Immingham Green Energy Terminal

9.3 Applicant's Responses to the Examining Authority's First Written Questions

(Responses to "Q1.9. Water Quality and Resources")

Infrastructure Planning (Examination Procedure) Rules 2010

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Table of contents

Chapter **Pages**

1 Introduction

Overview

1.1 This document has been prepared to accompany an application made to the Secretary of State for Transport (the "Application") under section 37 of the Planning Act 2008 ("PA 2008") for a development consent order ("DCO") to authorise the construction and operation of the proposed Immingham Green Energy Terminal ("the Project").

1.2 The Application is submitted by Associated British Ports ("the Applicant"). The Applicant was established in 1981 following the privatisation of the British Transport Docks Board. **The Funding Statement [APP-010]** provides further information.

1.3 The Project as proposed by the Applicant falls within the definition of a Nationally Significant Infrastructure Project ("NSIP") as set out in Sections 14(1)(j), 24(2) and 24(3)(c) of the PA 2008.

The Project

1.4 The Applicant is seeking to construct, operate and maintain the Immingham Green Energy Terminal, comprising a new multi-user liquid bulk green energy terminal located on the eastern side of the Port of Immingham (the "Port").

1.5 The Project includes the construction and operation of a green hydrogen production facility, which would be delivered and operated by Air Products (BR) Limited ("Air Products"). Air Products will be the first customer of the new terminal, whereby green ammonia will be imported via the jetty and converted on-site into green hydrogen, making a positive contribution to the UK's net zero agenda by helping to decarbonise the United Kingdom's (UK) industrial activities and in particular the heavy transport sector.

1.6 A detailed description of the Project is included in **Chapter 2: The Project** of the Environmental Statement ("ES") **[APP-044]**.

Purpose and Structure of this Document

1.7 This document contains the Applicant's responses to those of the Examining Authority's Written Questions 1 **[PD-008]** grouped under the theme "Q1.9. Water Quality and Resources". It represents one of a collection of eighteen such documents, each of which addresses a different theme.

1.8 Responses are ordered ascendingly by reference number, replicating the structure of the Examining Authority's Written Questions 1.

1.9 Responses are provided in a table. The text of the question appears on the lefthand side, with the Applicant's answer to its right.

1.10 Further materials pertinent to the Applicant's response are included at the end of the document as appendices where necessary.

2 Applicant's Responses to the Examining Authority's First Round of Written Questions

Q1.9. Water Quality and Resources	
Q1.9.1 Non-potable water supply	
Q1.9.1.1	
Question	**Response**
Daily Water Requirements The ES [APP-060, Paragraph 18.7.6] states "The operational Project is estimated to require approximately 3,640m3 /day of non-potable water". Confirm with explanation if this is the amount required once all the hydrogen production units are online, or for the first phase of operation only?	The main use of water on the site is for cooling water. The hydrogen production facility has a cooling water system involving induced draft cooling towers which cool the water with fans and circulate the cool water to the users, which in this case is almost exclusively the hydrogen liquefier units. Water is consumed by the cooling water system in two ways and the water needs to be replaced: • Evaporation (approximately 70–80% of water consumed) • Discharge (20–30% of water consumed) **Paragraph 18.7.6** of the **Environmental Statement ("ES") Chapter 18: Water Use, Water Quality, Coastal Protection, Flood Risk and Drainage [APP-060]** states, "*The operational Project is estimated to require approximately 3,640m^3 /day of non-potable water*". However, the design of the hydrogen production facility has evolved since the **draft Development Consent Order [PDA-004]** and **ES** submission, particularly around the design of the water treatment package. As such the current cooling water requirements for the Project are:

Cooling water demand per phase

Cooling water demand			
Phase	**No. of liquefiers**	**Total cooling water demand**	**Unit**
1	1	832.5	m^3/day
2	2	1,615.5	m^3/day
3	3	2,359.25	m^3/day
4	4	3,072	m^3/day
5	No significant additional water demand		
6	No significant additional water demand		

The above demand figures reflect the enhancement of the proposed water treatment package (included within Work No. 7) which will filter blowdown/discharge water and reduce both discharge and incoming water requirements.

Air Products have received a commercial offer/commitment from Anglian Water for supply of 3,456m^3/day which will satisfy normal demand and allow some flexibility for periods of higher demand.

