicant would be required to provide detailed and often complex evidence to justify its case that the following four stringent tests have been met:
- Test (a): All practicable steps are to be taken to mitigate the adverse impacts on the water body concerned.
  - Test (b): the reasons for modifications or alterations are specifically set out and explained in the RBMP.
  - Test (c)(1): There is an overriding public interest in the Project and/or Test (c)(2): its benefits outweigh the benefits of the WFD objectives (i.e., that the benefits of the project to human health, human safety or sustainable development outweigh the benefits of achieving the WFD objectives).
  - Test (d): The benefits of the project cannot be achieved by a significantly better environmental option (that are technically feasible and do not lead to disproportionate cost).
- 11.2.9 In addition, the development must not permanently exclude or compromise achievement of the WFD objectives in other bodies of water within the same RBD and must be consistent with the implementation of other environmental legislation. In applying Regulation 19, steps must also be taken to make sure that the new provisions guarantee at least the same level of protection as the existing legislation.

## 11.3 Desk Study

- 11.3.1 A desk-based study was carried out to capture information pertaining the Project that is not attainable through site survey. Reviewal of relevant information relating to the Study Area was undertaken to develop a baseline for WFD catchments, watercourses and surrounding areas. The following data sources were used for the desk study:
- Environment Agency WFD data (Environment Agency, 2022) (Ref 11-5);
  - Ordnance Survey maps (Ordnance Survey, 2022) (Ref 11-6);
  - Geology and soil data (BGS, 2022; Cranfield University 2022) (Ref 11-7);
  - Natural environment maps and designations on the MAGIC website (MAGIC, 2022) (Ref 11-8);
  - Hydrological information (CEH, 2022) (Ref 11-9); and
  - Met Office Climate Averages (Met Office, 2022) (Ref 11-10).



## 11.4 Limitations and Assumptions

- 11.4.1 This Screening and Scoping exercise is based on baseline and Project design information available at the time of writing in August 2022. It is based on the Project design set out in *PEIR Volume II Chapter 3: The Viking CCS Pipeline*.
- 11.4.2 The risk from surface water runoff to surface or groundwater bodies has been provisionally considered qualitatively on the basis of design principles that will be presented in an outline drainage strategy at the ES stage. As part of the full environmental impact assessment and WFD assessment, the risk from surface water runoff from new hard standing to surface or groundwater bodies will be assessed according to the Simple Index Approach presented in the C753 The SuDS Manual (Ref 11-11). It is expected that the pollutant risk will not be very high from runoff and that only one layer of treatment may be required. However, there is also potential to use proprietary measures if there is a greater risk or there are localised constraints.
- 11.4.3 There will be welfare facilities associated with the Project. Given the low daily occupancy only small volumes of foul drainage will be generated. At the time of writing, it is not known how any wastewater from permanent welfare facilities will be managed. However, this is anticipated to consist of a self-contained independent non-mains domestic storage and/or treatment system. An alternative where this is not possible, would be for a self-contained foul drainage system to a septic tank or similar. These tanks would be regularly emptied under contract with a registered recycling and waste management contractor.

## 11.5 Baseline Conditions and Desk Study

### Catchment Characteristic

#### General Characteristics

- 11.5.1 Generally, the topography for the entire Study Area is relatively subdued, with elevations typically ranging from 4mAOD westwards towards the Lincolnshire Wolds. This is due to the Project's proximity to the coast, which is typically formed of low-lying farmland and marshland.
- 11.5.2 The landcover of the catchment is dominated by arable land, with approximately 70% coverage, this is followed by improved grassland at 15% coverage, and supralittoral sediment at 8% coverage. Notable landcover equal to/lower than 5% is suburban, urban, and deciduous woodland<sup>4</sup> (Ref 11-12). The major urban areas within the Study Area are Immingham, Grimsby, and Mablethorpe, however, there are many small villages such as Alvingham, Grimoldby, Ashby cum Fenby and North Thoresby.
- 11.5.3 The two nearest weather monitoring station to the Study Area are Cleethorpes, Haverstoe Park which is located to the southeast of Grimsby on the Lincolnshire coast, and Manby, which is located approximately 8km east from the town of Louth. Both stations have rainfall data from 1991-2020<sup>5</sup> (Ref 11-10). The Cleethorpes station is subject to c.600.71 mm of rainfall per year and the Manby station demonstrates an average rainfall of 634.53 mm of rainfall per year which are both much lower than the UK average annual rainfall value of c.1163.04 mm. This demonstrates that the area can be categorised as dry in comparison to most of the United Kingdom. Rainfall at both of the stations is highest from mid-autumn to winter; however, it is more wet during summer compared to the late winter and spring and generally peaking in November, with the least rainfall falling in March on average.

