

HyNet North West Hydrogen Pipeline Project

Habitats Regulations Assessment Screening Report

September 2022

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Executive Summary

Purpose of this Report

Cadent Gas Ltd (the Applicant) intend to submit a Development Consent Order application to the Secretary of State for the proposed HyNet North West Hydrogen Pipeline Project in North West England.

Under Regulation 63 of the Habitats Regulations, a person applying for any consent, permission or other authorisation for a plan or project must provide such information as the competent authority may reasonably require for the purposes of the assessment or to enable them to determine whether an appropriate assessment is required. Thus, the Applicant is responsible for assembling and describing all the relevant information required to enable the competent authorities to carry out their Habitats Regulations Assessment (HRA) responsibilities.

This HRA Screening Report details the scope, approach and conclusions of the HRA screening in respect to the impact of the Project on the qualifying interest features of all European sites screened into the assessment, either alone or in combination with other plans or projects. The report concludes that there are no Likely Significant Effects (LSE) on any qualifying interest features of any sites within the new national site network.

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1. Introduction

- 1.1.1 This report forms one of a suite of documents, which together support and explain in detail the content and nature of the Applicant's HyNet North West Hydrogen Pipeline Project ('the Project') Development Consent Order (DCO) Application.

1.2 Background to and Purpose of this report

- 1.2.1 This report has been prepared to accompany an application for consent to develop a hydrogen pipeline network running from the Hydrogen Production Plant at the Essar Stanlow site to a Central Hub and then on to locations near Partington, St. Helens and south of Northwich. The Project is a Nationally Significant Infrastructure Project (NSIP) under Part 14(1)(f) ('*the construction of a pipe-line by a gas transporter*') of the Planning Act 2008 (as amended)¹. However, given ongoing regulatory uncertainty as to whether the Project will include blending into the gas network Cadent has obtained a section 35 direction dated 5 July 2022 from the Secretary of State for Business, Energy and Industrial Strategy confirming that the Project (save for the pipeline spurs) is of national significance and is to be treated as development for which development consent is required. Cadent intends to submit an application for an order granting development consent for the Project pursuant to the Planning Act 2008; this application is likely to include the pipeline spurs as associated development.
- 1.2.2 An outline of the Project is provided in **Section 2.2** and is shown in **Figure 1.1 – The Project**.
- 1.2.3 There is a requirement under The Conservation of Habitats and Species Regulations 2017 (the 'Habitats Regulations') to undertake a Habitat Regulations Assessment (HRA).
- 1.2.4 Council Directives 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora ("the Habitats Directive") and 2009/147/EC on the conservation of wild birds ("the Birds Directive") provide for the designation of sites for the protection of certain species and habitats. The sites designated under these Directives are collectively termed European sites and form part of a network of protected sites across Europe, known as the Natura 2000 network. In the UK the Habitats Regulations transposed these Directives into national law and applied them up to the 12 nautical mile limit of territorial waters.
- 1.2.5 Changes made by the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 (the 2019 Regulations). Special Area of Conservation (SACs) and Special Protection Areas (SPAs) in the UK no longer form part of the EU's Natura 2000 ecological network. The 2019 Regulations have created a national site network on land and at sea, including both the inshore and offshore

¹ UK Government (2008). Planning Act 2008. (Chapter 29). (Online) Available at: <https://www.legislation.gov.uk/ukpga/2008/29/contents> (Accessed January 2022).

marine areas in the UK. The national site network includes existing SACs and SPAs, plus new SACs and SPAs designated under the 2019 Regulations.

- 1.2.6 Any references to Natura 2000 in the Habitats Regulations and in guidance now refers to the new national site network, although for the purposes of this HRA all sites will still be referred to as European sites.
- 1.2.7 The UK Government is also a signatory to the Convention on Wetlands of International Importance 1972 (“the Ramsar Convention”). The Ramsar Convention provides for the listing of wetlands of international importance. UK Government policy is to give sites listed under this convention (“Ramsar Sites”) the same protection as European sites and the new national site network.
- 1.2.8 For the purposes of this HRA Screening Assessment, in line with the Habitats Regulations and relevant Government policy, the term “European sites” and new national site network includes SACs, candidate SACs (“cSAC”), possible SACs (“pSAC”), SPAs, potential SPAs (“pSPA”), listed and proposed Ramsar Sites and sites identified or required as compensatory measures for adverse effects on any of these sites.
- 1.2.9 The Project is in close proximity to several European sites², notably:
- Mersey Estuary SPA/Ramsar Site;
 - Dee Estuary SPA/Ramsar Site/SAC;
 - Mersey Narrows and North Wirral Foreshore SPA/Ramsar Site;
 - Ribble and Alt Estuaries SPA/Ramsar Site;
 - Rixton Clay Pits SAC;
 - Manchester Mosses SAC;
 - Midland Meres and Mosses Phase 1 and 2 Ramsar Site(s);
 - Rostherne Mere Ramsar Site; and
 - Liverpool Bay SPA.
- 1.2.10 Amongst other things, the Habitat Regulations define the process for the assessment of the implications of plans or projects on European sites. This process is termed the HRA.

² Under The Conservation of Habitats and Species Regulations 2017, European sites are defined as Special Areas of Conservation (SACs), candidate SACs, Sites of Community Importance, Special Protection Areas (SPA) and European Marine Sites (EMS), which are marine areas designated as SACs and SPAs. UK policy extends the requirements pertaining to European sites to include Ramsar Sites and potential SPAs, and this would include proposed extensions or alterations to existing SPAs.

1.2.11 HRA can involve up to four stages, as detailed in Box 1.

Box 1 Stages of Habitats Regulations Assessment

Stage 1 – Screening:

This stage identifies the likely impacts upon a European site of a project or Plan, either alone or ‘in combination’ with other projects or plans and considers whether these impacts are likely to be significant.

Stage 2 – Appropriate Assessment:

Where there are likely significant impacts, this stage considers the impacts of the Plan or project on the integrity of the relevant European sites, either alone or ‘in combination’ with other projects or plans, with respect to the sites’ structure and function and their conservation objectives. Where there are adverse impacts, it also includes an assessment of the potential mitigation for those impacts.

Stage 3 – Assessment of Alternative Solutions:

Where adverse impacts [on the integrity of the site] are predicted, this stage examines [whether or not there are] alternative ways of achieving the objectives of the project or Plan that avoid adverse impacts on the integrity of European sites.

Stage 4 – Assessment Where No Alternative Solutions Exist and Where Adverse Impacts Remain:

This stage assesses compensatory measures where it is deemed that the project or Plan should proceed for Imperative Reasons of Overriding Public Interest (IROPI).

1.2.12 Stages 1 and 2 are covered by Regulation 63 and Stages 3 and 4 are covered by Regulation 64 and 68 of the Habitat Regulations.

1.2.13 With respect to Stage 2, the integrity of a European Site relates to the site's conservation objectives and has been defined in guidance as *"the coherent sum of the site's ecological structure, function and ecological processes, across its whole area, which enables it to sustain the habitats, complex of habitats and/or populations of species for which the site is designated"*³. An adverse effect on integrity, therefore, is likely to be one which prevents the site from making the same contribution to favourable conservation status for the relevant feature as it did at the time of designation. The HRA screening process uses the threshold of LSE to determine whether effects on European sites should be the subject of further assessment. The Habitats Regulations do not define the term LSE.

³ European Commission (2018). Managing Natura 2000 sites: The provisions of Article 6 of the ‘Habitats’ Directive 92/43/EEC, at section 4.6.3 (Updated Version, November 2018). (online) Available at: [https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52019XC0125\(07\)&rid=2](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52019XC0125(07)&rid=2) (Accessed July 2022).

However, in the Waddenzee case (Case C-127/02)⁴ the European Court of Justice found that an LSE should be presumed, and an Appropriate Assessment (AA) carried out. If it cannot be excluded on the basis of objective information that the plan or project will not have significant effects on the conservation objectives of the site concerned, whether alone or in-combination with any other project. The Advocate General's opinion of the Sweetman case (Case C-258/11)⁵ further clarifies the position by noting that for a conclusion of an LSE to be made "*there is no need to **establish** such an effect... it is merely necessary to determine that there **may** be such an effect*" (original emphasis).

- 1.2.14 For the reasons highlighted above the assessment process follows the precautionary principle throughout and the word 'likely' is regarded as a description of a risk (or possibility) rather than in a legal sense an expression of probability.
- 1.2.15 Screening can however be used to screen-out European sites and elements of works from further assessment, if it is possible to determine that significant effects are unlikely (e.g., if sites or interest features are clearly not vulnerable (exposed and/or sensitive) to the outcomes of the proposal due to the absence of any reasonable impact pathways).
- 1.2.16 The screening process has two potential conclusions, namely that the proposed development, alone or in combination with other developments, could result in:
- No LSE on any of the designated features of the site; or
 - An LSE is identified that may have significant adverse effect on one or more of the qualifying features of the site and hence a significant effect on site integrity.
- 1.2.17 Only the last of these outcomes will trigger an AA. If one or more LSE are identified, or cannot be ruled out, it is then necessary to proceed to Stage 2 and produce an AA.
- 1.2.18 On 12 April 2018, the Court of Justice of the European Union (CJEU) issued a judgment on Case C323/17 (People over Wind, Peter Sweetman v Coillte Teoranta) which stated (at paragraph 41):
- "Article 6(3) of Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora must be interpreted as meaning that, in order to determine whether it is necessary to carry out, subsequently, an appropriate assessment of the implications, for a site concerned, of a plan or project, it is not appropriate, at the screening stage, to take account of the*

⁴ Judgment of the Court (Grand Chamber) of 7 September 2004. Landelijke Vereniging tot Behoud van de Waddenzee and Nederlandse Vereniging tot Bescherming van Vogels v Staatssecretaris van Landbouw, Natuurbeheer en Visserij. Reference for a preliminary ruling: Raad van State - Netherlands. Case C-127/02. (online) Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:62002CJ0127&from=EN> (Accessed July 2022).

⁵ Judgment of the Court (Third Chamber), 11 April 2013 Peter Sweetman and Others v An Bord Pleanála. Request for a preliminary ruling from the Supreme Court (Ireland) Case C-258/11. (online) Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:62011CJ0258&from=en> (Accessed July 2022).

measures intended to avoid or reduce the harmful effects [mitigation] of the plan or project on that site."

- 1.2.19 This means that any mitigation relating to protected sites under Regulation 63 (1) of the Habitat 2017 Regulations will no longer be considered at the screening stage but taken forward and considered at the appropriate assessment stage to inform a decision on whether no adverse effects on site integrity can be demonstrated.
- 1.2.20 The screening assessment provided within this HRA takes into account the CJEU ruling on 'People over Wind'. It has also adopted a strong precautionary approach in line with the precautionary principle, such that if a pathway (defined as a course of action, or route/way) for any effect is established between the Project and a European Site, then that site is taken through to AA. This ensures all effects are captured, including *de minimis* effects.
- 1.2.21 The subject of this report is HRA Stage 1, which examines whether the proposed development is likely to have significant effects on any European sites.
- 1.2.22 If one or more significant effects are likely to occur, it is then necessary to proceed to HRA Stage 2. However as detailed in Planning Inspectorate Advice Note 10 (PINS Advice Note 10)⁶, in the absence of any likely significant effects, this report will take the form of a 'No Significant Effects Report' (NSER).

1.3 Structure of this Report/HRA Screening Steps

- 1.3.1 This HRA Screening Report has been produced as a precursor to the production either an NSER or HRA Report and is intended to cover HRA Stage 1 - Screening only.
- 1.3.2 Screening aims to determine whether the Project will have any LSE on any European site, as a result of its implementation. It is intended to be an informed coarse filter for identifying effects (positive and negative) that may occur, to allow the assessment stage to focus on the most important aspects.
- 1.3.3 PINS Advice Note 10 details the process for which HRA is undertaken in relation to applications for Nationally Significant Infrastructure Projects (NSIPs) and provides advice for Applicants in relation to the preparation of the HRA. The advice note details that "*Anyone applying for development consent for a NSIP must provide the competent authority with such information as may reasonably be required 'for the purposes of the assessment' or 'to enable them to determine whether an appropriate assessment is required'. This information normally takes the form of a No Significant Effects Report (NSER) or a Habitats Regulations Assessment Report (HRA Report).*"
- 1.3.4 As well as the advice within PINS Advice Note 10, this report follows the procedures for screening described by the European Commission in the guidance document '*Assessment of plans and projects significantly affecting Natura 2000*

⁶ PINS (2017). The Planning Inspectorate Advice Note 10: Habitats Regulations Assessment relevant to nationally significant infrastructure projects November 2017, Version 8.

sites: *Methodological guidance on provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC*'. These steps are:

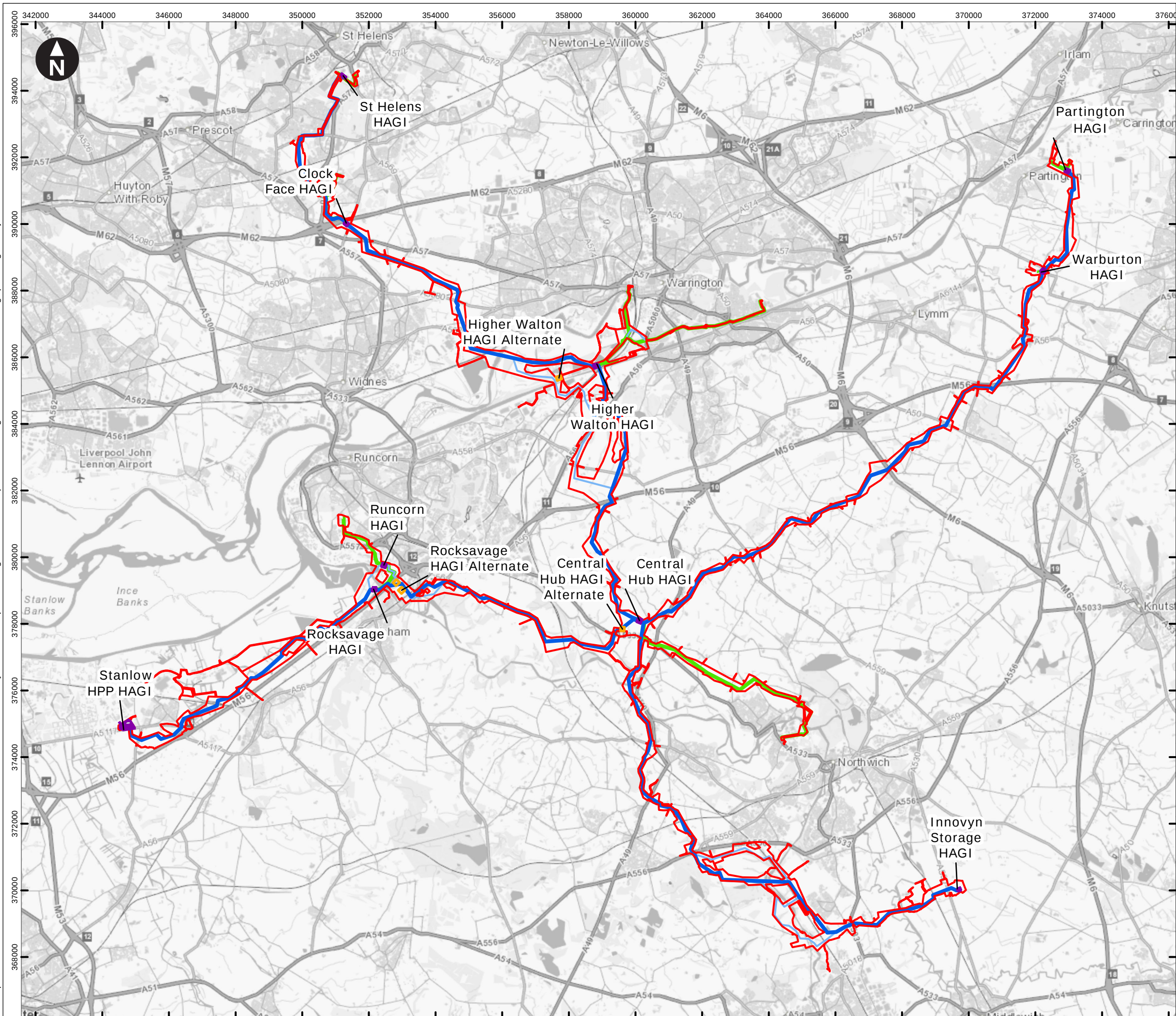
- Step 1: Determining whether the project or plan is directly connected with or necessary for the management of the site.
- Step 2: Describing the project (or plan).
- Step 3: Identifying the potential effects on European sites.
- Step 4: Assessing the presence of Likely Significance Effects on European sites.