	Regular and productive discussions have been held and continue to be held with Anglian Water.
Q1.9.1.2	
Question	**Response**
Alternatives to Using Cooling Water Have process design alternatives been considered in the event sufficient non-potable water is not available for cooling purposes [APP-060, Paragraph 18.7.8]?	Following discussions with Anglian Water, it has been agreed that there is sufficient non-potable water available for cooling purposes to serve the whole hydrogen production facility. A commercial offer/commitment has been provided by Anglian Water for 3,456m^3/day, which is sufficient for all phases of the Project. The Project design includes a cooling system involving induced draft cooling towers and circulation of cooling water. This is a typical arrangement in similar process/chemical facilities. The only commercially viable alternative cooling medium to water is air. Water is considered strongly preferable because of the disadvantages of using air, listed below: • Water has better heat transfer properties compared to air. For the same cooling requirement for the hydrogen production facility, an air-cooled system would require a significant number of motor-driven fans and heat exchangers to reject the heat load. As a result, the required equipment for air cooling would have a significantly larger footprint and need for land compared to water cooling. The water-based cooling towers require a total footprint of 15m wide x 60m long – compared to a 40m+ wide x 100m+ long footprint for an air-cooled system. • The air-cooled system would have a much larger electrical load compared to the cooling tower, resulting in higher energy demands for the hydrogen production facility. The cooling tower power

	consumption is approximately 300kW compared to 3MW for an air-cooled system. • The air-cooled system total sound power level (due to a significant number of motor-driven fans) would be considerably higher (louder) compared to the sound power level from a cooling tower. • Water cooling is considered the Best Available Technique as referenced in the Best Available Techniques guidance for industrial cooling systems[1]. For the above reasons, there are significant benefits to the use of a water cooling system rather than a system cooled by air. **References:** [1] European IPPC Bureau (2001). Industrial Cooling Systems. https://eippcb.jrc.ec.europa.eu/reference/industrial-cooling-systems
Q1.9.1.3	
Question	**Response**
Rainwater Harvesting The ES [APP-060, Table 18-1] states "The re-use of surface water for operational use is not considered viable because it in the absence of large storage volumes, which are not possible within a limited site area, this possible source would not provide a sufficiently reliable supply". What other alternatives has the Applicant considered, such as off-site	As a starting point, the hydrogen production facility requires a guaranteed supply of water. Neither the amount of water that can be collected from rainfall nor the period during which it can be collected is guaranteed. There will be periods during any given year when it does not rain. Based on publicly available rainfall data for the Immingham area, the volume of water collected would be insufficient to meet the cooling water

storage options, to reduce its total requirement for non-potable water from external sources.	demands of the hydrogen production facility. As an approximate estimate, if 90% of the average annual rainfall on Work No. 7 were able to be captured and stored, and 70% of this treated and made available for use as cooling water, then it would account for approximately 6% of the annual water demand of the Project. This also illustrates that the collection of rainfall off-site to serve the annual Project water demand (and cater for the natural variation in rainfall) would require a very substantial catchment area, in addition to land needed for water storage and transport infrastructure, and would be a wholly separate project (within the remit of Anglian Water). Accordingly, if rainfall was to be collected on- or off-site locally, a connection to an alternative source would still be required to ensure that the daily non-potable water needs of the hydrogen production facility would be met. Should rainwater be collected then further infrastructure, such as tanks, pumps and water treatment, would be required to manage the rainwater. With this equipment comes a requirement for additional footprint, increased energy consumption and increased use of chemicals. Using off-site storage would incur the same disadvantages but to a greater extent as there would be a pipeline requirement and additional pumps to move the water from the off-site location to the facility. Given the very limited contribution that the local collection of rainwater could make to the water demand of the Project, the disadvantages strongly outweigh the limited benefits.
Q1.9.2 Water Quality Impacts	
Q1.9.2.1	

Question	Response
Risk Reduction Measures The ES [APP-060, Paragraph 18.8.69] refers to impact pathways that have been assessed to have a potential impact on local water courses. Confirm with explanation if the following would be in place prior to operation commencing: tertiary containment, an interceptor and penstock valves?	Indicative details of the proposed drainage scheme for the Project, including all landside areas, are in the **Outline Drainage Strategy [APP-210]** and will be included within the Final Drainage Strategy, the submission of which is secured through **Requirement 12** in **Schedule 2** of the **draft Development Consent Order [PDA-004]** and which must be in general accordance with the **Outline Drainage Strategy**. The design of the drainage system within the landside facilities considers the management of the following types of water on the Site which may drain into the drainage ditches and ultimately into North Beck Drain and the Humber: • Clean stormwater • Accidentally oil contaminated water • Potentially ammonia or chemical contaminated water • Fire-fighting water The water quality component of the site drainage for the hydrogen production facility will also be controlled by the Environmental Permit. Details of segregation, containment and inspection prior to discharge to ensure that these potential sources of contamination are not able to impact the surrounding water courses are outlined below.