<sup>4</sup> <https://nra.ceh.ac.uk/data/>. Last accessed July 2022.

<sup>5</sup> <https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages> Last accessed August 2022

### **Catchment Geology and Soils<sup>6</sup>**

- 11.5.4 A review of British Geological Survey (BGS) geological maps (Ref 11-13) identified that the catchment was characterised by five different Superficial Deposits (from greatest proportion to least):
- Glacial Till (a heterogenous mixture of clay, sand, gravel, and boulders varying widely in size and shape (diamicton));
  - Tidal Flat Deposits (consolidated soft silty clay, with layers of sand, gravel, and peat);
  - Glaciofluvial Deposits (sand and gravel with rare clay interbeds; often cross-bedded; of glacial origin);
  - Alluvium present in localised channels between Immingham and Aylesby (comprise soft to firm consolidated, compressible silty clay, but can contain layers of silt, sand, peat, and basal gravel); and
  - Lacustrine Deposits (laminated clay and silt and can contain thin layers of organic material or sand).
- 11.5.5 Most of the Study Area is characterised by Burnham Chalk Formation bedrock geology, comprising white, thinly bedded chalk with common tabular and discontinuous flint bands and sporadic marl seams.
- 11.5.6 The eastern coastal section of the Study Area has a bedrock geology of Chalk of the Flamborough Chalk Formation. This is a white, well-bedded, flint-free chalk with common marl seams (characteristically approximately one per metre).
- 11.5.7 Chalk of the Welton Chalk Formation underlies the majority of the western section of the Study Area. Generally comprising white, massive, or thickly bedded chalk with common flint nodules, lacking tabular flint bands.
- 11.5.8 Soil composition within the catchment is composed of two main types<sup>7</sup>. The eastern section of the Study Area is characterised by loamy and clayey soils of coastal flats with naturally high groundwater. The western section of the Study Area is slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils. The habitats common with both type of soilscape is seasonally wet pastures and woodlands which has moderate fertility and impeded drainage (Ref 11-7).

### **WFD Status**

#### **WFD Status – Surface Water Bodies**

- 11.5.9 The Study Area falls within 13 WFD surface water body catchments. There are also several tributaries of these water bodies present within the Study Area; these are predominantly unnamed agricultural ditches, drains, and springs.
- 11.5.10 Further details regarding the WFD classifications of these 13 water bodies are given in **Table 11-1**.

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<sup>6</sup> <https://geologyviewer.bgs.ac.uk/> Last accessed August 2022

<sup>7</sup> <http://www.landis.org.uk/soilscales/> Last accessed August 2022

**Table 11-1: WFD Status Summary for Surface Waterbodies (Cycle 2)**

WFD Parameter	Status / Summary													
Water Body ID	GB104029067575	GB105029061660	GB105029061670	GB105029061680	GB104029061990	GB104029062000	GB104029062010	GB104029062100	GB104029067530	GB104029062030	GB104029067540	GB104029062162	GB105029061640	
Water Body Name	North Beck Drain	Great Eau (down-stream of South Thoresby)	Long Eau	South Dike and Grayfleet Drain	Louth Canal	Black Dyke Catchment (trib of Louth Canal)	Poulton Drain Catchment (trib of Louth Canal)	Waithe Beck Lower Catchment (to Tetney Lock)	Laceyby Beck / River Freshney Catchment (to N Sea)	New Dike Catchment (trib of Louth Canal)	Mawnbridge Drain	Land Dike Drain to Louth Canal (West)	Trusthorpe Pump Drain (upper end)	
Water Body Type	River	River	River	River	River	River	River	River	River	River	River	River	River	
Water Body Area (km <sup>2</sup> )	56.65	55.02	41.00	61.87	26.55	20.88	32.62	69.75	101.16	21.94	27.55	20.12	45.79	
Water Body Length (km)	9.03	23.89	16.93	25.07	20.55	11.02	6.93	18.59	15.62	3.04	1.313	1.48	17.34	
Hydromorphological Designation	Heavily Modified	Heavily Modified	Heavily Modified	Heavily Modified	Heavily Modified	Heavily Modified	Heavily Modified	Heavily Modified	Heavily Modified	Heavily Modified	Heavily Modified	Heavily Modified	Artificial	
Overall Ecological Status	Moderate	Poor	Moderate	Moderate	Poor	Moderate	Moderate	Moderate	Bad	Moderate	Moderate	Bad	Moderate	
Current Overall Status	Moderate	Poor	Moderate	Moderate	Poor	Moderate	Moderate	Moderate	Bad	Moderate	Moderate	Bad	Moderate	
Status Objective	Good by 2027	Good by 2027	Moderate by 2015	Good by 2027	Moderate by 2027	Good by 2021	Good by 2027	Good by 2027	Moderate by 2027	Good by 2027	Good by 2027	Good by 2027	Good by 2027	