Step 1

- 1.3.5 Regulation 63 of the Habitats Regulations applies to plans or projects that are not directly related to the conservation management of a European site. This first step of the screening process is therefore to identify whether the plan or project in question is related to the conservation management of any European sites.
- 1.3.6 The European Commission guidance makes it clear that, for a project or plan to be 'directly' connected with or necessary to the management of a European site, the management must refer to measures that are for conservation purposes, with the 'directly' element referring to measures that are solely conceived for the conservation management of a site and not direct or indirect consequences of other activities.
- 1.3.7 The Project is a 'plan or project', for the purpose of the Habitat Regulations, but is not directly connected with or necessary for the management of any European site. An AA may, therefore, still be required and so it is necessary to proceed to Step 2 of the Screening Process.

Steps 2 - 4

- 1.3.8 Sections 2 - 4 of this report deal in turn with Steps 2 - 4 of the screening process. Section 5 sets out the conclusions from the screening process.



- Key
- Red Line Boundary 26th May 2022
 - HAGI Layouts_26th May 2022
 - HAGI Location Options 26th May 2022
 - Preferred Route Centrelines 26th May 2022
 - Additional Route Options 26th May 2022
 - Preferred Spur Centrelines 26th May 2022

0 1 2 3 4 5 Kilometers
Scale at A3: 1:110,000
OS Open Greyscale: Contains OS data © Crown Copyright and database right 2020

Client
wood. Cadent

HyNet North West Hydrogen Pipeline Project
No Significant Effects Report
Habitats Regulations Assessment Screening

Figure 1.1
The Project

2. HRA Screening Step 2: Project Description

2.1 Introduction

- 2.1.1 This step requires an understanding of the location and description of the elements of the Project that could result in effects on a European site or land functionally linked to that site. The description must identify the elements of the Project that may directly affect a European Site (e.g., land-take), those that may in-directly affect a European Site (e.g., emissions to air) and those that may act in-combination with other plans or projects.

2.2 The Project

The Site and its surroundings

- 2.2.1 The proposed key components of the Project are shown in **Figure 1.1 – The Project** and can be summarised as follows:
- Hydrogen Pipeline Network (HPN) across the North West region:
 - ▶ The West Corridor: Hydrogen Production Plant HAGI (HPP HAGI) at Stanlow to the Central Hub HAGI, incorporating the Rocksavage HAGI; spur to Runcorn HAGI and onward to the following users Intergen (Rocksavage) and The Heath Industrial and Business Park.
 - ▶ The North Corridor: Central Hub HAGI to the St Helens HAGI, incorporating the Higher Walton and Clock Face HAGIs; spurs to Solvay/Ingevity; Novelis; NGF Europe Ltd; NSG Pilkington's Greengate Works and Glass Futures.
 - ▶ The East Corridor: Central Hub HAGI to Partington HAG, incorporating the Warburton HAGI; spur to customers at SAICA, Partington National Grid AGI and Bassel Polyfins, as well as to the existing National Grid AGI on Carr Green Lane to facilitate Hydrogen Injection Blending (HIB) of the hydrogen supply into the wider gas supply.
 - ▶ The South Corridor would start at the Central Hub HAGI with the pipeline running approximately 20.5 km south to the Hydrogen Storage Facility (HSF); spur from Central Hub HAGI to TATA Chemicals.

Description of the Project

Introduction

- 2.2.2 The Project includes the construction, operation and maintenance of up to 125km of new pipelines to distribute hydrogen to industry, power stations and for blending with the existing natural gas network in the North West. The pipeline network would connect to a newly constructed Hydrogen Plant at the Essar Stanlow site as

the source of hydrogen for onward distribution through the network. A Central Hub connects the four main pipeline corridors. Branching off from each main corridor there would be spurs - smaller pipelines - that form the connections to users identified as part of the Project.

- 2.2.3 The pipelines that make up the network would vary in diameter between approximately 6" and 42" dependent on which corridor or spur they are on. Two main types of pipe expected to be used are Carbon Steel (CS) and Polyethylene (PE) pipes. The Pipeline would be buried along the entire route apart from short sections within secure compounds at locations where HAGIs and Block Valves are required. It is currently envisaged that ten HAGIs and two Block Valves would be required at points along the network.
- 2.2.4 The Pipeline would be constructed predominantly using open cut techniques; where open cut is not practicable trenchless crossing techniques will be used at key locations including motorways and major highways, rail, rivers (typically those classed as main rivers, but some may be ordinary watercourses) and canals.
- 2.2.5 In some locations it has been necessary to retain optionality (e.g., at some complex trenchless crossing locations and sites for HAGIs and Block Valves) at this stage. These options will be subject to further analysis and design development through ground investigation, environmental surveys, landowner and stakeholder consultation.
- 2.2.6 **Table 2.1** presents a description of these corridors and sections between the HAGIs for which a description follows. **Figure 1.1 - The Project** illustrates these route corridors and sections.

Table 2.1 Corridor locations, description and characteristics and indicative construction requirements

Corridor	Section	Description and characteristics	Indicative construction requirements
West	Stanlow Hydrogen Production Facility to Rocksavage HAGI	The West Corridor would start at the Hydrogen Production Plant HAGI (HPP HAGI) at Stanlow with the pipeline running approximately 9.7 km northeast to the Rocksavage HAGI and then approximately 9.7 km southeast to the Central Hub HAGI. The pipeline would be High Pressure and diameter is anticipated to be 42". The West Corridor is typically characterised by open fields with hedgerows and tree lines separating them. The pipeline be between approximately 1.5 km and 2 km from the Mersey Estuary SPA and Ramsar at the nearest point.	Approximately 9.7 km of pipeline. Three major crossings.
	Rocksavage HAGI to Central Hub HAGI	The HPP HAGI would be located within the south-easterly extent of the Essar Stanlow site, approximately 30m north of the A5117 and 180m west of Pool Lane (<i>it does not form part of the Project</i>). There are three options for the location of the Rocksavage HAGI. Option 1 is located in an agricultural field approximately 100 m north of the M56 at the nearest point and 15 0m southwest the centre of the River Weaver. Option 2 is located on land bound by the M56 approximately 300 m to the northwest, 220 m from the centre of the River Weaver to the southwest, 180 m from the Weaver Navigation to the northeast and 150 m from the railway viaduct to the southeast. Option 3 is also located on the same area of land but is in an area of woodland with the M56 approximately 30 m to the northwest.	Approximately 9.7 km of pipeline. Eight major crossings.
North	Central Hub to Higher Walton HAGI	The North Corridor would start at the Central Hub HAGI with the High-Pressure pipeline running approximately 12 km north to the Higher Walton HAGI and then approximately 9 km northwest to the Clock Face HAGI. Following design reviews, the two potential HAGIs identified in the EIA Scoping Report at Cuerdley and Burtonwood have been removed from the Project with their future pipeline connection points and infrastructure included at the Clock Face HAGI;	Approximately 12 km of pipeline. Five major crossings.

Corridor	Section	Description and characteristics	Indicative construction requirements
	Higher Walton HAGI to Clock Face HAGI	this reduces the overall footprint of the HAGIs. The corridor continues broadly north for 8 km to the St Helens HAGI, which would be an Intermediate Pressure pipeline. The pipeline diameter on the North Corridor is expected to be between 10" to 18". The North Corridor is typically characterised by open fields with hedgerows and tree lines separating them before Sutton Heath where the route is more typically adjacent to residential areas and proceeds to the more industrial setting around Ravenhead.	Approximately 9 km of pipeline. Six major crossings.
	Clock Face HAGI to St Helen's HAGI	The proposed location for the Clock Face HAGI is in an agricultural field bound by the M62 approximately 20 m to the north and the B5419 approximately 30 m to the east (both measured to the nearest point). The proposed location of the St Helens HAGI is an area of open grass and scrub directly off Burtonhead Road and to the rear of the Ravenhead Retail Park. There are two options for the location of the Higher Walton HAGI. Option 1 would be located in the south of the Moore Nature Reserve and Option 2 would be located on land north of the Manchester Ship Canal and the southern edge of the Moore Nature Reserve.	Approximately 8 km of pipeline. Three major crossings.
East	Central Hub to Warburton HAGI	The East Corridor would start at the Central Hub HAGI with the pipeline running approximately 20 km northeast to the Warburton HAGI. The pipeline would then continue northeast for approximately 5 km to the Partington HAGI. The pipeline diameter is expected to be 30". A Block Valve is expected to be required between the Central Hub HAGI and Warburton HAGI; three options are under consideration. Option 1 is located in an agricultural field with hedgerows at its	Approximately 20 km of pipeline. Six major crossings.

Corridor	Section	Description and characteristics	Indicative construction requirements
	Warburton HAGI to Partington HAGI	edges. It is approximately 1.1 km to the northeast of the M6 and adjacent to Moss Lane. The locations for Options 2 and 3 are in agricultural fields approximately 10 m southwest and northeast respectively of the A50 (Warrington Road) to the rear of established trees and hedgerows.) The Warburton HAGI would be located adjacent to the existing National Grid Above Ground Installation (AGI) facility at Carr Green Lane. The HAGI would be approximately 20 m southeast from the B5160 (Dunham Road) in a field with existing established hedgerows and trees. While some of the vegetation may need to be removed temporarily for access and pipeline connection and then reinstated, the majority would be maintained as visual screening. A thicker belt of woodland to the south of the HAGI location would provide visual screening for the Trans-Pennine Trail / Bollin Valley Way. The Partington HAGI would be located west of the junction of Ashton Road and Townsend Farm Lane on an existing disused brownfield site. To the south and east there are extensive belts of established trees including those along the disused railway line. To the north-northwest, there is a more open industrial setting towards the industrial facilities of Partington and Carrington. The Warburton and Partington HAGIs would connect to existing National Grid AGI facilities to allow blending of hydrogen into the existing gas network. The East Corridor is typically characterised by open fields with hedgerows and tree lines separating them. Note, there are no major trenchless crossings planned between the Warburton and Partington HAGIs.	Approximately 5 km of pipeline. No major crossings.
South	Central Hub HAGI to Hydrogen Storage Facility	The South Corridor would start at the Central Hub HAGI with the pipeline running approximately 21 km south to the Hydrogen Storage Facility (HSF). The pipeline is expected to be High Pressure and 42" diameter. The HAGI	Approximately 21 km of pipeline.

Corridor	Section	Description and characteristics	Indicative construction requirements
		would be located within the Order Limits approximately 250 m to the east of the A530 in a field currently bounded by hedgerow and mature trees. The South Corridor includes five options for the location of the South Block Valve. Options 1 and 2 are located in fields to the north and south of the A556 (Chester Road) respectively. Option 3 is located in a field to the east of Whitegate Lane. Option 4 is located further south in a field to the west of Whitegate Lane. Option 5 is located to the west of an established belt of trees at Jack Lane.	Fourteen major crossings.

Spurs

- 2.2.7 The spurs are the connections from the pipeline to users identified as part of the Project. These include spurs from the following locations on the corridors, which are shown in **Figure 1.1 - The Project**.

Runcorn Spur

- 2.2.8 The Runcorn Spur would start at the Rocksavage HAGI and run north to the Runcorn HAGI. From the Runcorn HAGI there would be two spurs routed broadly northwest to connect the following users:
- Intergen (Rocksavage).
 - The Heath Industrial and Business Park.
- 2.2.9 These spur options are bounded by Manchester Ship Canal to the west and Runcorn Heath to the East. Crossings of the River Weaver, Weaver Navigation Canal and the A557 Expressway would be required. This would be approximately 4 km of pipeline.

Warrington Spurs

- 2.2.10 The Warrington Spur(s) would start at the Higher Walton HAGI and run northeast for approximately 0.7 km with a High Pressure 8" spurline to provide connection to the following users:
- Solvay, Warrington (shared connection with Ingevity).
 - Ingevity, Warrington (shared connection with Solvay).
- 2.2.11 A second spurline of 10" diameter Medium Pressure pipeline would run for approximately 1.3 km parallel to the railway with two options in this area prior to the onward street works connection to the following user:
- Novelis, Warrington.

Clock Face Spur

- 2.2.12 The Clock Face Spur starts at the Clock Face HAGI and runs northeast to connect to the following user:
- NGF Europe Ltd.
- 2.2.13 This Medium Pressure spur would include approximately 2.1 km of 8" diameter pipeline through areas of fields adjacent to Chapel Lane and continue into the existing industrial area along Lea Green Road. There would be one major trenchless crossing.

St. Helens Spurs

- 2.2.14 The St. Helens Spurs start at the St Helens HAGI and connect to the following users:
- NSG Pilkington's Greengate Works.

- Glass Futures.

2.2.15 The Intermediate Pressure 8" diameter spurline to NSG Pilkington's Greengate Works would run along Burtonhead Road to the northwest for approximately 0.3 km.

2.2.16 The Medium Pressure Glass Futures 8" diameter spurline would run along Burtonhead Road with Ravenhead Nature Park to the southwest then turn north with one major trenchless crossing of the A570 (St Helen's Linkway) to the Glass Futures site to the north of Sherdley Road Industrial Estate. This would be approximately 0.85km of spurline.

Warburton Spur

2.2.17 The Warburton Spur starts at the Warburton HAGI and runs approximately 0.2 km west to connect to the existing National Grid AGI on Carr Green Lane to facilitate Hydrogen Injection Blending (HIB) of the hydrogen supply into the wider gas supply. This Spur is expected to be a 12" diameter pipeline. No major trenchless crossings are required.

Partington Spur

2.2.18 The Partington Spur(s) start at the Partington HAGI within a disused industrial area and connect to the following users:

- SAICA, Partington.
- Partington National Grid AGI.
- Bassel Polyfins.

2.2.19 The 8" High Pressure spurline to SAICA would be 0.5 km in length and travel northwest along an existing road and would require a single major trenchless crossing of the A6144 to connect to SAICA.

2.2.20 The High Pressure spurline would run northwest to the existing National Grid AGI at Partington and is expected to be approximately 0.3 km and up to 18" diameter pipeline. This would facilitate HIB of the hydrogen supply into the wider gas supply.

2.2.21 The High Pressure spurline to Bassel Polyfins would run north for approximately 0.4 km and is expected to be up to 18" diameter. It would connect to an existing metering house at Bassel Polyfins.