	<u>Clean stormwater</u> Clean stormwater is rainwater which falls on areas of the site which are not normally at risk of contamination. Such areas would include building roofs, paved areas away from process equipment, gravelled areas, etc. For the Jetty Access Road, clean stormwater will flow into filter drains along the road before being discharged into the drainage ditches. Emergency procedures will be in place to deal with any accidental spills on the Jetty Access Road. Clean stormwater will be collected from various landside areas within the site (excluding the Jetty Access Road) and routed via underground drainage pipes towards a water retention pond. There will be an isolation valve on the discharge of the ponds to adjacent drainage ditches and it will be an operations routine to regularly visually inspect and test the retention pond prior to water discharge. Water from the retention pond will be released into the adjacent drainage ditch at a maximum rate agreed with the Internal Drainage Board and specified in the **Drainage Strategy [APP-210]**. **<u>Accidentally oil contaminated water ("AOC")</u>** Accidentally oil contaminated water ("AOC") is water which falls on areas which are at risk of minor oil contamination such as road trailer parking areas and heavy traffic roads.

	Drains in these areas will be segregated from the clean stormwater system and will be routed to an oily water separator/interceptor. Oil free water from the separator will then be routed to the water attenuation pond. Equipment with potential for oil leaks or spills will be contained within a bund or kerbed area and will have a sump. The sump will be connected to the AOC drains and routed to the oily water separator. However, the sump will have a normally closed valve so that water is only released once it is seen to be clean. Transformers – which have a larger inventory of oil – will be contained within a concrete pit and isolated from the drainage network. Any oil or water collecting in the pit would be removed via suction tanker. **Ammonia/glycol contaminated water** Water which falls on areas which are at risk of ammonia or chemical contamination such as around the ammonia pumps will be contained within a bunded area with a water collection sump. The sump will be connected to the clean stormwater system and the water retention pond. However, the sump will have an isolation valve and an instrument to detect contamination. If the instrument detects contamination in the water, the isolation valve will automatically close to prevent discharge to the clean stormwater system. **Firewater** During a fire event, firewater would be routed to the water retention pond, either via the clean water system or the AOC system. The pond will be suitably sized with a capacity to contain 2-hours retention for maximum firewater discharge (one event). The pond isolation valve will

	be closed in the event of a fire and the pond inspected and tested prior to release to the drainage ditches. **Summary** The approach outlined above includes water segregation, primary, secondary and tertiary containment and water is only released to adjacent drainage ditches via the water retention ponds which have isolation valves on the discharge lines. The drainage system will be operational prior to operation of the facility. The drainage approach explained above will be further detailed in the Final Drainage Strategy, secured through Requirement 12 in Schedule 2 of the draft Development Consent Order [PDA-004]. In addition, details will be outlined in the Environmental Permit application as representing Best Available Techniques and secured via the Environmental Permit.
Q1.9.2.2	
Question	**Response**
Discharges to Humber Confirm if there would be any controlled discharges to the Humber [APP-059, Table 17-1], either directly or via drainage channels; and if yes, would there be any testing mechanisms before allowing release?	As outlined in response to Question Q1.9.2.1 and the **Outline Drainage Strategy [APP-210]**, there will be controlled discharges from water retention ponds in landside Work Nos. 3, 5 and 7 into adjacent drainage ditches, which in turn flow into North Beck Drain and then into the Humber. Water from the Jetty Access Road (Work No. 2) will also flow at an agreed controlled rate into the adjacent drainage ditch, North Beck Drain and the Humber. As outlined in response to Question Q1.9.2.1, water in the retention ponds will be tested to ensure that it is clean and suitable for discharge.

	Appropriate testing will be specified and regulated through the Environmental Permit.
Q1.9.3 Water Framework Directive (WFD)	
Q1.9.3.1	
Question	**Response**
WFD Compliance You have requested [RR-010] additional information/ clarification in respect of the Applicant's assessment of Water Quality [APP-209, Section 3.4]. a) Following receipt of this, are you able to conclude your assessment on whether or not the Proposed Development will comply with the WFD? b) If not what additional information do you still require from the Applicant, to reach a conclusion.	a) An inconsistency has been identified by the Applicant between **Environmental Statement ("ES") Chapter 18 [APP-060]** and the **Water Framework Directive ("WFD") Compliance Assessment [APP-208]** in relation to the description of the North Beck Drain as being a WFD water body. A correction to **ES Chapter 18** has been included in the **Table of Errata [TR030008/APP/8.7 (2)]**. In its lowest part, i.e. adjacent to the Project, the watercourse is recognised as being heavily modified**, moderate for ecological status** and **in** the Environment Agency's opinion **for chemical status** that "*it does not require assessment (2022)*"[1] because of this. Any effects on the North Beck Drain from the Project remain as stated in ES Chapter 18 [APP-060] and are not significant. b) n/a Note: APP-209 relates to the Flood Risk Assessment. It is APP-208 that contains the WFD.

	References: [1] https://environment.data.gov.uk/catchment-planning/WaterBody/GB104029067575]