WFD Parameter	Status / Summary												
Biological Quality Elements	N/A	Poor	Poor	Bad	Poor	Poor	Moderate	Good	Bad	High	N/A	Bad	Good
Physico-chemical Quality Elements	N/A	High	Moderate	N/A	Good	N/A	N/A	Good	Moderate	N/A	N/A	Moderate	Moderate
Hydromorphological Quality Elements	Supports Good	Supports Good	Supports Good	Supports Good	Supports Good	Supports Good	Supports Good	Supports Good	Supports Good	Supports Good	Supports Good	Supports Good	Supports Good
Chemical	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail

### WFD Status – Ground Water Bodies

11.5.11 The Project is underlain by two ground water bodies: South Lincolnshire Chalk Unit (GB40501G401600); North Lincolnshire Chalk Unit (GB40401G401500). A summary of the WFD status of both water bodies is given in **Table 11-2**.

**Table 11-2: WFD Status Summary for Groundwater Bodies (Cycle 2)**

WFD Parameter	GWB 1	GWB 2
Water Body ID	GB40501G401600	GB40401G401500;
Water Body Type	South Lincolnshire Chalk Unit	North Lincolnshire Chalk Unit
Water Body Area	Ground Water Body	Ground Water Body
Overall Status	Poor	Poor
Quantitative	Good	Poor
Quantitative Status Elements	Good	Poor
Quantitative Saline Intrusion	Good	Poor
Quantitative Water Balance	Good	Good
Quantitative GWDTEs test	Good	Good
Quantitative Dependent Surface Water Body Status	Good	Poor
Chemical	Poor	Poor
Chemical Status Elements	Poor	Poor
Chemical Drinking Water Protected Area	Good	Poor
General Chemical Test	Poor	Poor
Chemical GWDTEs test	Good	Good
Chemical Dependent Surface Water Body Status	Good	Good
Chemical Saline Intrusion	Good	Good
Prevent and Limit Objective	Active	Active

## 11.6 WFD Screening

The purpose of the WFD screening stage as outlined in PINS Advice Note 18<sup>8</sup> (Ref 11-4) is to identify a zone of influence of the Project and to determine whether that influence has the potential to adversely impact upon WFD water body receptors; this approach has been taken in this assessment and is outlined in this section.

- 11.6.1 A Study Area of 1km from the Draft Order Limits has been considered in order to identify water bodies that are potentially hydrologically connected to the Project, and potential works associated with the Project that could cause direct impacts.
- 11.6.2 The screening stage also identifies specific activities of the Project that could affect receptor water bodies' WFD status, and which should be carried forward to subsequent stages of the assessment process at the ES stage. Justification is provided where water body receptors are screened out and are not carried forward through the assessment. Water bodies or activities screened 'out' of the assessment will therefore not be considered further at the impact assessment stage, subject to agreement being obtained from the Environment Agency.

### Screening of WFD Water Bodies

- 11.6.3 The Project interacts with 13 surface WFD water bodies. WFD Screening of these water bodies is provided in **Table 11-3**. Any other remaining downstream water bodies not mentioned below are considered sufficiently far downstream to avoid impacts of the Project and are therefore screened out of further assessment.

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<sup>8</sup> <https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/>. Last accessed August 2022

**Table 11-3: Screening of the Project Activities**

Water Body ID	Screening Outcome	Justification
North Beck Drain (GB104029067575)	In	WFD water bodies may be directly impacted by the Project due to a range of activities that would interact with the local watercourse network during construction, operation and decommissioning phases of the Project.
Great Eau (downstream of South Thoresby) (GB105029061660)		
Long Eau (GB105029061670)		
South Dike and Grayfleet Drain (GB105029061680)		
Louth Canal (GB104029061990)		
Black Dyke Catchment (trib of Louth Canal) (GB104029062000)		
Poulton Drain Catchment (trib of Louth Canal) (GB104029062010)		
Waithe Beck Lower Catchment (to Tetney Lock) (GB104029062100)		
Laceby Beck / River Freshney Catchment (to N Sea) (GB104029067530)		
New Dike Catchment (trib of Louth Canal) (GB104029062030)		
Mawnbridge Drain (GB104029067540)		
Land Dike Drain to Louth Canal (West) (GB104029062162)		
Trusthorpe Pump Drain (upper end) (GB105029061640)		

### Screening of Activities

11.6.4 As described in Section 1, the Project comprises a number of activities, some of which present a potential risk to the WFD status of water bodies. These components and activities are listed in **Table 11-4** together with a screening assessment.