Northwich Spur

2.2.22 The Northwich Spur (see Figure X.X, Sheet X) starts at the Central Hub HAGI and runs to the southeast to connect to the following users:

- TATA Chemicals, Winnington.

2.2.23 This Intermediate Pressure spur would include approximately 7 km of 16" diameter pipeline and include four major trenchless crossings.

HAGIs

- 2.2.24 The HAGIs are required to control the flow and pressure of hydrogen provide connections to the network producers, users and storage and to be able to monitor, operate, maintain and inspect the network during operation.
- 2.2.25 The HAGI options are shown in **Figure 1.1 - The Project**.
- 2.2.26 HAGI sites would typically include a range of permanent above ground components for which further description is provided under the headings below. The above ground components described will be kept at low level for safety and to reduce visual impact. This would typically be approximately up to 3 m in height subject to final design. The HAGIs will require connection to the local electrical distribution and telecommunication systems. Alternative sources of power e.g., use of renewables are under consideration.
- 2.2.27 The sites would require security fencing, typically 2.4 m to 3.6 m high with double-leaf access gates for vehicles. It is noted that if HAGIs are designated as Critical National Infrastructure (CNI) sites the fence heights may be higher and additional security infrastructure incorporated. Access will be required from the adjacent road network, access tracks or similar. There will also need to be space for operatives to safely park their vehicle(s) off the highway and open the gates.
- 2.2.28 The HAGI sites will vary in area but will typically range between 0.5 ha to 2 ha. The area required will be subject to further design development including requirements for security, safety and associated landscaping such as planting or bunds to provide screening. HAGIs will generally be unlit except during maintenance or potential breakdown/emergency requirements when task lighting columns (approximately 2 – 3 m high) would be used.

Pressure Reduction Units

- 2.2.29 The Pressure Reduction Unit (PRU) is provided to control the flow or pressure into the network and consists of above ground components including pipework. Above ground pipework (for PRUs as well as metering and pigging facilities) will vary in diameter with the maximum piping sizes approximately the same diameter as the adjacent buried pipeline but many of the associated pipes would be much smaller.
- 2.2.30 The pressure reduction process can result in noise emissions. This will be considered further during the design development and EIA process and consideration given to the requirement for attenuation measures.
- 2.2.31 A typical PRU will be skid mounted i.e., mounted to a frame at the point of manufacture and delivered to site for connection.

Metering Facilities

- 2.2.32 Metering facilities are required for volume measurements of the hydrogen gas flow for control and fiscal purposes. As with a PRU, these consist of above ground pipework and components and can be skid-mounted.

Pigging facilities

- 2.2.33 Pigging facilities support future in-line inspection (ILI) and the cleaning of the pipeline network. The ILI and cleaning are undertaken by passing a device known as a 'pig' through the pipeline which is propelled by the flowing gas without interruption to the gas supply. The facilities include above ground pipework from which to launch and receive the pig as well as operating equipment including valves.

Instrumentation and Control Kiosks

- 2.2.34 Instrumentation and Control (I&C) kiosks will house the equipment that monitors key parameters (including the flow, pressure and temperature). Field instruments located on pipework will connect the equipment in the kiosk. Signals are sent to an Energy Control Centre via satellite link or similar. The kiosks are typically prefabricated Glass Reinforced Plastic (GRP) units of approximately 2.4 m height placed on a concrete base that is cast in situ.

Block Valves

- 2.2.35 Where the distance between two HAGIs is greater than 16 km, a Block Valve (BV) is typically required. These are smaller sites than the HAGIs described above.
- 2.2.36 These sites would be housed in a compound (up to approximately 0.5 ha) with fencing approximately 2.4 m high with an access gate. Access will be required for service vehicles, typically a Light Goods Vehicle (LGV) and is likely to include access track and facilities for turning vehicles.
- 2.2.37 The main valve will be in-line with the buried pipeline and some ancillary valves and pipework will be above ground. The valve actuator will extend a short height (approximately 1.5 m) above ground. The valves may be operated remotely for which the necessary equipment on site will be housed in an I&C kiosk (similar to those described above).

Cathodic Protection

- 2.2.38 A Cathodic Protection (CP) system will be required as part of the pipeline system. This protects the pipeline from corrosion by imposing a small electrical current which inhibits the electrochemical process of corrosion. This requires the placement of Transformer Rectifier (TR) units including cabinets and groundbeds at strategic locations around the network. These would typically be included at the HAGIs with required electrical supplies or if necessary, they can be installed on the street within a typical telecommunications cabinet.
- 2.2.39 CP monitoring points would be installed at regular intervals along the pipeline (approximately every 1 – 2km). These are housed within marker posts typically at selected road or footpath crossings and do not require any other above ground infrastructure such as a compound or kiosk. Markers would also be required at crossings and field boundaries. CP/Marker posts are small posts, typically made of concrete and less than 1 m high.

Construction

- 2.2.40 The following section provides an overview of the typical form and sequencing of construction for both the pipeline and HAGIs. The pipeline would predominantly be constructed by the open lay installation technique. This is most applicable to rural settings i.e., open fields. A range of options for trenchless solutions are identified and will be employed at crossing points where required. These crossing points will be refined during the design process.
- 2.2.41 The proposed HyNet North West Hydrogen Pipeline would be a multi-diameter pipeline transportation network and as such each section would have a working width specific to the given leg diameter to ensure environmental impact is minimised. These working widths will be developed further during the EIA process, e.g., for a 42" pipeline the working width would be expected to be up to 36 m. The working width is divided into work, transport and laydown areas. It typically comprises topsoil and subsoil laydown areas, the trench area, pipe string and construction equipment area and a running track for through access of construction related personnel.
- 2.2.42 A wider working width, known as a box out section, will be required in some instances e.g., at crossings including major trenchless crossings and where the pipeline route changes direction. This is in order to facilitate safe working, additional spoil storage and equipment laydown. These areas are reflected in the Preliminary Order Limits (site boundary).
- 2.2.43 Temporary construction site accesses have also been identified across the Project. There are three categories of access routes, one for all construction traffic including plant and Heavy Goods Vehicles (HGVs), those that are limited to use by Light Goods Vehicles (LGVs) only and accesses at crossing points on the pipeline route where access would be needed at installation and reinstatement.
- 2.2.44 The Preliminary Order Limits have also been developed to include areas for pipe and other material storage ('material storage areas') along the corridors. These are sections of pipe of approximately 12 – 18 m in length and are typically stacked using timber separators up to a maximum of 4 m in height.

Construction phasing and timescales

- 2.2.45 Construction is expected to commence in 2025 with commissioning in 2027. The Project would be fully operational from late 2027 to early 2028.
- 2.2.46 Pipeline construction is seasonal with the main activities conducted between spring and autumn (March to September). Two pipelaying seasons, in 2025 and 2026, are expected for the Project. The works for crossings may occur outside the typical pipelaying season and throughout the year. It is expected that construction of each corridor would take 12-18 months.
- 2.2.47 Pipeline construction typically advances at 500 m to 1 km per day. In more congested areas and when pipe diameter and weights are larger, progress is slower, and the advance may be only tens of metres per day.
- 2.2.48 Independent construction crews would work on the main pipeline spread and, on the road, rail and watercourse crossings. Work crews would be located at several

locations at any one time and move forward as the work progresses. Equally at times during the construction period there would be no active work at particular locations. Each crew would typically have 30 persons and the total workforce would be 200 to 500 personnel at any one time.

- 2.2.49 Different plant and vehicles are required according to the activities of pipe laying, making trenchless crossings, HAGI or Block Valve construction and temporary compounds. These will include plant of varying height such as mobile telescopic and crawler cranes, 360 tracked excavators and sidebooms for pipelaying. Use of larger equipment such as cranes would be temporary and generally short-term dependent on the task, plant suitability and availability.
- 2.2.50 Construction of a HAGI would typically take between 6-12 months and may be in progress at any point during the year, subject to any local constraints. Block Valves would typically take up to four months.
- 2.2.51 Standard construction working hours would be 10 hours per day (08:00 to 18:00) from Monday to Saturday, with no works on Sundays or Bank Holidays. There may be the need for some extended working hours for certain activities, but this would be subject to agreement with the local planning authority.
- 2.2.52 There would be the need for continuous (24-hour) working for some activities including the following:
- Tunnelling and Horizontal Directional Drilling.
 - Pipe pulling at trenchless crossings.
 - Pipeline testing.
- 2.2.53 A number of works would be expected to occur in parallel, however, the exact phasing of the works has yet to be determined. Further details of the likely construction programme and phasing will be developed for the ES.

Pipeline Construction

Construction site preparation

- 2.2.54 Following survey of the construction site, including utilities and Unexploded Ordnance (UXO) checks, work would commence to prepare the pipeline corridor. This would include any installation of site fencing, the type of which would be determined based on key factors including security and land use. For example, demarcation fencing may be used in arable fields or where livestock is present, stock fencing appropriate to the type of livestock e.g., cattle, sheep, deer etc. Where the surrounding land is publicly accessible, then requirements would be enhanced for safety and security e.g., 2.4 m Heras fencing or similar.
- 2.2.55 Safe crossing points would be implemented e.g., where a Public Right of Way (PRoW) crosses the working width. Where necessary, a temporary closure and diversion will be put in place and signage provided. An Outline Public Rights of Way Management Plan (PRoWMP) will be developed for submission with the application for development consent detailing the locations of crossings, closures and diversions and the proposed method for their implementation.

- 2.2.56 The accesses and the need for improvements at these points e.g., visibility splays, bellmouths and widening will be subject to further design and consultation with the appropriate Highways Authority, the outcome of which along with the results of further environmental surveys will inform the required assessments in the EIA.
- 2.2.57 Once access is achieved from the highway, the access track would be based on the particular conditions on the access route. This would vary from stripping the topsoil to allow vehicles to run on the subsoil, to use of bog mats or overlaying crushed stone on a geotextile membrane.
- 2.2.58 Site clearance and localised re-grading would take place. Earthworks would be limited due to the generally gentle undulation of the terrain. Some levelling or cut and fill works may be required on a limited number of steep slopes or banks. Benching (terracing) may be required in a small number of locations where side slopes exist. The earthworks are not expected to require import or export of material from the site, all excavated materials would be reused in reinstatement and restoration of ground levels.
- 2.2.59 The requirements for clearance would be location specific but during the development of the Project a key consideration would be to retain and protect sensitive areas, including habitats and vegetation, where practicable.
- 2.2.60 Topsoil would be stripped across the required working area and stored at the edge of the works and in accordance with industry best practice to protect topsoil integrity for future reuse during reinstatement. The topsoil bunds would typically be in the order of 2 m in height though may be higher subject to ensuring there is no excessive soil compaction and visibility restrictions. Topsoil bunds would be sited to avoid impeding areas of surface water flow and gaps left between bunds to avoid waterlogging.
- 2.2.61 Other activities likely to be required during site preparation include:
- Site signage, service protection and other site safety requirements;
 - Establishment of temporary facilities for site personnel;
 - Establishing site environmental management requirements e.g., tree protection fencing and other site-specific pre-commencement activities;
 - Development of temporary site drainage, sediment management and any necessary temporary watercourse crossings; and
 - Creation of temporary accesses along the working width including opening field boundaries along the route.

Trenching

- 2.2.62 The pipe trench would generally be dug using mechanical excavators or trenching machines which would normally straddle the trench. The depth and width would vary with pipeline diameter but would allow a minimum reinstated cover of 1.2 m over the top of the pipeline. The subsoil material excavated would be stored separately from the topsoil to avoid mixing.
- 2.2.63 Dewatering of trenches may be required e.g., in the event that groundwater is present. Groundwater monitoring is to take place as part of ground investigation.

The method of dewatering will be dependent on the ground conditions however it is likely to include the use of mobile pumps.

Fabrication

- 2.2.64 Line pipes would be brought to site and stored in stacks prior to deployment along the pipeline route, before being transported to their final location along the route where they would be placed on wooden supports or skids adjacent to the trench. This process is known as pipe stringing.
- 2.2.65 Where necessary changes in horizontal direction and vertical profiling would be undertaken by employing cold bending i.e., undertaken at ambient temperature. This would require mobilisation of associated plant on site.
- 2.2.66 Line pipes would be lifted onto skids and the pipes welded to form a continuous string. A range of techniques for CS pipes including semi-automatic and manual welding techniques would be employed along the route. All joints would be tested by Non-Destructive Test procedures. Jointing of PE pipes would be undertaken using Butt Fusion or Electrofusion fittings. Once tested an anti-corrosion coating would be applied to the welded joints.

Pipe laying

- 2.2.67 Welded pipe sections would be carefully lifted and lowered into the trench in a continuous operation using side booms. PE pipes may be lifted into position using lighter lifting equipment or may be pulled into the trench using a winch and rollers or pulled into the ground using trenchless methods. PE pipe may come to site in coils allowing much longer lengths of pipe without joints being necessary.
- 2.2.68 The pipe would generally be laid on bedding material and covered in padding material. This would typically be soft fill from excavated materials and would serve to protect and minimise movement of the pipe. Backfilling would be undertaken using subsoil from the temporary storage areas.

Testing

- 2.2.69 The pipeline would be cleaned using pigging equipment and hydrostatically pressure tested, using a local water source, agreed and permitted by the Environment Agency and appropriate local authority as required. Disposal of test water would also be undertaken in accordance with the permit.
- 2.2.70 The pipeline would be further inspected by pigging equipment to ensure it is free of defects e.g., unacceptable dents, flat spots or areas of ovality. Final end to end drying and dew point testing would be undertaken.

Reinstatement

- 2.2.71 Reinstatement of the working area would be undertaken typically including regrading, subsoil ripping to relieve compaction and removal of debris. Topsoil would be reinstated to the former depth.
- 2.2.72 Where possible, previous land uses would be re-established e.g., agricultural areas and fencing established in accordance with agreements with landowners

and in consideration of the necessary easements. Areas of landscaping and required habitat reinstatement, including tree and hedgerow planting, would be implemented through a landscaping scheme that would be prepared and delivered in accordance with a requirement of the DCO.

- 2.2.73 Drainage altered during construction would be reinstated and where necessary, new drainage would be laid. All temporary materials such as bog mats, road fill, temporary culverts and geotextile membrane will be removed during the reinstatement works.

Crossing techniques

- 2.2.74 A crossing schedule has been developed and will be included within the draft DCO. A description of open cut installation and trenchless crossing techniques are provided below.

Open cut

- 2.2.75 Open cut installation involves the excavation of a trench across the feature to be crossed and the installation of the pipeline in the trench. This method is typically used for third party utilities (subject to agreement), minor roads, tracks, small rivers, streams and ditches.
- 2.2.76 At each crossing point it is necessary to install the pipeline beneath the feature being crossed and provide a means of crossing for construction plant and vehicles.
- 2.2.77 Open cut installation at minor roads would typically involve the following stages:
- Implementation of traffic control measures (subject to agreement with the Highways Authority) to ensure safety and minimise disruption. Works would be undertaken in as short a timeframe as possible, typically five days or less.
 - Identification of services and protection as required.
 - Cutting of the road surface at the trench edges using a road saw.
 - Excavation of the trench to the required depth.
 - Installation of the pipe or a construction sleeve for installation of the pipeline at a later date.
 - Backfilling of the trench and resurfacing undertaken in accordance with the requirements of the Highways Authority.
- 2.2.78 Construction plant and vehicles must be able to cross from one side of a road for onward access to the route. This involves tracking major plant across the road for which traffic control measures and service protection would be undertaken as above. The road surface would be protected using rubber matting or similar, or by use of a temporary surface such as sand or a temporary sacrificial tarmac surface. Measures would be put in place to ensure the highway is clear of debris and any restoration works would be subject to agreement with the highway authority.
- 2.2.79 The crossing point would be required for the duration of the construction period within the particular section. However, the crossing point would only be in

operation when it is necessary to transfer plant or vehicles across. The highway would otherwise remain open to the public as normal for the majority of the time a crossing is in place.