**Table 11-4: Screening of WFD Water Bodies Potentially Impacted by the Project**

Activity	Description	Screening Outcome	Justification
Immingham Facility	This component consists of a inlet manifold with valve access platform, permanent pig receiver, overpressure protection system (HIPPS), permanent pig launcher to allow the onshore CO <sub>2</sub> pipeline to be cleaned and inspected during commissioning and operation and be suitable for intelligent pigging, common pig handling area for the pig receiver and launcher, Emergency Shutdown Valve (ESDV) for each pipeline, venting system; various instruments installed on the pipework, including temperature and pressure measurement and ultrasonic flowmeter, Local equipment room (LER) and Analyser house. It is currently proposed that such infrastructure would be located at TA 1702 1685, a currently unused section of land, around 0.15km <sup>2</sup> , to the south of the VPI Immingham site.	<b>Out:</b> <ul style="list-style-type: none"> <li>• North Beck Drain (GB104029067575);</li> <li>• Great Eau (downstream of South Thoresby) (GB105029061660);</li> <li>• Long Eau (GB105029061670);</li> <li>• South Dike and Grayfleet Drain (GB105029061680);</li> <li>• Louth Canal (GB104029061990);</li> <li>• Black Dyke Catchment (trib of Louth Canal) (GB104029062000);</li> <li>• Poulton Drain Catchment (trib of Louth Canal) (GB104029062010);</li> <li>• Waithe Beck Lower Catchment (to Tetney Lock) (GB104029062100);</li> <li>• Laceby Beck / River Freshney Catchment (to N Sea) (GB104029067530);</li> <li>• New Dike Catchment (trib of Louth Canal) (GB104029062030);</li> <li>• Mawnbridge Drain (GB104029067540);</li> <li>• Land Dike Drain to Louth Canal (West) (GB104029062162);</li> <li>• Trusthorpe Pump Drain (upper end) (GB105029061640).</li> </ul>	The proposed location of the facility is not within 10m of a water body (measured from the edge of watercourses defined broadly by the position of the main channel and normal flow water's edge) and so should not have an effect on the WFD status of the surrounding water body. Any works that may generate runoff or spillages during construction are anticipated to be adequately addressed through mitigation measures to be outlined in the CEMP and WMP in order to avoid adverse impacts on water quality to watercourses receiving drainage from the site. The CEMP and WMP would be secured through a requirement in the DCO.
Onshore pipeline	The pipeline is expected to have an internal diameter of 24 inch(") and	<b>In:</b> <ul style="list-style-type: none"> <li>• North Beck Drain (GB104029067575);</li> </ul>	The pipeline crosses nine WFD watercourses and so is screened in



Activity	Description	Screening Outcome	Justification
	<p>be buried to a minimum depth of 1.2m to the top of the pipe, which may be increased at crossing points of watercourses. The pipeline is expected to cross WFD watercourses in 9 locations throughout the route, with intrusive, open-cut techniques planned for four of these crossings (North Beck Drain, Laceby Beck, Waithe Beck, and Grayfleet Drain). With this technique, it is generally understood that the watercourse is temporarily diverted (though a pipe or flume or by over-pumping around the working area) whilst the bed, and therefore the banks are excavated to a depth where cables will be laid. The watercourse will subsequently be reinstated. Non-intrusive crossings will be used for the other five crossings (Louth Canal, Black Dyke, Poulton Drain, Great Eau, and Long Eau). With this technique, it is understood that launch and receive pits will be dug that will be set back from the water's edge by a minimum of 10m, drilling beneath the watercourse bed to avoid disturbance to the channel, with the pipeline passed through this tunnel.</p>	<ul style="list-style-type: none"> <li>• Great Eau (downstream of South Thoresby) (GB105029061660);</li> <li>• Long Eau (GB105029061670);</li> <li>• South Dike and Grayfleet Drain (GB105029061680);</li> <li>• Louth Canal (GB104029061990);</li> <li>• Black Dyke Catchment (trib of Louth Canal) (GB104029062000);</li> <li>• Poulton Drain Catchment (trib of Louth Canal) (GB104029062010);</li> <li>• Waithe Beck Lower Catchment (to Tetney Lock) (GB104029062100); and</li> <li>• Laceby Beck / River Freshney Catchment (to N Sea) (GB104029067530).</li> </ul> <p><b>Out:</b></p> <ul style="list-style-type: none"> <li>• New Dike Catchment (trib of Louth Canal) (GB104029062030);</li> <li>• Mawnbridge Drain (GB104029067540); and</li> <li>• Land Dike Drain to Louth Canal (West) (GB104029062162); Trusthorpe Pump Drain (upper end) (GB105029061640).</li> </ul>	<p>for each of the corresponding water bodies, even for the watercourses where non-intrusive cuttings are planned as there may still be effects during the construction phase, such as the uncontrolled release of construction site runoff that may include high levels of fine sediment, oils and drilling muds if this runoff is not carefully managed.</p> <p>In the case of the intrusive cuttings, there is potential for direct impacts to the riparian zone and channel and increased fine sediment delivery to water bodies and pollution of water bodies during construction works. Although construction works will be completed within a matter of days to few weeks, the impact on riparian habitat will persist until vegetation re-establishes.</p> <p>In the case of water bodies where an activity is not screened in, this is on the basis that watercourses are situated a significant distance from the pipeline:</p> <p>New Dike Catchment (trib of Louth Canal) lies 2.3km to the east of the pipeline at its closest point. Mawnbridge Drain is 4.5km to the east of the pipeline at its closest point.</p>