2.2.80 Open cut installation of watercourses would typically be undertaken by one of two methods, either by fluming or damming. Fluming would typically include the following stages:

- Steel or plastic pipe is installed along the bed such that the water flows unimpeded through the flume. These would be sized to ensure that the total flow capacity includes any anticipated increase in flow due to wet weather plus a factor of safety.
- Excavation of a trench beneath the flume and the pipeline inserted beneath.
- Backfilling of the trench and removal of the temporary flume.
- Reinstatement of the feature crossed to pre-construction condition.

2.2.81 Damming would typically include the following stages:

- Damming at the proposed crossing location through installation of steel trench sheets, aggregate/ sandbags or similar.
- Transfer of flowing water from upstream to downstream using pumps and hoses. Pumps and hoses would be suitably sized to ensure that the total flow capacity includes anticipated increase in flow due to wet weather plus a factor of safety. Note, this may not be necessary in drainage ditches where water flows in either direction.
- Excavation of the trench through the temporarily dammed area and installation of the pipeline.
- Backfilling of the trench and removal of the temporary dam.
- Reinstatement of the feature crossed to pre-construction condition

2.2.82 To maintain access either side of these features, temporary crossing points would be required. This would typically include bridging where larger spans are required, or fluming for smaller features. Bridging would typically be used on features including larger streams and canals (note, this is for access only and the pipeline would still be installed using a trenchless crossing at a canal).

2.2.83 Bridging would include installation of a temporary 'bailey' type bridge with support bases on either side, typically aggregate or stone. For canals, the height of the temporary bridge would include clearance to enable safe passage of boats beneath. At the end of the construction period, the bridges and supports would be removed and banks reinstated to pre-construction condition.

2.2.84 For flumed temporary crossing points, these would include sizing and laying of a steel or plastic pipe as described above. To complete the installation of the crossing, a combination of geotextile and fill (e.g., stone, excavated materials) and / or bog mats would provide the surface for plant and vehicles to move over. At the end of construction, the materials and pipe would be removed, and reinstatement undertaken to pre-construction condition.

- 2.2.85 There would also be the need for crossings of numerous hedgerows on the Project. Crossings of hedgerows would be undertaken in a manner to minimise the working width as possible and therefore minimise the impact on hedgerows across the Project. A typical crossing for a 42" pipeline would involve 5 m for pipe laying and 4 m for plant crossings as opposed to the standard 36m working width.

Trenchless Crossing Techniques

- 2.2.86 There are a number of methods by which these crossings would be undertaken, the choice of which is determined by a number of factors including the feature being crossed, agreements with third parties regarding asset protection, ground conditions and the length and depth of the crossing. It is not possible to determine which method would be used at each trenchless crossing prior to the establishment of these factors and appointment of the Contractor(s) to undertake the works.
- 2.2.87 Each trenchless crossing technique is characterised by the need for establishment of an entry and exit site. In order to assess a reasonable worst case, a set of the maximum footprint for each type of crossing has been established.
- 2.2.88 The layout and equipment at each crossing point would vary but would include site fencing (Heras or 2.4 m to 3.6 m fencing depending on security requirements) as well as site office, welfare, pipe and equipment laydown and storage as well as drilling rigs and the ancillary equipment including generators, settlement pits and water treatment facilities. Equipment heights will vary but are typically expected to range between 1 m and 4 m. Some larger equipment including cranes is likely to be required for short periods during the works.
- 2.2.89 The length of time a trenchless crossing site would be in use varies depending on the technique, complexity and length of crossing. This may vary between one to six months.

Horizontal Directional Drilling (HDD)

- 2.2.90 The HDD technique is typically used on longer trenchless crossings. It involves guiding a pilot hole along a pre-determined profile beneath the obstacle. The depth of the drilled profile can be set to minimise risk to the obstacle being crossed and maximise protection of the pipeline.
- 2.2.91 Once the pilot hole is complete the bore is enlarged in stages using reamers (drill heads) in soft ground or hole openers in hard ground to a diameter approximately 1.5 times greater than the diameter of the pipeline to be installed.
- 2.2.92 Excavation takes place by rotating a cutting head at the front of the drill string and pumping drilling fluid from the surface, through the drill string, to the cutting head. During drilling, the bore is supported by drilling fluid which also performs functions such as drill bit cooling, lubrication and as a transport medium for the removal of drill cuttings. Settlement pits are used for the separation of excavated materials and recycling of the drilling fluid.
- 2.2.93 When the bore has been enlarged to the required diameter the pipeline is pulled through using the drilling rig. A stringing site that is equivalent to the length of the

HDD crossing is required to fabricate the product pipeline in a single length allowing the installation operation to be completed without interruption.

Auger Boring

- 2.2.94 Auger bores are typically used for shorter trenchless crossings. The auger bore process requires the establishment of a drive and reception pit and boring the hole under the feature to be crossed. The pipeline can be simultaneously installed in the bored hole as excavation takes place (uncased). Alternatively, a sacrificial pipe (steel or concrete) the same diameter as the pipeline is installed in the bored hole (cased) as excavation takes place which is later displaced after the bored hole has been completed.
- 2.2.95 Excavation takes place by rotating a cutting head at the front of the pipe as it is pushed into the ground. Excavated material is removed from inside the pipe back to the drive pit by helical-wound auger flights inside the pipe.
- 2.2.96 Following reception of the auger head the screw cutting head is removed and the pipe is welded and pushed through the reception pit.
- 2.2.97 Auger bores can be unguided or guided, each method generally follows the same excavation and pipe installation principles but guided auger boring uses more accurate guidance systems as conditions and the particular crossing may require.

Micro-tunnelling

- 2.2.98 Microtunnelling can be used for short and longer crossings but generally require larger footprint including installation of drive and reception pits or shafts. A cutting tool/machine provides the mechanical excavation, generally controlled remotely from an above ground compound. There are a range of open and closed face tools/machines including: boring, earth pressure balance and pressurised slurry for use in the appropriate ground conditions. Excavated spoil is transported back to the surface at the drive shaft site for disposal.
- 2.2.99 A pre-cast concrete pipe is driven in behind the cutting machine using a hydraulic ram or jack placed within the drive shaft. A typical profile arrangement has a shaft at one end and a tunnel profile long radius at the other where the pipe exits and transitions to normal cover.
- 2.2.100 The line pipes are then welded into a string pipe and gradually pushed or pulled into the casing or, where space is limited, the pipe may be welded at the base of a shaft. Following pipeline installation inside the tunnel, the remaining void between the tunnel and installed pipeline is typically filled with cementitious grout.

Direct Pipe

- 2.2.101 Direct pipe can be applied to short and longer trenchless crossings. This technique is similar in its method and set up as described for microtunnelling. However, the pipeline is installed directly into the ground behind the cutting machine, rather than being installed inside a completed tunnel.

Compounds

- 2.2.102 Temporary construction compounds would be established to support the construction of the pipeline and HAGIs. The Preliminary Order Limits include areas identified for temporary compounds which are located adjacent to the HAGI sites and where applicable, the HAGI options.
- 2.2.103 The temporary compounds would typically include:
- Secure fencing between 2.4 m to 3.6 m high and access for plant, vehicles and personnel;
 - Hard surfacing and drainage using Sustainable Drainage Systems (SuDS);
 - Temporary connections to utilities;
 - Welfare facilities up to two storeys;
 - Vehicle and plant storage and associated fuels;
 - Storage for pipes in stacks, equipment and materials; and
 - Lighting for safety of personnel working during the hours of darkness (typically winter months) and which may be task lighting (erected temporarily for a specific task) or would be maintained for the duration of the compound's use. This lighting will only be used whilst work is in progress. Lighting for security purposes may be required and it may be necessary for this to be on for extended periods. Lighting would be installed such that light spill outside the compound near residents and ecological receptors is limited e.g., through considering the height of the columns, use of shields etc.
- 2.2.104 Once the pipeline has been constructed and reinstated, the temporary compounds themselves will be decommissioned and land reinstated to its former condition. Landscaping would be implemented through a landscaping scheme that would be prepared and delivered in accordance with the DCO.

Above ground infrastructure

- 2.2.105 The construction site for a HAGI would typically include the necessary temporary works area to be co-located for maximum convenience. The temporary works area would be adequate to accommodate all requirements described in the compounds section above. The temporary working area is expected to be up to approximately 3 ha.
- 2.2.106 The typical site construction sequence would include:
- Site preparation including typical activities for pipeline construction described above;
 - Earthworks and civils including establishment of bases;
 - Installation of mechanical equipment and laying and connection of pipes;
 - Installation of electrics, I&C and associated kiosk; and
 - Testing and commissioning.

- 2.2.107 Reinstatement of temporary accesses, working areas and landscaping would be undertaken in accordance with a landscape scheme, prepared in accordance with the DCO.

Operation and maintenance

- 2.2.108 The HAGIs would generally be operated remotely from an Energy Control Centre located off-site. The HAGIs would be operational continuously (24 hours a day) but dependent on downstream consumer usage of the hydrogen supply. The frequency of periodic maintenance undertaken on-site has yet to be determined but would typically include the following:
- Routine checks on a weekly basis requiring 1-2 personnel for a short period (approximately one hour).
 - Annual maintenance requiring two personnel for approximately one day.
 - Major maintenance requiring five personnel for approximately one week (every two to five years).
 - Pipeline pigging operations requiring ten personnel for approximately one week and undertaken every five to 15 years, subject to further development for hydrogen pipelines. Pigging operations involve an internal inspection of the pipe undertaken by a “pig”, an automatic inspection tool, which travels inside the pipeline from one HAGI to the next. Access to the pipeline between HAGIs is not required.
 - Infrequent breakdown or emergency visits with access on a 24/7 basis if required.
- 2.2.109 Pipeline visual inspection is undertaken by helicopter or drone and vantage surveys so access onto private land is not normally required. Aerial surveys are typically undertaken every two weeks, but frequency will be determined during further design development. There are some infrequent maintenance surveys which may be required, and which would require access on foot (line walking) over the route of the pipeline but do not require excavation or other intrusive activities.
- 2.2.110 As described above, the inspection of the pipelines is undertaken internally from the pigging facilities at HAGI without access to the buried pipeline route. It is anticipated that no pipeline maintenance would be required where excavation of the pipeline is required unless a defect is identified.

Decommissioning

- 2.2.111 The design life of the pipeline and HAGIs is 40 years but it is anticipated that the actual life of the pipeline would extend well over 40 years depending on its condition, as over time parts are likely to be refurbished or replaced through maintenance activities. It is reasonably expected that the statutory framework will develop prior to any decommissioning. Similarly, technology and good practice would develop and provide for new ways to undertake the process.
- 2.2.112 Decommissioning of the Project would likely involve leaving the pipeline in situ and making it safe. This would typically involve rail, road and watercourse crossings

being filled with grout and the removal of all HAGIs. The sequence of decommissioning these elements would be the reverse of the construction sequence and would likely involve the application of similar construction plant and methods. All materials removed would be reused or recycled where possible or disposed of in accordance with relevant waste disposal requirements. Land would then be restored to its former use.

2.2.113 As part of the DCO application an Outline Decommissioning Strategy will be produced, which will detail measures envisaged to be implemented to avoid or reduce impacts during the decommissioning phase. It is envisaged that this will be secured by the DCO.

2.2.114 At the appropriate point in time a Decommissioning Plan will be developed by the Undertaker in accordance with this strategy. The Decommissioning Plan will be a live document which is updated and refined as appropriate. The Plan would address the relevant statutory requirements at the time, any extant commitments with landowners/statutory authorities and take account of any developed technology and good practice at the time of decommissioning.

Above ground infrastructure

2.2.115 It is envisaged that HAGIs and block valves will be removed by reversing the methods used for installation, with similar levels and types of equipment involved. Temporary decommissioning accesses may be required alongside compounds for the storage of equipment. HAGIs would be disconnected from the local electrical distribution and telecommunication systems, following which all electrical components would be removed. At this point the I&C Kiosks and mechanical equipment would be dismantled, disconnected and removed from the HAGI site. For HAGIs and block valves, pipework would be removed to surface where it would be backfilled and capped.

2.2.116 Reinstatement of temporary accesses, compounds and landscaping would be undertaken in accordance with a landscape scheme, which would be defined in the decommissioning plan.

2.2.117 The decommissioning of the HAGIs is anticipated to take the same amount of time as construction (6 to 12 months), although this is indicative and may vary.

Crossings

2.2.118 It is envisaged that all rail, road and watercourse crossings will be filled with grout and reinstated to pre-construction conditions.

3. HRA Screening Step 3: Identification of Potential Effects on European Sites

3.1 Scope of Screening Principles

- 3.1.1 The following sections outline the principles discussed with consultees, whereby potentially sensitive qualifying features, possible effects of the development, and their interactions, have been identified. The outcome of this HRA Screening stage is a list of SPAs, SACs, and Ramsar Sites and associated qualifying features for which the potential for LSE to arise as a result of works associated with the Project cannot be excluded.
- 3.1.2 In line with the ruling of the European Court of Justice in 2004, an LSE is one which cannot be excluded on the basis of objective information, either individually or in-combination with other plans or projects⁷.
- 3.1.3 In order to undertake a robust assessment, it has been essential to determine the linkages between bird species, the Preliminary Order Limits, and relevant European sites. For wintering birds, these linkages were determined based on, dispersal from roost sites, an understanding of foraging range and movement between inland foraging/roosting sites and low tide foraging sites.

3.2 European Sites included for Assessment

Approach

- 3.2.1 Each European site is designated as a SAC, classified as an SPA, or listed as a Ramsar Site in respect of specific 'qualifying features'. These 'qualifying features' (habitats, mosaics of habitats, species or assemblage of species, and combinations of these) are the reasons for which the site is to be protected and managed for conservation purposes.
- 3.2.2 For SPAs the qualifying features are the birds for which the SPA is classified, under either the Birds Directive:
- Article 4(1) rare and vulnerable species, species in danger of extinction or requiring particular attention because of their habitat needs, listed in Annex I; or
 - Article 4(2) regularly occurring migratory species (e.g., on passage or over-wintering or an internationally important assemblage of birds) not listed in Annex I.
- 3.2.3 The qualifying features of SACs are the habitats listed in Annex I of the Habitats Directive and the species listed in Annex II of the Directive. The 'qualifying features' of Ramsar Sites are the list of Criteria as set out in the Convention on Wetlands of International Importance (Ramsar Convention). All receptors that are

⁷ European Court of Justice, Case C-127/02⁴, Judgement of the Court, September 2004, paragraph 45.

qualifying features of European sites and/or Ramsar Sites (or support such features), and which may potentially be affected by the Project have been considered within this screening process.