Activity	Description	Screening Outcome	Justification
			<p>Land Dike Drain to Louth Canal (West) is 2.6km away from the pipeline at its closest point. Trusthorpe Pump Drain (upper end) is 1.8km away from the pipeline at its closest point. Despite having some likely hydrological connectivity to drainage channels, it is anticipated that any water quality issues relating to construction runoff or spillages that have potential to enter these tributaries will be mitigated by the Construction Environmental Management Plan (CEMP), which will be secured under the DCO, and Water Management Plan (WMP). The CEMP will be standard procedure for the Project and will describe the principles for the protection of the water environment during construction. The CEMP will be supported by the WMP appendix, that will provide greater detail regarding the mitigation to be implemented to protect the water environment from adverse effects during construction including requirements for water quality monitoring. A Draft CEMP will be prepared and will accompany the ES. Given this mitigation and the lack of any direct works to these</p>

Activity	Description	Screening Outcome	Justification
			water bodies, it is considered that they can be screened out of further assessment.
Block Valve Stations	Block valves are used to isolate sections for maintenance or in case of emergency, and would be installed below ground level, with minimal above ground infrastructure. Block valves would be within a block valve station of around 1088 m <sup>2</sup> . There are three block valve stations proposed, at TF 3588 9057, TA 2628 0030, and TA 1955 0718 (see Figure 3-7). The sites for these stations would be cleared, excavated, and graded to achieve required finished levels. Surfaces will be constructed to falls, so that rainwater can drain to existing open ground, to soakaways or to existing drainage facilities, as appropriate. The majority of the site will be permeable surface to minimise runoff. Swales and soakaways will be utilised to promote sustainable drainage.	<b>Out:</b> <ul style="list-style-type: none"> <li>• North Beck Drain (GB104029067575);</li> <li>• Great Eau (downstream of South Thoresby) (GB105029061660);</li> <li>• Long Eau (GB105029061670);</li> <li>• South Dike and Grayfleet Drain (GB105029061680); Louth Canal (GB104029061990);</li> <li>• Black Dyke Catchment (trib of Louth Canal) (GB104029062000);</li> <li>• Poulton Drain Catchment (trib of Louth Canal) (GB104029062010);</li> <li>• Waithe Beck Lower Catchment (to Tetney Lock) (GB104029062100);</li> <li>• Laceby Beck / River Freshney Catchment (to N Sea) (GB104029067530);</li> <li>• New Dike Catchment (trib of Louth Canal) (GB104029062030);</li> <li>• Mawnbridge Drain (GB104029067540);</li> <li>• Land Dike Drain to Louth Canal (West) (GB104029062162);</li> <li>• Trusthorpe Pump Drain (upper end) (GB105029061640).</li> </ul>	The proposed location of the facilities is not within 10m of a water body (measured from the edge of watercourses defined broadly by the position of the main channel and normal flow water's edge) and so should not have an effect on the WFD status of the surrounding water body. Any works that may generate runoff or spillages during construction are anticipated to be adequately addressed through measures to be outlined in the CEMP and WMP in order to avoid adverse impacts on water quality to watercourses receiving drainage from the site.
Theddlethorpe Facility	The Theddlethorpe facility is required to enable the CO <sub>2</sub> to flow from the new 24" pipeline into the existing LOGGS 36" pipeline. There are currently two options for the	<b>Out:</b> <ul style="list-style-type: none"> <li>• North Beck Drain (GB104029067575);</li> <li>• Great Eau (downstream of South Thoresby) (GB105029061660);</li> </ul>	The proposed location of the Theddlethorpe facility is not within 10m of a water body (measured from the edge of watercourses defined broadly by the position of

Activity	Description	Screening Outcome	Justification
	<p>Theddlethorpe Facility. The first is a new facility, approximately 20,200m<sup>2</sup> at the former TGT site (TF 4864 8756). The onshore pipeline would enter the repurposed TGT site from the west and terminate at new facilities built next to the existing offshore Pipeline, which enters the site from the east. The CO<sub>2</sub> would enter the site via the 24” onshore pipeline and would be routed into the 36” LOGGS pipeline. An additional connection would be provided to allow for future carbon capture projects to connect to the Theddlethorpe Facility. The second option would be a new facility slightly to the west of the former TGT site, covering around 5,000m<sup>2</sup> of arable land directly to the west of The Cut. This facility would be accessed from the south of the Draft Order Limits off the A1031 Mablethorpe Road. The key components of this consist of a LOGGS pipeline tie-in; Emergency Shutdown Valves; pig receiver and launcher; overpressure protection system (HIPPS); venting system; local equipment room (LER).</p>	<ul style="list-style-type: none"> <li>• Long Eau (GB105029061670);</li> <li>• South Dike and Grayfleet Drain (GB105029061680); Louth Canal (GB104029061990);</li> <li>• Black Dyke Catchment (trib of Louth Canal) (GB104029062000);</li> <li>• Poulton Drain Catchment (trib of Louth Canal) (GB104029062010);</li> <li>• Waithe Beck Lower Catchment (to Tetney Lock) (GB104029062100);</li> <li>• Laceby Beck / River Freshney Catchment (to N Sea) (GB104029067530);</li> <li>• New Dike Catchment (trib of Louth Canal) (GB104029062030);</li> <li>• Mawnbridge Drain (GB104029067540);</li> <li>• Land Dike Drain to Louth Canal (West) (GB104029062162);</li> <li>• Trusthorpe Pump Drain (upper end) (GB105029061640).</li> </ul>	<p>the main channel and normal flow water’s edge) and so should not have an effect on the WFD status of the surrounding water body. The field of the second proposed location is bordered by the Cut, however it is assumed that development will maintain a 10m buffer between itself and the watercourse, and so should also not have an effect on the WFD status of the surrounding waterbody. This should be feasible, the field in question is measured at approximately 220,000m<sup>2</sup>, and so much larger than the size of the activity (5,000m<sup>2</sup>). Any works that may generate runoff or spillages during construction are anticipated to be adequately addressed through measures to be outlined in the CEMP and WMP in order to avoid adverse impacts on water quality to watercourses receiving drainage from the site.</p>
<p>Existing LOGGS pipeline</p>	<p>The existing LOGGS 36” pipeline (offshore pipeline) enters the former TGT site from the east and terminates at an existing shutdown</p>	<p><b>Out:</b></p> <ul style="list-style-type: none"> <li>• North Beck Drain (GB104029067575);</li> <li>• Great Eau (downstream of South Thoresby) (GB105029061660);</li> </ul>	<p>The proposed location of the facility is not within 10m of a water body (measured from the edge of watercourses defined broadly by</p>

Activity	Description	Screening Outcome	Justification
	valve within the site.	<ul style="list-style-type: none"> <li>• Long Eau (GB105029061670);</li> <li>• South Dike and Grayfleet Drain (GB105029061680); Louth Canal (GB104029061990);</li> <li>• Black Dyke Catchment (trib of Louth Canal) (GB104029062000);</li> <li>• Poulton Drain Catchment (trib of Louth Canal) (GB104029062010);</li> <li>• Waithe Beck Lower Catchment (to Tetney Lock) (GB104029062100);</li> <li>• Laceby Beck / River Freshney Catchment (to N Sea) (GB104029067530);</li> <li>• New Dike Catchment (trib of Louth Canal) (GB104029062030);</li> <li>• Mawnbridge Drain (GB104029067540);</li> <li>• Land Dike Drain to Louth Canal (West) (GB104029062162);</li> <li>• Trusthorpe Pump Drain (upper end) (GB105029061640).</li> </ul>	<p>the position of the main channel and normal flow water's edge) and so should not have an effect on the WFD status of the surrounding water body. Any works that may generate runoff or spillages during construction are anticipated to be adequately addressed through measures to be outlined in the CEMP and WMP in order to avoid adverse impacts on water quality to watercourses receiving drainage from the site.</p>

## 11.8 WFD Scoping

11.8.1 The WFD scoping stage defines the level of detail required for further WFD assessment. This includes identifying risks to the WFD receptors from the Project’s activities. The scoping stage assessment is presented in **Table 11-5**.