Study Area

- 3.2.4 With respect to European sites featuring qualifying ornithological interests that could be affected by the Project, sites were included if they fell within 20 kilometres (km) of the Preliminary Order Limits.
- 3.2.5 When considering the effects of the Project on European sites, consideration must be given to the effects on birds using land outwith the boundaries of the European sites as well as within. Such land can be deemed to be functionally linked to the European site, for example, golden plover feeding on farmland outwith the boundary of the Mersey Estuary SPA. Therefore, some habitats outwith the SPA can be considered to be functionally linked land (FLL).
- 3.2.6 FLL in this context is defined as:
- “Areas of land or sea outside of the boundary of a European site that may be important ecologically in supporting the populations for which the European site has been designated or classified. Occasionally impacts to such habitats can have a significant effect upon the species interest of such sites, where these habitats are considered to be functionally linked to the European site”⁸.*
- 3.2.7 The Mersey Estuary SPA and Ramsar Site, Dee Estuary SPA and Ramsar Site, plus Ribble and Alt Estuaries SPA and Ramsar Site will all have FLL (habitats outwith their respective site boundaries used by qualifying species of waterbirds for roosting and/or feeding).
- 3.2.8 For ornithological features that utilise FLL of European sites, linkages were determined based on an understanding of potential connectivity with foraging range and movement between the roosting and foraging sites (via published literature and consultation with Natural England). The 20 km search distance implemented in this HRA is generally considered to be the maximum distance most non-marine species of birds would regularly travel between foraging and roost sites⁹.

⁸ Natural England. (2016). Functional linkage: How areas that are functionally linked to European sites have been considered when they may be affected by plans and projects - a review of authoritative decisions. Natural England Commissioned Report NECR207. (online) Available at: <http://publications.naturalengland.org.uk/publication/6087702630891520> (Accessed July 2022).

⁹ NatureScot (formerly Scottish Natural Heritage). (2016). Assessing Connectivity with Special Protection Areas (SPAs) Guidance. Version 3. (online) Available at: <https://www.nature.scot/sites/default/files/2018-08/Assessing%20connectivity%20with%20special%20protection%20areas.pdf> (Accessed July 2022).

- 3.2.9 In accordance with the IAQM's Guidance on the assessment of dust from demolition and construction¹⁰, the HRA and AQ analysis will consider the impacts of air emissions associated with the construction and operation of the Project on all statutory nature conservation sites within 350 m.

Disturbance to birds

- 3.2.10 In order to assess the potential effects of disturbance on qualifying bird species (due to construction works and operational activities), ornithological baseline data was obtained from desk study and field surveys to ascertain the type and level of use by these species within the Preliminary Order Limits and surrounds. Published literature on the sensitivity of these species will then be used to assess the effects of disturbance on the qualifying bird populations involved and determine any LSE.

Consultation

- 3.2.11 The HRA Screening has also been informed by a consultation process undertaken with relevant stakeholders. **Table 3.1 Consultation Feedback** provides an HRA focused overview of the consultation feedback regarding the EIA Scoping Report¹¹. This feedback has been factored into the approach to the HRA.

¹⁰ IAQM. (2014). Guidance on the assessment of dust from demolition and construction. (online) Available at: http://iaqm.co.uk/wp-content/uploads/guidance/iaqm_guidance_report_draft1.4.pdf (Accessed July 2022).

¹¹ Wood Group UK Ltd on behalf of Cadent Gas Limited Ltd. January 2022. HyNet North West Hydrogen Pipeline Project – EIA Scoping Report.

Table 3.1 Consultation Feedback

Stakeholder/ Date of consultation	Stakeholder comment	Action taken to address comment
Scoping Opinion		
PINS 08/03/2022	The Applicant proposes to scope out effects on <i>Midlands Meres and Mosses Phase 1 Ramsar Site</i> on the basis that there are no ornithological features designated as part of the Ramsar, and there is no hydrological connectivity between the Site and the Proposed Development. The Inspectorate considers that effects on this designated site can be scoped out on this basis.	Scoped out of HRA Screening.
PINS 08/03/2022	The Applicant proposes to scope out effects on <i>Dee Estuary SPA and Ramsar Site</i> on the basis that the sites qualifying features are unlikely to forage within the proposed site boundary or a 500 m buffer, given the distance from the Proposed Development (c. 13.5km west) and the lack of hydrological connectivity between the Proposed Development and Ramsar site. The Inspectorate considers that if it can be demonstrated there is no potential effect pathway between the Proposed Development and these designated sites, then the Inspectorate agrees that these can be scoped out.	Assessed within HRA Screening.
PINS 08/03/2022	The Applicant proposes to scope out effects on <i>Mersey Narrows and North Wirral Foreshore SPA and Ramsar Site</i> on the basis that the sites qualifying features are unlikely to forage within the proposed site boundary or 500 m buffer, given the distance from the Proposed Development (c. 18.2 km northwest) and the lack of hydrological connectivity between the Proposed Development and Ramsar site.	Assessed within HRA Screening.

Stakeholder/ Date of consultation	Stakeholder comment	Action taken to address comment
	The Inspectorate considers that insufficient evidence has been submitted to demonstrate that the Proposed Development will not impact on functionally linked land. The ES should identify the potential for bird species associated with the designated sites to be present and assess any likely significant effects.	
PINS 08/03/2022	The Applicant proposes to scope out effects on <i>Ribble and Alt Estuaries SPA and Ramsar Site</i> on the basis that the sites qualifying features are unlikely to forage within the proposed site boundary or 500m buffer, given the distance from the Proposed Development (c. 18.5 km northwest) and the lack of hydrological connectivity between the Proposed Development and Ramsar site. The Applicant highlights that the upper limit of pink-footed goose (a qualifying feature of the SPA) foraging activity from winter roost sites is 15-20 km with farmland the principal foraging habitat in winter and states that given the amount of grassland habitat within the wider area, impacts on this species are considered negligible. The Inspectorate considers that if it can be demonstrated there is no potential effect pathway between the Proposed Development and these designated sites, then the Inspectorate agrees that these can be scoped out.	Assessed within HRA Screening.
PINS 08/03/2022	The Applicant proposes to scope breeding bird surveys targeted at non-Schedule 1 species out of the assessment on the basis that any effects upon active nests of breeding birds can be mitigated via the embedded environmental measures listed in Table 5.5 of the Scoping Report (e.g. timing of vegetation clearance works outside the breeding bird season) and where this is not possible, through carrying out preconstruction nest	N/A

Stakeholder/ Date of consultation	Stakeholder comment	Action taken to address comment
	checks and where a nest is found, through implementing measures such as protective buffers and ecological monitoring. Subject to demonstrating that the timing of works will avoid impacts to breeding birds and that this is secured through the DCO or other legal mechanism, the Inspectorate is content that this matter can be scoped out.	
PINS 08/03/2022	Table 5.7 of the Scoping Report identifies potentially significant effects from noise and physical activities leading to disturbance of SPA qualifying features and Site of Special Scientific Interest (SSSI) designated species using functionally linked land. The ES should also consider the impacts that any direct loss of functionally linked land may have on relevant European and nationally designated sites.	Assessed within HRA Screening.
PINS 08/03/2022	Table 5.9 of the Scoping Report states that winter bird survey methods will involve walking a number of transects, will be undertaken in two key areas within the scoping red line boundary and will focus on detecting qualifying features of the Mersey Estuary SPA using functionally linked land within the Zone of Influence of the designated site. It is unclear how the two key areas have been identified or why these are representative of the effects of the Proposed Development on wintering birds. The baseline survey data contained within the ES should be representative of the full effects of the scheme. The ES should include evidence that the extent, location and methodology of surveys has been agreed with relevant consultation bodies.	The winter bird survey approach was based on the preferred pipeline routes outlined in the HyNet Phase 2 Feasibility Report - North West England Hydrogen Pipeline Network (Saith Limited, 2020) and the CO2 and H2 Pipeline Enabling Works – Wintering Bird Survey Methodology (WSP, 2021). Survey areas were amended or extended to ensure all FLL within 500 m potentially impacted by alternative routeing options were suitably covered. FLL was assessed on the basis of the

Stakeholder/ Date of consultation	Stakeholder comment	Action taken to address comment
		following NE commissioned report: "Review and analysis of changes in waterbird use of the Mersey Estuary SPA, Mersey Narrows & North Wirral Foreshore pSPA and Ribble & Alt Estuaries SPA (NECR173)". It is intended to agree the survey approach and finalise the scope with Natural England.

European Sites Screened into the Assessment

- 3.2.12 There are six SPAs, three SACs and four Ramsar Sites within 10 km of the Project. There are a further four SPAs and three Ramsar Sites (designated for ornithological features) within 20 km. There are no potential or possible SPAs, SACs or Ramsar Sites within the search areas.
- 3.2.13 Details of the European sites considered for assessment and their qualifying features are listed in **Table 3.2 - European Sites within the Study Area included for Assessment**. The distances provided are from the closest point of the Preliminary Order Limits. **Figure 3.1 - Location of European Sites** illustrates the location of these sites relative to the Preliminary Order Limits.

Table 3.2 European Sites within the Study Area included for Assessment

Site Name	Approx. distance from the Preliminary Order Limits	Site Description	Qualifying features
Mersey Estuary SPA	830 m west	The Mersey Estuary is on the Irish Sea coast of north-west England. It is a large, sheltered estuary which comprises large areas of saltmarsh and extensive intertidal sand and mudflats, with limited areas of brackish marsh, rocky shoreline and boulder clay cliffs, within a rural and industrial environment. The intertidal flats and saltmarshes provide feeding and roosting sites for large and internationally important populations of waterfowl. During the winter, the site is of major importance for duck and waders. The site is also important during spring and autumn migration periods, particularly for wader populations moving along the west coast of Britain.	Non-breeding: shelduck (<i>Tadorna tadorna</i>), teal (<i>Anas crecca</i>), pintail (<i>Anas acuta</i>), golden plover (<i>Pluvialis apricaria</i>), dunlin (<i>Calidris alpina</i>), black-tailed godwit (<i>Limosa limosa</i>) and redshank (<i>Tringa totanus</i>). Waterbird assemblage.
Mersey Estuary Ramsar Site	830 m west	A large, sheltered estuary comprising large areas of saltmarsh and intertidal sand and mudflats. The site includes brackish marsh, rocky shoreline, and cliffs set in a rural and industrial	Ramsar criterion 5: Assemblages of international importance. Species with peak counts in winter: 89,576 waterfowl (5 year peak mean 1998/99-2002/03).

Site Name	Approx. distance from the Preliminary Order Limits	Site Description	Qualifying features
		environment. Internationally important numbers of various species of waterbirds feed and roost at the site in winter, or stage at the site in spring and fall, notably ringed plover (<i>Charadrius hiaticula</i>). Human activities include livestock grazing, hunting, industrial activities.	Ramsar criterion 6: species/populations occurring at levels of international importance. Qualifying Species/populations (as identified at designation): Species with peak counts in spring/autumn: shelduck, NW Europe, 12,676 individuals, representing an average of 4.2% of the population (5 year peak mean 1998/99-2002/03); black-tailed godwit, Iceland/W Europe 2,011 individuals, representing an average of 5.7% of the population (5 year peak mean 1998/99-2002/03); redshank, 6651 individuals, representing an average of 2.6% of the population (5 year peak mean 1998/99-2002/03). Species with peak counts in winter: teal, NW Europe 10,613 individuals, representing an average of 2.6% of the population (5 year peak mean 1998/99-2002/03); pintail NW Europe 565 individuals, representing an average of 2% of the GB population (5 year peak mean 1998/99-2002/03); dunlin, W Siberia/W Europe 48,364 individuals, representing an average of 3.6% of the population (5 year peak mean 1998/99-2002/03).
Midlands Meres and	2.25 km south-west	The Meres & Mosses form a geographically discrete series of lowland open water and peatland sites in the	Ramsar criterion 1: The site comprises a diverse range of habitats from open water to raised bog.

Site Name	Approx. distance from the Preliminary Order Limits	Site Description	Qualifying features
Mosses Phase 2 Ramsar Site		north-west Midlands of England. These have developed in natural depressions in the glacial drift left by receding ice sheets which formerly covered the Cheshire/Shropshire Plain. The 16 component sites include open water bodies (meres), the majority of which are nutrient-rich with associated fringing habitats; reed swamps, fen, carr & damp pasture. Peat accumulation has resulted in nutrient poor peat bogs (mosses) forming in some sites in the fringes of meres or completely infilling basins. In a few cases the result is a floating quaking bog or schwingmoor. The wide range of resulting habitats support nationally important flora & fauna.	Ramsar criterion 2: Supports a number of rare species of plants associated with wetlands, including the nationally scarce cowbane (<i>Cicuta virosa</i>) and, elongated sedge (<i>Carex elongata</i>). Also present are the nationally scarce bryophytes <i>Dicranum affine</i> and <i>Sphagnum pulchrum</i> . Also supports an assemblage of invertebrates including several rare species. There are 16 species of British Red Data Book insect listed for this site including the following endangered species: the moth <i>Glyphipteryx lathamella</i> , the caddisfly <i>Hagenella clathrata</i> and the sawfly <i>Trichiosoma vitellinae</i> .
Rostherne Mere Ramsar Site	2.67 km east	Part of a series of open water and peatland, including peat bog and marsh areas set in glaciated landscape. Vegetation consists of fringing reedbeds, wooded and agricultural land. Wintering waterbirds include nationally important numbers of various duck species. Human	Ramsar criterion 1a: Good representative example of the meres of the Shropshire-Cheshire Plain. Rostherne Mere is one of the deepest and largest of the meres. Its shoreline is fringed with common reed (<i>Phragmites australis</i>) and a small area of peat bog has developed at the north-west end of the mere.

Site Name	Approx. distance from the Preliminary Order Limits	Site Description	Qualifying features
		activities include agricultural use and bird hunting.	Ramsar criterion 3c: Over winter this site regularly supports nationally important numbers of shoveler 86 individuals; and pochard 757 individuals.
Rixton Clay Pits SAC	3.43 km west	Situated east of Warrington, this site comprises parts of an extensive disused brickworks quarry excavated in glacial boulder clay. The excavation has left a mosaic of water-filled hollows and clay banks. Long-abandoned areas have undergone natural succession to scrub and woodland while more recently worked areas support calcareous grassland. The site is important for great crested newt and holds the county's largest known breeding population.	Great crested newt (<i>Triturus cristatus</i>).
Midlands Meres and Mosses Phase 1 Ramsar Site	3.61 km east	As above for Midlands Meres and Mosses Phase 2 Ramsar Site.	Ramsar criterion 1: The site comprises a diverse range of habitats from open water to raised bog. Ramsar criterion 2: Supports a number of rare species of plants associated with wetlands including five nationally scarce species together with an assemblage of rare wetland invertebrates (three endangered insects and five other British Red Data Book species of invertebrates).