**Table 11-5: WFD scoping of the Project’s Activities against WFD Quality Elements**

WFD Quality Element	Potential Risk to Receptor (Yes/No)	Justification	Scoping Outcome (In/Out)
<b>Biological Quality Elements</b>			
Fish	Yes	<p>Non-intrusive crossings of water bodies have the potential to result in a spillage of drilling fluids or pollutants, which have the potential to impact fish populations during the construction phase.</p> <p>Temporary blockages in longitudinal connectivity from intrusive crossing methods of water bodies, and watercourse crossings required for site access. Potential for loss of biological continuity resulting in interference with fish population movements and blocking the exchange of individuals among populations, reducing gene flow and disrupting the ability of ‘source’ populations to support declining populations nearby. Potential direct impact on fish populations from disturbance of the bed and / or release of contaminated construction site runoff, including the risk of ‘break out’ during directional drilling operations.</p>	In
Invertebrates	Yes	<p>Non-intrusive crossings of water bodies have the potential to result in a spillage of drilling fluids or pollutants, which have the</p>	In

WFD Quality Element	Potential Risk to Receptor (Yes/No)	Justification	Scoping Outcome (In/Out)
		<p>potential to impact fish populations during the construction phase.</p> <p>Intrusive crossings of water bodies may cause direct mortality of invertebrates or the smothering of habitat with fine sediment.</p>	
<p>Macrophytes and Phytobenthos Combined</p>	<p>Yes</p>	<p>Non-intrusive crossings of water bodies have the potential to result in a spillage of drilling fluids or pollutants, which have the potential to impact fish populations during the construction phase.</p> <p>Intrusive crossings of water bodies may cause the removal of macrophytes, and removal of the bed or macrophytes supporting phytobenthos. Similar impacts could arise from installation of watercourse crossings for site access.</p>	<p>In</p>
<p><b>Physico-Chemical Quality Elements</b></p>			
<p>Thermal conditions</p>	<p>No</p>	<p>Non-intrusive crossings have the potential to alter the level of shading to water bodies following potential riparian vegetation removal, however this is very unlikely given launch and receive pits will be located at least 10m from the water body.</p> <p>Intrusive crossings may result in riparian vegetation removal, yet this will only be at a very local scale and would not alter the water body temperature.</p>	<p>Out</p>
<p>Oxygenation conditions</p>	<p>Yes</p>	<p>Non-intrusive and intrusive crossings of water bodies have the potential to increase</p>	<p>In</p>

WFD Quality Element	Potential Risk to Receptor (Yes/No)	Justification	Scoping Outcome (In/Out)
		sediment and organic material entry into watercourses.	
Salinity	No	No materials that may alter the salinity of the watercourses are known to be proposed for use in the Project.	Out
Acidification status	No	No materials that may alter the pH of water bodies are known to be proposed for use in the Project. The CEMP and WMP will specify measures to manage the spillage risk of chemicals used in construction.	Out
Nutrient conditions	Yes	Non-intrusive and intrusive crossings of water bodies have the potential to increase sediment loads to watercourses and organic material from site clearance works.	In
<b>Hydromorphological Quality Elements</b>			
Quantity and dynamics of water flow	No	There is no mechanism for non-intrusive crossing methods to impact this element; intrusive crossings will preferably be carried out during dry periods or maintain water body flow by installation of a pipe or flume or by over-pumping the flow for the relatively short duration of the works.	Out
Connection to groundwater bodies	No	The pipeline would cross beneath water bodies and other infrastructure, but this should not impact connectivity to groundwater bodies due to the small scale of activity compared to water body size. Watercourse crossings for site access may also present a barrier to connection with	Out



WFD Quality Element	Potential Risk to Receptor (Yes/No)	Justification	Scoping Outcome (In/Out)
		groundwater bodies, but this will be extremely localised and would not present an impact at the water body scale.	
River continuity	Yes	Intrusive crossings would present a temporary blockage to continuity whilst excavation takes place. Watercourse crossings for site access can also interrupt river continuity. There is no mechanism for non-intrusive crossings to affect this quality element.	In
River depth and width variation	Yes	Intrusive crossings may lead to local changes in channel profile to impact this element. Watercourse crossings for site access would also impact this element locally by their uniform, unchangeable nature.	In
Structure and substrate of the riverbed	Yes	Intrusive crossings may lead to local changes in bed substrate to impact this element. Watercourse crossings for site access can present an interruption to the natural bed substrate.	In
Structure of the riparian zone	Yes	Intrusive crossings would involve digging below the watercourse bed, which would inevitably involve disruption of the watercourse banks and the riparian zone as they will be temporarily removed before being reinstated. Non-intrusive crossings will also involve excavations each side of riverbanks, but these will be set back by a minimum of 10m from the normal flow channel/ water's edge. Watercourse	In

WFD Quality Element	Potential Risk to Receptor (Yes/No)	Justification	Scoping Outcome (In/Out)
		crossings for site access can locally disconnect the river channel from the riparian zone.	
<b>Groundwater Quality Elements</b>			
Quantitative Elements	Yes	There are potential impacts from groundwater ingress to excavations for non-intrusive crossings on certain water bodies, roads, and the railway.	In
Chemical Elements	Yes	There are potential impacts from groundwater ingress to excavations for non-intrusive crossings.	In