Site Name	Approx. distance from the Preliminary Order Limits	Site Description	Qualifying features
Manchester Mosses SAC	3.85 km west	Mossland formerly covered a very large part of Greater Manchester, Merseyside, south Lancashire and north Cheshire, and provided a severe obstacle to industrial and agricultural expansion. While most has been converted to agriculture or lost to development, several examples have survived as degraded raised bog, such as Risley Moss, Astley and Bedford Mosses, and Holcroft Moss on the Mersey floodplain. Their surfaces are now elevated above adjacent land due to shrinkage of the surrounding tilled land, and all except Holcroft Moss have been cut for peat at some time in the past. While past drainage has produced dominant purple moor-grass (<i>Molinia caerulea</i>), bracken (<i>Pteridium aquilinum</i>) and birch (<i>Betula</i> spp.) scrub or woodland, wetter pockets have enabled peat-forming species to survive.	Degraded raised bogs still capable of natural regeneration.
The Dee Estuary SPA	13.52 km west	The Dee Estuary lies on the border between England and Wales on the	Non-breeding: shelduck, teal, pintail, oystercatcher (<i>Haematopus ostralegus</i>), grey plover (<i>Pluvialis</i>

Site Name	Approx. distance from the Preliminary Order Limits	Site Description	Qualifying features
		north-west coast of Britain. It is a large, funnel-shaped, sheltered estuary, which supports extensive areas of intertidal sand and mudflats and saltmarsh. Where agricultural reclamation has not occurred, the saltmarshes grade into transitional brackish and swamp vegetation on the upper shore. The Site also includes the three sandstone islands of Hilbre, with their important cliff vegetation and maritime heathland and grassland. The two shorelines of the Estuary show a marked contrast between the industrialised usage of the coastal belt in Wales and residential/recreational use in England. The Site is of major importance for waterbirds; during the winter the intertidal flats, saltmarshes and fringing habitats including coastal grazing marsh/fields, provide feeding and roosting sites for internationally important numbers of ducks and waders; in summer the Site supports nationally important breeding colonies of two species of tern. The Site is also important	<i>squatarola</i>), knot, dunlin, black-tailed godwit, bar-tailed godwit, curlew, redshank and Sandwich tern (<i>Sterna sandvicensis</i>) Breeding: common tern and little tern (<i>Sterna albifrons</i>). Waterbird assemblage.

Site Name	Approx. distance from the Preliminary Order Limits	Site Description	Qualifying features
		during migration periods, particularly for wader populations moving along the west coast of Britain and for Sandwich terns post-breeding.	
The Dee Estuary Ramsar Site	13.52 km west	The Dee is a large funnel-shaped sheltered estuary and is one of the top ten estuaries in the UK for wintering and passage waterfowl populations. The Estuary supports internationally important numbers of waterfowl and waders. The Estuary plays a very important role in shoreline stabilisation and dissipation of erosive forces, sediment trapping and water supply. The two shorelines of the Estuary show a marked contrast between the industrialised usage of the coastal belt in Wales and residential and recreational usage in England. The Site was subject of Ramsar Advisory Missions in 1993 and 1994 due to several adverse factors affecting its ecological character: pollution, overfishing, introduction of invasive species and general disturbance from transport and industrial activities.	Ramsar criterion 1: Extensive intertidal mud and sand flats (20 km by 9 km) with large expanses of saltmarsh towards the head of the estuary. Habitats Directive Annex I features present on the pSAC include: H1130 Estuaries, H1140 Mudflats and sandflats not covered by seawater at low tide, H1210 Annual vegetation of drift lines, H1230 Vegetated sea cliffs of the Atlantic and Baltic coasts, H1310 Salicornia and other annuals colonising mud and sand, H1330 Atlantic salt meadows (<i>Glaucopuccinellietalia maritima</i>), H2110 Embryonic shifting dunes, H2120 Shifting dunes along the shoreline with <i>Ammophila arenaria</i> ("white dunes"), H2130 Fixed dunes with herbaceous vegetation ("grey dunes"), H2190 Humid dune slacks. Ramsar criterion 2: supports breeding colonies of the vulnerable Natterjack Toad. Ramsar criterion 5: Assemblages of international importance: Species with peak counts in winter: Non-breeding season regularly supports 120,726

Site Name	Approx. distance from the Preliminary Order Limits	Site Description	Qualifying features
		Since then, management plans have been developed and implemented. However, some of the threats remain.	individual waterbirds (5 year peak mean 1994/95–1998/99). Ramsar criterion 6 – species/populations occurring at levels of international importance. Species with peak counts in spring/autumn: black-tailed godwit, Iceland/W Europe 3,323 individuals, representing an average of 7% of the population (5-year peak mean 1998/99-2002/03); redshank, 4,465 individuals, representing an average of 1.7% of the population (5-year peak mean 1998/99-2002/03); dunlin, W Siberia/W Europe 38,196 individuals, representing an average of 2.8% of the population (5-year peak mean 1998/99-2002/03 - spring peak); grey plover, E Atlantic/W Africa - wintering 11,021 individuals, representing an average of 4.4% of the population (5-year peak mean 1998/99-2002/03 - spring peak); knot, W & Southern Africa (wintering) 42,692 individuals, representing an average of 9.4% of the population (5-year peak mean 1998/99-2002/03); ringed plover, Europe/Northwest Africa 3,761 individuals, representing an average of 5.1% of the population (5-year peak mean 1998/99-2002/03 - spring peak); and sanderling, Eastern Atlantic 7,401 individuals, representing an average of 6% of the population (5-year peak mean 1998/99-2002/03 -

Site Name	Approx. distance from the Preliminary Order Limits	Site Description	Qualifying features
			spring peak). Species with peak counts in winter: bar-tailed godwit, W Palearctic 13,935 individuals, representing an average of 11.6% of the population (5-year peak mean 1998/99-2002/03); oystercatcher, Europe & NW Africa-wintering 18,926 individuals, representing an average of 1.8% of the population (5-year peak mean 1998/99-2002/03); teal, NW Europe 5,107 individuals, representing an average of 1% of the population (5-year peak mean 1998/99-2002/03); wigeon, NW Europe 69,841 individuals, representing an average of 4.6% of the population (5-year peak mean 1998/99-2002/03); pintail, NW Europe 1,497 individuals, representing an average of 2.5% of the population (5-year peak mean 1998/99-2002/03); pink-footed goose, Greenland, Iceland/UK 6,552 individuals, representing an average of 2.42% of the population (5-year peak mean 1998/99-2002/03); Bewick's swan, NW Europe 230 individuals, representing an average of 1.1% of the GB population (5-year peak mean 1998/99-2002/03); and whooper swan, Iceland/UK/Ireland 211 individuals, representing an average of 1% of the population (5-year peak mean 1998/99-2002/03).

Site Name	Approx. distance from the Preliminary Order Limits	Site Description	Qualifying features
Liverpool Bay / Bae Lerpwl SPA	14.51 km north-west	Liverpool Bay/Bae Lerpwl SPA is in the east of the Irish Sea, bordering the coastlines of north-west England and north Wales, and running as a broad arc from Morecambe Bay to the east coast of Anglesey. It is classified for the protection of red-throated diver (<i>Gavia stellata</i>), common scoter (<i>Melanitta nigra</i>), and little gull (<i>Hydrocoloeus minutus</i>) in the non-breeding season; common tern (<i>Sterna hirundo</i>) and little tern (<i>Sterna albifrons</i>) in the breeding season, and an internationally important waterbird assemblage. Liverpool Bay/Bae Lerpwl SPA encompasses marine areas supporting large aggregations of wintering red-throated diver and common scoter as well as important marine foraging areas of little terns breeding within The Dee Estuary SPA, and foraging areas of common terns breeding at the Mersey Narrows & North Wirral Foreshore SPA. The boundary of Liverpool Bay/Bae Lerpwl SPA extends beyond 12 nautical	Non-breeding: red-throated diver, common scoter and little gull (<i>Hydrocoloeus minutus</i>). Breeding: common tern and little tern. Waterbird assemblage.

Site Name	Approx. distance from the Preliminary Order Limits	Site Description	Qualifying features
		miles and therefore lies partly in Welsh and English territorial waters and partly in offshore waters; hence it is a site for which Natural England, Natural Resources Wales, and JNCC have responsibility to provide statutory advice.	
Mersey Narrows and North Wirral Foreshore SPA	17.09 km west	Mersey Narrows and North Wirral Foreshore is located on the northwest coast of England at the mouths of the Mersey and Dee estuaries. The Site comprises intertidal habitats at Egremont foreshore, man-made lagoons at Seaforth and the extensive intertidal flats at North Wirral Foreshore. Egremont is most important as a feeding habitat for waders at low tide whilst Seaforth is primarily a high tide roost site, as well as a nesting site for terns. North Wirral Foreshore supports large numbers of feeding waders at low tide and also includes important high tide roost sites.	Non-breeding: bar-tailed godwit, little gull, knot and common tern. Breeding: common tern. Waterbird assemblage.
Mersey Narrows and	17.09 km west	Located on the Irish Sea coast of north-west England, on the mouths of the	Ramsar Criterion 4: regularly supports plant and/or animal species at a critical stage in their life cycles,

Site Name	Approx. distance from the Preliminary Order Limits	Site Description	Qualifying features
North Wirral Foreshore Ramsar Site		Mersey and Dee estuaries, the Site comprises large areas of saltmarsh and extensive intertidal sand and mud flats, with limited areas of brackish marsh, rocky shoreline and boulder clay cliffs, along a rural and industrial stretch of coast. The intertidal flats are internationally important feeding grounds for waders: the Site regularly supports more than 20,000 waterbirds, including 2.4% of the knot <i>Calidris canutus islandica</i> population and 2.8% of the black-tailed godwit <i>Limosa lapponica</i> population. The Wetland provides ecosystem services including shoreline stabilisation and dissipation of erosive forces, sediment trapping and water supply. The potential threats to its ecological character derive from increasing recreational activities and social and economic pressures to return the foreshore back to sandy beaches, and sedimentation of the foreshore which reduces the available low tide feeding habitat and causes vegetation	or provides refuge during adverse conditions: During 2004/05-2008/09 the Mersey Narrows and North Wirral Foreshore Ramsar site supported important numbers of non-breeding little gulls and common terns. Ramsar Criterion 5 because it regularly supports 20,000 or more waterbirds: During the winters 2004/05-2008/09, the Mersey Narrows and North Wirral Foreshore Ramsar site supported an average peak of 32,402 individual waterbirds. Ramsar Criterion 6: regularly supports 1% of the individuals in the populations of the following species or subspecies of waterbird in any season: During the winters 2004/05-2008/09, the Mersey Narrows and North Wirral Foreshore Ramsar site supported 2.4% of the islandica subspecies, W Europe/Waddensea/Britain/Ireland (non-breeding) population of knot and 2.8% of the lapponica subspecies W Europe/NW Africa (non-breeding) population of bar-tailed godwits.

Site Name	Approx. distance from the Preliminary Order Limits	Site Description	Qualifying features
		succession. The adjacent land is dedicated to agriculture and urban development as well as nature conservation and scientific research and monitoring. Recreational activities include bird watching, walking, fishing, sailing, canoeing, cycling and kite surfing, all carried out at intensive levels. There is a visitor centre at Seaforth Nature Reserve.	
Ribble and Alt Estuaries SPA	19.07 km north-west	The Site lies on the coast of Lancashire and Sefton in northwest England and overlaps the Ribble Estuary SSSI and Sefton Coast SSSI. The Site consists of extensive areas of sandflats and mudflats, as well as large areas of saltmarsh, particularly in the Ribble. There are also areas of coastal grazing marsh.	Non-breeding: Bewick's swan (<i>Cygnus columbianus</i>), whooper swan (<i>Cygnus cygnus</i>), pink-footed goose (<i>Anser brachyrhynchus</i>), shelduck, wigeon, teal, pintail, oystercatcher, ringed plover, golden plover, grey plover, knot, sanderling (<i>Calidris alba</i>), dunlin, black-tailed godwit, bar-tailed godwit and redshank. Breeding: ruff (<i>Philomachus pugnax</i>), lesser black-backed gull and common tern. Waterbird assemblage. Seabird assemblage.
Ribble and Alt Estuaries Ramsar Site	19.07 km north-west	A large area, including two estuaries, extensive sand and mudflats, saltmarsh and dunes. The tidal flats and saltmarsh	Ramsar criterion 2: This site supports up to 40% of the GB population of natterjack toads.

Site Name	Approx. distance from the Preliminary Order Limits	Site Description	Qualifying features
		support internationally important populations of wintering waterbirds. Internationally important vegetation communities and amphibian populations occur in the sand dunes. Human activities include tourism, livestock grazing, hunting, and large-scale industrial and military activities. There are port facilities, as well as oil and gas production and exploration activities, in the surroundings.	Ramsar Criterion 5: Assemblages of international importance: Species with peak counts in winter: 222,038 waterfowl (5 year peak mean 1998/99-2002/2003). Ramsar Criterion 6: species/populations occurring at levels of international importance. Qualifying Species/populations (as identified at designation): Species regularly supported during the breeding season: Qualifying Species/populations (as identified at designation): lesser black-backed gull, W Europe/Mediterranean/W Africa 4,108 apparently occupied nests, representing an average of 2.7% of the breeding population (Seabird 2000 Census). Species with peak counts in spring/autumn: ringed plover, Europe/Northwest Africa 3,761 individuals, representing an average of 5.1% of the population (5 year peak mean 1998/99-2002/03 - spring peak); grey plover, E Atlantic/W Africa - wintering 11,021 individuals, representing an average of 4.4% of the population (5 year peak mean 1998/99-2002/03 - spring peak); knot, W & Southern Africa (wintering) 42,692 individuals, representing an average of 9.4% of the population (5 year peak mean 1998/99-2002/03); sanderling, Eastern Atlantic 7,401 individuals, representing an average of 6% of the

Site Name	Approx. distance from the Preliminary Order Limits	Site Description	Qualifying features
			population (5 year peak mean 1998/99-2002/03 - spring peak); dunlin, W Siberia/W Europe 38,196 individuals, representing an average of 2.8% of the population (5 year peak mean 1998/99-2002/03 - spring peak); black-tailed godwit, Iceland/W Europe, 3,323 individuals, representing an average of 9.4% of the population (5 year peak mean 1998/99-2002/03); redshank, 4,465 individuals, representing an average of 1.7% of the population (5 year peak mean 1998/99-2002/03); lesser black-backed gull, 1,747 individuals, representing an average of 2.8% of the GB population (5 year peak mean 1998/99-2002/03). Species with peak counts in winter: Bewick's swan, NW Europe 230 individuals, representing an average of 2.8% of the GB population (5 year peak mean 1998/99-2002/03); whooper swan, Iceland/UK/Ireland 211 individuals, representing an average of 1% of the population (5 year peak mean 1998/99- 2002/03); pink-footed goose, Greenland, Iceland/UK 6,552 individuals, representing an average of 2.7% of the population (5 year peak mean 1998/99-2002/03); shelduck, NW Europe 2,944 individuals, representing an average of 3.7% of the GB population (5 year peak mean 1998/99-2002/03); wigeon, NW Europe 69,841

Site Name	Approx. distance from the Preliminary Order Limits	Site Description	Qualifying features
			individuals, representing an average of 4.6% of the population (5 year peak mean 1998/99-2002/03); teal, NW Europe 5,107 individuals, representing an average of 1.2% of the population (5 year peak mean 1998/99-2002/03); pintail, NW Europe 1,497 individuals, representing an average of 2.4% of the population (5 year peak mean 1998/99-2002/03); oystercatcher, Europe & NW Africa -wintering 18,926 individuals, representing an average of 1.8% of the population (5 year peak mean 1998/99-2002/03); and bar-tailed godwit, W Palearctic 13935 individuals, representing an average of 11.6% of the population (5 year peak mean 1998/99-2002/03).

3.3 Ornithology baseline

3.3.1 This section summarises information obtained from the following sources:

- Data gathered during wintering bird surveys undertaken in 2020 and 2021 by the Applicant¹² and Wood on behalf of the Applicant has also been used to inform the chapter in relation to bird species present within the Study Area; and
- Published literature, including:
 - ▶ The Bird Atlas 2007-11: the breeding and wintering birds of Britain and Ireland (Balmer *et al.*, 2013)¹³;
 - ▶ Birds in Cheshire and Wirral: A breeding and wintering atlas (Cheshire and Wirral Ornithological Society, 2008)¹⁴; and
 - ▶ Natural England Commissioned Report NECR361: Identification of Functionally Linked Land supporting Special Protection Areas (SPAs) waterbirds in the North West of England (Bowland Ecology, 2021)¹⁵.

Desk Study

3.3.2 The *Identification of Functionally Linked Land supporting SPA waterbirds in the North West of England* report (Bowland Ecology, 2021), highlighted the following areas of functionally linked land in proximity to the Proposed Development (i.e., within 500 m):

- Fiddlers Ferry Power Station and Lagoons/Runcorn Sands and Astmoor Saltmarsh (moderate potential) partially fall within the northern corridor;
- Lordship Lane Fields (low potential)/Frodsham Sludge Lagoons (high)/Weaver Estuary (moderate)/Weaver Estuary to Catton Hall (moderate) partially fall within the western corridor; and
- Woolston Eyes (high potential) lies less than 500 m from the Novelis spur terminus within the northern corridor (approximately 280 m).

3.3.3 The *Birds in Cheshire and Wirral: A breeding and wintering atlas* (Cheshire and Wirral Ornithological Society, 2008), reported the following SPA/Ramsar Site qualifying species in proximity to the Proposed Development:

- Pink-footed goose – only sporadic records of low numbers of birds in the area;

¹² Cadent (2021). Hydrogen Pipeline - Wintering Bird Surveys.

¹³ Balmer, D.E, Gillings, S., Caffrey, B.J., Swann, R.L., Downie, I.S. & Fuller, R.J. (2013). The Bird Atlas 2007-11: the breeding and wintering birds of Britain and Ireland. BTO Books, Thetford, UK.

¹⁴ Cheshire and Wirral Ornithological Society. (2008). Birds in Cheshire and Wirral: A breeding and wintering atlas. (online) Available at: <http://www.cheshireandwirralbirdatlas.org/species/> (Accessed 26 November 2021).

¹⁵ Bowland Ecology. (2021). Identification of Functionally Linked Land supporting SPA waterbirds in the North West of England. NERC361. Natural England.

- Whooper swan – small numbers reported around Lordship Lane Fields;
- Golden plover – Frodsham Marsh is a favoured site in the region, with peak counts of 1,000-4,000 birds reported here, although most records were of small flocks, with a median size of 40 birds;
- Teal – the most recent Mersey Estuary SPA wintering population was estimated at 11,723 individuals (Natural England, 2019¹⁶), which forms almost half of the total county population of ~25,000 individuals. Other important sites for teal include the Dee Estuary, which averages counts of 4,400 teal, and at Woolston Eyes, which holds around 2,000 birds on average. Additionally, flocks of more than 500 birds were recorded at Fiddler's Ferry during the atlas period;
- Shelduck – the atlas highlighted that WeBS counts show that counts average 14,500 birds in the Mersey and over 11,000 on the Dee estuaries. This status is based on the moulting flock on the Mersey, which peaks in July or August, and the maximum on the Dee, is usually in October. Mid-winter counts are much lower and the numbers staying to winter on the Mersey have dropped considerably since the moulting flock became established, declining from 5,000 in the late 1990s to 3,000 in recent years. The only non-estuarine areas with three figure counts were from Frodsham Marsh (220 birds) and Fiddlers Ferry (100 birds). Both are feeding and loafing sites adjacent to the tidal Mersey;
- Pintail – occasional reports, including a record of 250 birds using Frodsham Marsh in winter 2004/05;
- Redshank – most redshank records were from coastal habitats during the atlas period, although 30 were recorded on flooded fields alongside the lower River Weaver at Aston; and
- Black-tailed godwit – the freshwater sites adjacent to the estuaries are important for the species where they can supplement their diet with earthworms, with Frodsham Marsh being a key area. There were few atlas records of birds away from the estuaries and adjacent sites.

3.3.4 The *Bird Atlas 2007-11: the breeding and wintering birds of Britain and Ireland* (Balmer *et al.*, 2013) also reported similar distribution to that reported in the county atlas above.

Field Survey

3.3.5 Wintering bird surveys conducted by WSP from October 2020 to March 2021 inclusive (Cadent, 2021¹²), recorded a total of 115 bird species, of which six are qualifying species of the Mersey Estuary SPA (shelduck, teal, pintail, golden plover, black-tailed godwit and redshank).

3.3.6 Wintering bird surveys undertaken by Wood from October 2021 to February 2022 inclusive, recorded the following seven Mersey Estuary SPA qualifying species

¹⁶ Natural England. (2019). European Site Conservation Objectives for Mersey Estuary SPA (UK9005131). Mersey Estuary SPA citation (22/08/2014). (online) Available at: <http://publications.naturalengland.org.uk/file/6485318211469312> (Accessed 28 October 2021).

within the Study Area: shelduck, teal, pintail, golden plover, black-tailed godwit, dunlin and redshank. Several assemblage species were also recorded within the Study Area including shoveler, lapwing and curlew. Only shelduck, teal, pintail, black-tailed godwit, redshank and shoveler were recorded in notable numbers, with distribution largely restricted to the Ince Marshes, a high tide roost site at Frodsham Sludge Lagoon (functionally linked to the SPA)¹⁷, and around the 'Weaver Bend' (a large meander in the River Weaver, also functionally linked to the SPA). Pink-footed goose, a qualifying species of the Ribble and Alt Estuaries and Ramsar Site, were also recorded overflying the Study Area (although the Study Area lies at the extreme end of their foraging range from the SPA roost sites)¹⁸.

3.4 Potential Impact Pathways

- 3.4.1 This step identifies whether impacts of the Project (during construction, operation and decommissioning) described in Step 2 (see **Section 2**) have the potential to result in LSE on the qualifying features of these European sites.
- 3.4.2 The main mechanisms by which the Project could affect European sites are through either direct or indirect impact pathways, and described as follows:

Construction

- 3.4.3 **Construction activity including use of plant and presence of workforce.** The production of aural and visual stimuli due to noise, vibration, movement of construction vehicles and operatives has the potential to result in disturbance/displacement of birds from SPA/Ramsar Site functionally linked land (if present). This could result in the reduction of energy intake and/or an increase in energy expenditure leading to a reduction in survival or productivity rates.
- 3.4.4 **Use of construction vehicles and generator sets.** The deposition of oxides of nitrogen and concentrations of NOx in air from vehicle emissions has the potential to result in enrichment and/or acidification of the environment. This effect/impact could lead to the alteration of the plant community through changes in baseline conditions, resulting in effects on habitats and species (as qualifying features of SACs and SPAs).
- 3.4.5 **Dust creation during construction activity.** The deposition of dust has the potential to result in loss of or damage to terrestrial or freshwater environments

¹⁷ Natural England. (2015). Review and analysis of changes in waterbird use of the Mersey Estuary SPA, Mersey Narrows & North Wirral Foreshore pSPA and Ribble & Alt Estuaries SPA (NECR173). 27 May 2015. Annex II: Roost locations by species at a regional level. (online) Available at: <http://publications.naturalengland.org.uk/file/5495789449117696> (Accessed 28 October 2021).

¹⁸ Brides, K., Mitchell, C. & Hearn R.D. (2013). Mapping the distribution of feeding Pink-footed Geese in England. Wildfowl & Wetlands Trust / Natural England Report, Slimbridge. 43pp. (online) Available at: <https://monitoring.wwt.org.uk/wp-content/uploads/2018/12/Mapping-feeding-Pinkfeet-in-England-Final-report-vFinal.Jan15-2.pdf> (Accessed 22 March 2022).

from smothering or enrichment resulting in effects on habitats and species (as qualifying features of SACs and SPAs).

Operation

- 3.4.6 **Land take.** The presence of permanent infrastructure (e.g. HAGIs) has the potential to result in displacement/disturbance of birds from functionally linked land (qualifying features of SPAs/Ramsar Sites). This could result in the reduction of available foraging habitat and therefore the leading to a reduction in survival or productivity rates.
- 3.4.7 **Use of plant and presence of workforce.** The production of aural and visual stimuli due to noise, vibration, movement of vehicles and operatives has the potential to result in disturbance/displacement of birds from functionally linked land (qualifying features of SPAs/Ramsar Sites). This could result in the reduction of energy intake and/or an increase in energy expenditure, leading to a reduction in survival or productivity rates.
- 3.4.8 **Vehicles (along highway routes accessing to access the Project).** The deposition of oxides of nitrogen from engine exhausts derived from vehicles moving to and from the Project has the potential to result in enrichment and/or acidification of the environment. This could lead to the alteration of the plant community through changes in baseline conditions, resulting in effects on habitats and species (as qualifying features of SACs, SPAs and Ramsar sites).

Decommissioning

- 3.4.9 The environmental changes and effects due to the decommissioning phase have been considered to be the same as for the construction phase.

3.5 High Level Screening

- 3.5.1 **Table 3.3 - High Level Screening Table of Environmental Changes and Potential Effects of the Project** provides a high-level screening exercise of each potential environmental change and effect due to the Project during construction, operation and decommissioning, and its geographic extent. Where there is likely to be no connectivity between the Project and European sites qualifying features, and due to sites falling outwith the corresponding study area, these sites were not taken forward for further consideration (in **Section 4**).

Table 3.3 High Level Screening Table of Environmental Changes and Potential Effects of the Project

Activity	Potential Change	Potential Effect	Geographic Extent (Zone of Influence)	Rationale	Screened in?	European sites potentially affected
Construction and decommissioning phase(s)						
Construction activity including use of plant and presence of workforce.	Production of aural and visual stimuli due to noise and vibration and movement of construction vehicles and engineers.	Disturbance/displacement of birds (qualifying features of SPA/Ramsar) resulting in a reduction of energy intake and/or an increase in energy expenditure leading to a reduction in survival or productivity rates.	Within 500 m of the Project. This is a precautionary distance based on information reported on disturbance in the literature (e.g., Cutts, Phelps & Burdon 2009 ¹⁹ , Ruddock & Whitfield 2007 ²⁰).	The are no European sites within 500 m of the Project. Potential FLL is present within 500 m of the Project.	Yes	Mersey Estuary SPA & Ramsar Site
Use of chemicals (e.g., fuels, solvents etc.)	Loss of pollutants or fine material from the Site	The introduction of toxic pollutants or sediments resulting in loss of, or damage to terrestrial or	Within 50 m of the Project. This geographic parameter is	The are no European sites or potential FLL	No	Mersey Estuary SPA &

¹⁹ Cutts, N., Phelps, A. & Burdon, D. (2009). Construction and Waterfowl: Defining Sensitivity, Response, Impacts and Guidance. Report to Humber INCA. Institute of Estuarine and Coastal Studies, University of Hull.

²⁰ Ruddock, M. & Whitfield, D. P. (2007). A Review of Disturbance Distances in Selected Bird Species. A report from Natural Research (Projects) Ltd to Scottish Natural Heritage. (online) Available at: <http://www.snh.org.uk/pdfs/strategy/renewables/birdsd.pdf>. (Accessed July 2022).

Activity	Potential Change	Potential Effect	Geographic Extent (Zone of Influence)	Rationale	Screened in?	European sites potentially affected
and the liberation of fine material (e.g., through excavation).	due to surface water flows during rainfall events.	freshwater environments leading to effects on habitats and species (as qualifying features of SACs and SPAs).	based on professional judgement following a review of the Environment Agency Pollution Prevention Guidance PPG5 ²¹ (which suggests control of impacts can be managed within 50 m).	within 50 m of the Project.		Ramsar Site
Use of construction vehicles and generator sets.	Deposition of oxides of nitrogen and NOx in air from engine exhausts.	Deposition of oxides of nitrogen and concentrations of NOx in air from vehicle emissions resulting in enrichment and/or acidification of the environment leading to alteration of the plant community through changes	Within 200 m of the Project and/or wider road network. This geographic parameter is based on Department for Transport (2005)	The are no European sites within 200 m of the Project. Potential FLL is present within 200 m of the Project,	No	Mersey Estuary SPA & Ramsar Site

²¹ Environment Agency (2007). Pollution Prevention Guidelines: Works and maintenance in or near water: PPG5. (online) Available at: <https://webarchive.nationalarchives.gov.uk/ukgwa/20140328090931/http://www.environment-agency.gov.uk/business/topics/pollution/39083.aspx> (Accessed July 2022).

Activity	Potential Change	Potential Effect	Geographic Extent (Zone of Influence)	Rationale	Screened in?	European sites potentially affected
		in baseline conditions resulting in effects on habitats and species (as qualifying features of SACs and SPAs).	Interim Advice Note 61/04: Guidance for Undertaking Environmental Assessment of Air Quality for Sensitive Ecosystems in Internationally Designated Nature Conservation Sites and SSSIs ²² .	although this is mainly farmland (or within farmland), a habitat that already receives high levels of chemical input as part of farm management and, therefore is considered not to be adversely affected by emissions from the Project.		
Dust creation during construction activity	Deposition of dust in areas neighbouring the Site.	Deposition of dust resulting in loss of or damage to terrestrial or freshwater environments from smothering or enrichment resulting in effects on	Within 50 m of the Project, and 500 m of the Project access points.	The are no European sites within 500 m of the Project.	No	Mersey Estuary SPA & Ramsar Site

²² Department of Transport (2005). Interim Advice Note 61/04. Guidance for Undertaking Environmental Assessment of Air Quality for Sensitive Ecosystems in Internationally Designated Nature Conservation Sites and SSSIs (Supplement to Design Manual for Roads and Bridges 11.3.1) Technical Guidance LAQM.TG (09).