## 11.9 Summary

- 11.9.1 There will be welfare facilities associated with the Project. Given the low daily occupancy only small volumes of foul drainage will be generated. At the time of writing, it is not known how any wastewater from permanent welfare facilities will be managed. However, this is anticipated to consist of a self-contained independent non-mains domestic storage and/or treatment system. An alternative where this is not possible, would be for a self-contained foul drainage system to a septic tank or similar. These tanks would be regularly emptied under contract with a registered recycling and waste management contractor.
- 11.9.2 A WFD screening and scoping exercise has been undertaken following guidance in the PINS Advice Note 18 (Ref 11-4). Proposed work activities that could influence water bodies have been outlined and the WFD water bodies that could potentially be affected have been identified.
- 11.9.3 The following water bodies have been identified within the Study Area and screened in for further consideration as the DCO application is advanced:
- North Beck Drain (GB104029067575);
  - Great Eau (downstream of South Thoresby) (GB105029061660);
  - Long Eau (GB105029061670);
  - South Dike and Grayfleet Drain (GB105029061680);
  - Louth Canal (GB104029061990);
  - Black Dyke Catchment (trib of Louth Canal) (GB104029062000);
  - Poulton Drain Catchment (trib of Louth Canal) (GB104029062010);
  - Waithe Beck Lower Catchment (to Tetney Lock) (GB104029062100); and
  - Laceby Beck / River Freshney Catchment (to N Sea) (GB104029067530).
- 11.9.4 The Project will have to demonstrate that there is no deterioration in any of the identified baseline classifications, and no prevention of future improvement for these classifications. If this cannot be achieved, an Article 4.7 derogation would be required.
- 11.9.5 As design details for the Project are finalised for assessment within the ES, the following WFD assessment stages will be advanced, for inclusion within a full WFD Assessment to accompany the DCO application:
- **Stage 3: WFD Impact Assessment** - A detailed assessment of the water bodies and activities carried forward from the WFD screening and scoping stages.
- 11.9.6 These stages of assessment will be undertaken in consultation with the Environment Agency and Internal Drainage Boards, to ensure an appropriate level of assessment.

## 11.10 References

**Ref 11-1** Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. Available at:

<https://www.legislation.gov.uk/ukxi/2017/407/contents/made>

**Ref 11-2** Environmental Permitting Regulations (England and Wales) 2016. Available at: <https://www.legislation.gov.uk/ukxi/2016/1154/contents/made>

**Ref 11-3** Environment Agency (2016a). Water Framework Directive risk assessment. How to assess the risk of your activity. Available at:

<https://www.gov.uk/government/publications/water-framework-directive-how-to-assess-the-risk-of-your-activity>. Last accessed August 2022.

**Ref 11-4** The Planning Inspectorate (2017). Advice Note eighteen: The Water Framework Directive. Available from:

<https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/>. Last accessed August 2022.

**Ref 11-5** Environment Agency (2016b). Protecting and improving the water environment. Water Framework Directive compliance of physical works in rivers. Environment Agency internal position statement, made available to AECOM as part of a data request.

**Ref 11-6** Ordnance Survey (2022) Open Data Download. Available at

<https://osdatahub.os.uk/downloads/open>. Last accessed August 2022.

**Ref 11-7** Cranfield University 2022. The Soils Guide. Available at:

<http://www.landis.org.uk>. Cranfield University, UK. Last accessed August 2022.

**Ref 11-8** MAGIC Map (2022). Defra's Multi Agency Geographical Information for the Countryside website <https://magic.defra.gov.uk/MagicMap.aspx>. Last accessed July 2022.

**Ref 11-9** Environment Agency (2022). Catchment Data Explorer. Available at:

<https://environment.data.gov.uk/catchment-planning>. Last accessed August 2022.

**Ref 11-10** Met Office (2022). Met Office Climate Averages. Available at

<https://environment.data.gov.uk/catchment-planning>. Last accessed August 2022.

**Ref 11-11** C753 The SuDS Manual. Available at:

<https://www.ciria.org/ItemDetail?iProductCode=C753F&Category=FREEPUBS>. Last accessed August 2022.

**Ref 11-12** Centre for Ecology and Hydrology (CEH) (2022). Retrieved from National River Flow Archive: <https://nrfa.ceh.ac.uk/data/>. Last accessed July 2022.

**Ref 11-13** BGS. (2022). Geology of Britain viewer. Retrieved from Geology of Britain:

<https://mapapps.bgs.ac.uk/geologyofbritain/home.html>. Last accessed August 2022.