Activity	Potential Change	Potential Effect	Geographic Extent (Zone of Influence)	Rationale	Screened in?	European sites potentially affected
		habitats and species (as qualifying features of SACs) and birds (as qualifying features of SPAs).	IAQM guidance is to assess ecological receptors which are within 50 m of the construction site and within 500 m of any Site entrance(s).	There is no potential FLL present within 50 m of the Project (or 500 m of proposed site entrances).		
Operational phase						
Land take (i.e. HAGIs)	Direct loss of functionally linked land from above ground infrastructure.	Displacement of birds (qualifying feature of SPA) resulting in a reduction of energy intake and/or an increase in energy expenditure leading to a reduction in survival or productivity rates.	Within 500 m of the Project. This is a precautionary distance based on information reported on disturbance in the literature (e.g., Cutts, Phelps & Burdon 2009, Ruddock & Whitfield 2007).	There are no European sites within 500 m of the Project. Potential FLL is present within 500 m of the Project, although there is no above ground infrastructure such as HAGIs within 500 m of	No	None

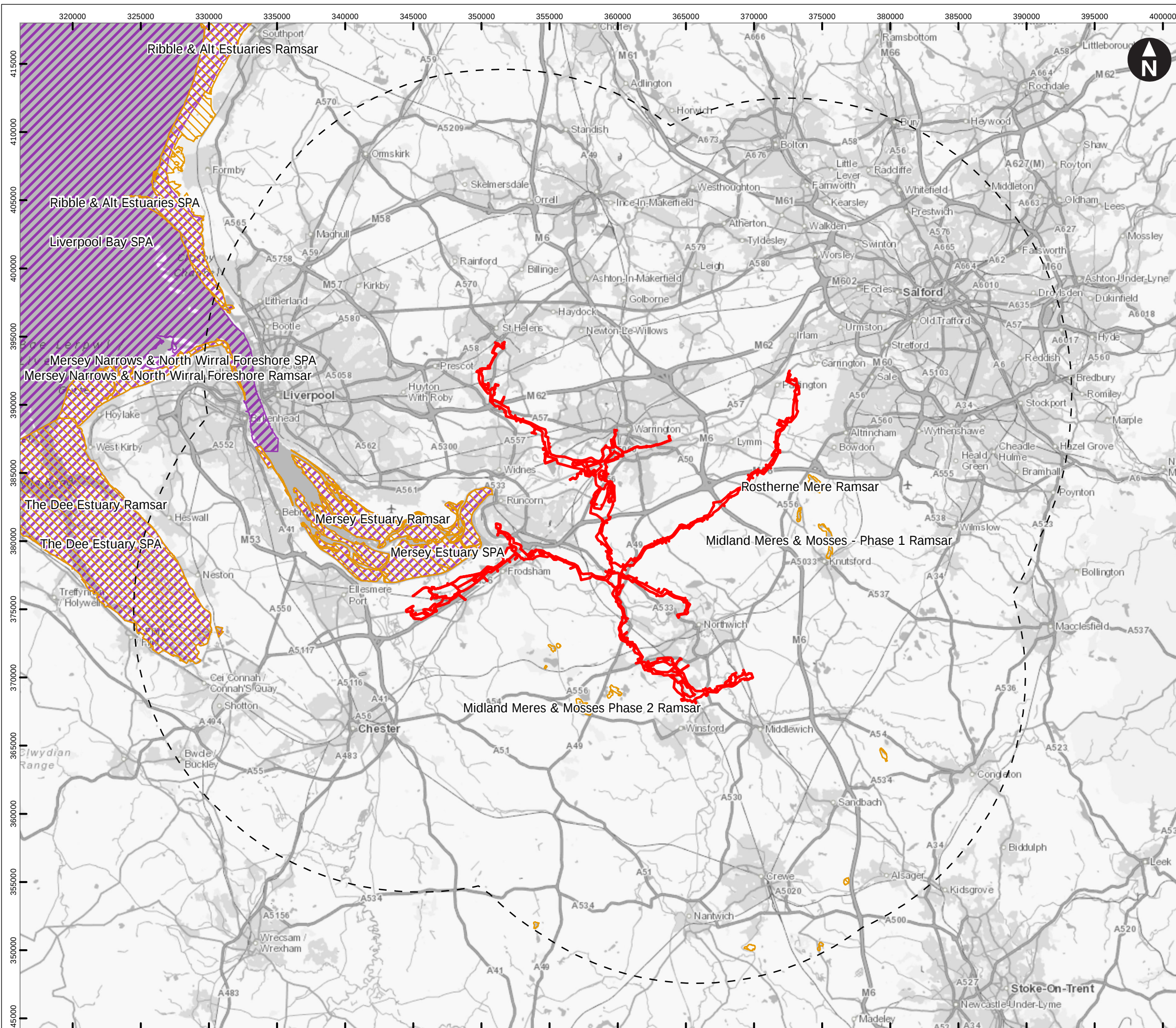
Activity	Potential Change	Potential Effect	Geographic Extent (Zone of Influence)	Rationale	Screened in?	European sites potentially affected
				any potential FLL.		
Operational activities (including presence of workforce)	Production of aural and visual stimuli due to noise and vibration from machinery and their operatives during operational activities.	Disturbance/displacement of birds (qualifying features of SPA) resulting in a reduction of energy intake and/or an increase in energy expenditure leading to a reduction in survival or productivity rates.	Within 500 m of the Project. This is a precautionary distance based on information reported on disturbance in the literature (e.g., Cutts, Phelps & Burdon 2009, Ruddock & Whitfield 2007).	The are no European sites within 500 m of the Project. Potential FLL is present within 500 m of the Project.	Yes	Mersey Estuary SPA & Ramsar Site
Vehicles (along highway routes to access the Proposed Development)	Deposition of oxides of nitrogen from engine exhausts.	Deposition of oxides of nitrogen from vehicle emissions resulting in enrichment and/or acidification of the environment, leading to alteration of the plant community through changes in baseline conditions, resulting in effects on habitats and species (as	European sites within 200 m of the Project boundary and/or major road links with it (the wider road network). This geographic parameter is based on Department for	The are no European sites within 200 m of the Project.	No	None

Activity	Potential Change	Potential Effect	Geographic Extent (Zone of Influence)	Rationale	Screened in?	European sites potentially affected
		qualifying features of SACs and SPAs)	Transport (2005) Interim Advice Note 61/04: Guidance for Undertaking Environmental Assessment of Air Quality for Sensitive Ecosystems in Internationally Designated Nature Conservation Sites and SSSIs.			

3.6 In Combination Effects

- 3.6.1 As part of the HRA screening process, information on other projects and plans that have been subject to a HRA in relation to the European designated sites being assessed is required to allow an assessment of any 'in-combination' effects of the proposed development with other schemes that may affect the European sites.
- 3.6.2 The screening assessment provided within this HRA takes into account the CJEU ruling on 'People over Wind'. It has also adopted a strong precautionary principle; if a pathway of effect is established between the Project and a European Site, then that site is taken through to appropriate assessment. This ensures all effects are captured, including *de minimis* effects.
- 3.6.3 Only those qualifying features and European sites where it can be demonstrated that there is no likelihood of an LSE occurring have been screened out.
- 3.6.4 Therefore, due to the precautionary approach taken to the screening process and identification of LSEs for the Project, in-combination effects will only need to be considered if it is found that the Project is likely to result in LSE on the European sites being considered and detailed within the HRA Screening Assessment.

\\woodplc.net\Wood\UK\SAL\SAL-FS10-Shared\MODELS\PROJECTS\EA-210\807733 HyNet\GIS\Workspaces\No Significant Effects Report\Habitats Regulations Assessment Screening.aprx Originator: jonathan.collini



- Key
- Red Line Boundary 26th May 2022
 - Red Line Boundary 20km buffer
 - Ramsar Site
 - Special Protection Area

0 2 4 6 8 10 12 14 km
Scale at A3: 1:271,451
OS Open Greyscale: Contains OS data © Crown Copyright and database right 2020

Client
wood. Cadent

HyNet North West Hydrogen Pipeline Project
No Significant Effects Report
Habitats Regulations Assessment Screening

Figure 3.1
Location of European Sites

June 2022

wood.

4. HRA Screening Step 4: Assessing the presence of Likely Significance Effects on European sites

4.1 Introduction

4.1.1 This step identifies whether the Project described in Step 2 (**Section 2**) and potential effects taken forward for further consideration in Step 4 (in **Table 3.3 – High Level Screening of Environmental Changes and Potential Effects of the Project**) have the potential to cause LSE on the qualifying features of those European sites identified in Step 3 (**Table 3.2 – European sites within the Study Area included for Assessment**). The potential effects taken forward for further consideration are:

- Construction and Decommissioning:
 - ▶ The effects of disturbance (and resulting displacement) from operatives and their machinery on qualifying features using potentially FLL associated with Mersey Estuary SPA/Ramsar Site.
- Operation:
 - ▶ The effects of disturbance (and resulting displacement) from operatives and their machinery on qualifying features of Mersey Estuary SPA/Ramsar Site using potentially FLL.

4.2 Effects of disturbance and resultant displacement on qualifying bird species and potential FLL

Construction and Decommissioning phases

4.2.1 There is the potential for qualifying bird species of the Mersey Estuary SPA and Ramsar site to be deterred from using functionally linked land surrounding (and within) the Project for foraging and roosting, due to disturbance during construction and decommissioning of the Proposed Development (due to noise, vehicles, machinery and the presence of operatives).

4.2.2 Based on the distributions and known habitat preferences of the qualifying features of the Mersey Estuary SPA and Ramsar site, which are listed in **Table 3.2 – European sites within the Study Area included for Assessment**, all qualifying species (shelduck, teal, pintail, golden plover, black-tailed godwit, dunlin and redshank) could potentially utilise FLL within the Project and/or within a 500 m buffer.

4.2.3 Further consideration is given below, to all species recorded within potential FLL considered to be vulnerable to disturbance from the Project.

- 4.2.4 Potentially functionally linked land was identified through the desk study, with wintering waterbird surveys focussing on these key areas.
- 4.2.5 Most records of SPA-qualifying species from the wintering waterbird surveys related to birds roosting and/or feeding on a waterbody within Frodsham Sludge Lagoons at approximate grid reference SJ 500 780. This waterbody is a well-known high-tide roost site for SPA-qualifying black-tailed godwit, dunlin, shelduck, teal, golden plover and redshank (Natural England, 2015) and is therefore deemed to be functionally linked to the Mersey Estuary SPA (Bowland Ecology, 2021). The winter waterbird surveys in winter 2021/22 confirmed that the waterbody was regularly used across the survey period by black-tailed godwit (peak count of 956 birds), pintail (peak count of 109 birds) and teal (peak count of 984 birds). Shelduck and redshank were also recorded here but sporadically and in low numbers. This waterbody lies ~50 m from an established access route which is proposed to be used during the construction of the Project. A well-established bund (approximately ~10 m high and 30 m wide) associated with the Frodsham Sludge Lagoons lies between the FLL and the Preliminary Order Limits and would therefore negate any effects associated with visual and noise disturbance.
- 4.2.6 Ince Marshes also held over 1% of SPA-qualifying black-tailed godwit (peak count of 82 birds). The Ince Marshes lies within 500 m of an established access route, which is proposed to be used during the construction of the Project. An operational industrial plant lies between the Project and FLL ~1 km to the north. This physical barrier negates any effects associated with visual and noise disturbance created from the construction, operational and/or decommissioning processes. The Weaver Estuary held important numbers of SPA-qualifying shelduck (peak count of 116 birds), teal (peak count of 166), pintail (peak count of 39), black-tailed godwit (peak count of 219) and redshank (peak count of 57) albeit sporadically over the winter period. The key area used by these birds falls outwith a 500 m buffer around the Project and therefore the species would not be impacted by any construction related activities.
- 4.2.7 It was considered that although Woolston Eyes forms high potential FLL within 500 m of the Project, the spur terminus here lies between Woolston Eyes and a currently operational industrial plant and therefore no impact pathways on any qualifying species using such FLL are predicted due to this physical barrier.
- 4.2.8 Therefore, there are no pathways for any effects associated with disturbance from the construction and decommissioning of the Project, on any qualifying features using FLL, therefore no LSEs are identified.

Operational phase

- 4.2.9 There is the potential for qualifying bird species of the Mersey Estuary SPA and Ramsar site to be deterred from using functionally linked land surrounding (and within) the Project for foraging and roosting, due to disturbance during the operational phase of the Proposed Development (due to noise, vehicles, machinery and the presence of operatives).
- 4.2.10 Based on the distributions and known habitat preferences of the qualifying features of the Mersey Estuary SPA and Ramsar site, which are listed in **Table 3.2 – European sites within the Study Area included for Assessment**, all

qualifying species (shelduck, teal, pintail, golden plover, black-tailed godwit, dunlin and redshank) could potentially utilise FLL within the Project and/or within a 500 m buffer.

4.2.11 Further consideration is given in the previous section, to all species recorded within potential FLL considered to be vulnerable to disturbance from the Project.

4.2.12 Therefore, the same conclusion applies for the operational phase of the development, in that there are no pathways for any effects associated with disturbance on any qualifying features using FLL, and therefore no LSEs are identified.

4.3 Conclusion

4.3.1 A summary of the conclusions set out in **Section 4** is provided in **Table 4.1 - Scoped in European sites, Screening Rationale and Potential for LSE**. Each European site and its qualifying features are listed with a screening rationale on whether potential for any LSE is predicted.

Table 4.1 Scoped in European sites, Screening Rationale and Potential for LSE

Site name	Qualifying Feature(s)	Screening Rationale	Potential for LSE
Mersey Estuary SPA	Non-breeding: shelduck, teal, pintail, golden plover, dunlin, black-tailed godwit and redshank. Waterbird assemblage.	<i>Disturbance and resultant displacement</i> There is no evidence to indicate that functionally linked land utilised by SPA-qualifying features identified within 500 m of the Project would form a pathway for LSE during the construction, operational or decommissioning phases of the Project. The FLL of the Frodsham Sludge Lagoons is ~50 m from the Preliminary Order Limits but is screened by a 10m high, 30m wide earth bund. Therefore, there will be no impacts from disturbance and displacement during construction and operation of the Project. Consequently, there would be no pathway for LSE on any Mersey Estuary SPA-qualifying features associated with disturbance and resultant displacement as a result of the Project.	No
Mersey Estuary Ramsar site	Populations of international importance in the spring / autumn of shelduck, black-tailed godwit and redshank; and in the winter of teal, pintail and dunlin.	<i>Disturbance and resultant displacement</i> There is no evidence to indicate that functionally linked land utilised by SPA-qualifying features identified within 500 m of the Project would form a pathway for LSE during the construction, operational or decommissioning phases of the Project. The FLL of the Frodsham Sludge Lagoons is ~150 m from the Preliminary Order Limits but is screened by a 10m high, 30m wide earth bund. Therefore, there will be no impacts from disturbance and displacement during construction and operation of the Project. Consequently, there would be no pathway for LSE on any Mersey Estuary SPA-qualifying features associated with disturbance and resultant displacement as a result of the Project.	No

5. HRA Conclusions

- 5.1.1 Stage 1 of the HRA process, the four-part screening, identifies any likely impacts upon a European Site arising from a project or Plan, either alone or 'in combination' with other projects or plans, and considers whether these impacts are likely to result in LSEs.
- 5.1.2 The screening assessment provided within this HRA takes into account the CJEU ruling on 'People over Wind'. It has also adopted a strong precautionary approach - if a pathway of effect is established between the Project and a European Site, then that site is taken through to appropriate assessment. This ensures all effects are captured, including *de minimis* effects.
- 5.1.3 Only those qualifying features and European sites where it can be demonstrated that there is no likelihood of a significant effect occurring have been screened out.
- 5.1.4 Therefore, due to the precautionary approach taken to the screening process and identification of LSEs for the Project, in-combination effects will only need to be considered if it is found that the proposed development is likely to result in LSE on the European sites being considered and detailed within any HRA Report.
- 5.1.5 Potential effects taken forward for further consideration in Step 4 (in **Table 3.3 – High Level Screening of Environmental Changes and Potential Effects of the Project**) had the potential to cause LSE on the qualifying features of those European sites within the study area in Step 3 (**Table 3.2 – European sites within the Study Area included for Assessment**). The potential effects taken forward for further consideration were:
- Construction and Decommissioning:
 - ▶ The effects of disturbance (and resulting displacement) from operatives and their machinery on qualifying features using potentially FLL associated with the Mersey Estuary SPA/Ramsar site.
 - Operation:
 - ▶ The effects of disturbance (and resulting displacement) from operatives and their machinery on qualifying features of Mersey Estuary SPA/Ramsar site using potentially FLL.
- 5.1.6 Based on the evidence set out in **Sections 3 and 4 and Table 4.1 - Scoped in European sites, Screening Rationale and Potential for LSE**, there is no potential for LSEs to occur in relation to potential effects associated disturbance and displacement and air pollution on any of the qualifying features of the following European sites:
- Mersey Estuary SPA and Ramsar Site:
 - ▶ Non-breeding populations of international importance: shelduck, teal, pintail, golden plover, dunlin, black-tailed godwit and redshank; and
 - ▶ Waterbird assemblage.

5.1.7

As there are no LSEs for any qualifying features of any European sites, there is no requirement for Stage 2 of HRA Appropriate Assessment to be undertaken.

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