ARUP

Phillips 66 Limited

Low Sulphur Gasoline (LSG) Project

Environmental Impact Assessment Screening Report

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1. Introduction

1.1 Background

Ove Arup & Partners Ltd ('Arup') has been commissioned by Phillips 66 Limited (hereafter referred to as 'Phillips 66' or 'the Applicant') to prepare a request for an Environmental Impact Assessment (EIA) screening opinion, in respect to the development of a Low Sulphur Gasoline (LSG) installation at their existing Humber Refinery site in South Killingholme, Immingham (herein referred to as the 'Proposed Scheme').

This is a formal request for a screening opinion from North Lincolnshire Council (NLC) under Part 2 of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 ('the EIA Regulations') in terms of the requirement for an EIA.

In accordance with Regulation 6 of the EIA Regulations, this request for a screening opinion comprises the following information:

(a) 'a plan sufficient to identify the land (Appendix A)

(b) a description of the development, including in particular:

(i) a description of the physical characteristics of the development and, where relevant, demolition works (Section 1.3);

(ii) a description of the location of the development, with particular regard to the environmental sensitivity of geographical areas likely to be affected (Section 1.2).

(c) a description of the aspects of the environment likely to be significantly affected by the development;

(d) to the extent of the information available, a description of any likely significant effects of the Proposed Scheme on the environment resulting from:

(i) the expected residues and emissions and production of waste, where relevant; and

(ii) the use of natural resources, in particular soil, land, water and biodiversity; and

(e) such other information or representations as the person making the request may wish to provide or make, including any features of the Proposed Scheme or any measures envisaged to avoid or prevent what might otherwise have been significant adverse effects on the environment.'

Phillips 66 is a diversified energy manufacturing and logistics company. The company processes, transports, stores and markets fuels and products globally and operates 13 refineries. The Humber Refinery is one of the most complex refineries in the Phillips 66 portfolio and one of the most sophisticated in Europe.

Phillips 66 recognises the need to address climate change and environmental improvements and is committed to providing energy that is needed today to promote human progress and economic growth whilst also advancing environmental and climate change solutions. In the UK, Phillips 66 is pursuing projects, technologies and collaborations that aim to lower its Greenhouse Gas Emissions. In 2021 launched its Emerging Energy division, a multidisciplinary team to support this aim and it concentrates on four key areas: renewable fuels, batteries, carbon capture and hydrogen.

The LSG Project is just one of a number of projects being implemented at the Humber Refinery to lower its greenhouse gas emissions and increase the quantity of sustainable fuels it produces.

The draft planning application (red line) boundary for the Proposed Scheme is included in Appendix A.

2. Site Location and Description

2.1 Site Location

The plot location (the 'Site') for the Proposed Scheme is within the boundary of the Humber Refinery site centred at approximate National Grid Reference (NGR) TA 15721 16749 (see Appendix A). As the Site is within the Refinery is it bounded on all sides by existing infrastructure associated with the operational refinery. The Site and Humber Refinery falls under the authority area of NLC.

The consolidated temporary and permanent works boundary (the red line boundary) measures approximately 2.7ha. The permanent plant and equipment required for the project has a floor space of approximately 1,200m^2. The Site is currently occupied by decommissioned gas turbines which would require removal prior to the works commencing.

2.2 Description of the Development

Phillips 66 is intending to install additional plant and equipment to enable the removal of sulphur from the gasoline produced in the Fluidised Catalytic Cracker (FCC) Unit, thereby reducing the sulphur emissions at the point of use of the gasoline fuel. The project is referred to the Low Sulphur Gasoline (LSG) project.

The LSG project will require the installation of a new Selective Hydrogenation Unit (SHU) and Selective Hydrodesulphurisation (HDS) unit to desulphurise two of the naphtha streams produced in the existing FCC Unit. The new plant will remove sulphur from both the Mid Catalytic Naphtha (MCN) stream (980ppm wt sulphur) and the Heavy-Light Catalytic Naphtha (HLCN) stream (710ppm wt sulphur). This will then be used as a blending component with other low sulphur streams produced at the Refinery to produce a low sulphur gasoline product (10ppm wt sulphur), which will be sold in worldwide markets requiring 10 ppm wt sulphur content.

Currently the MCN stream produced in the FCC gasoline splitter is sent to either the Virgin Hydrodesulphurisation Unit (VHDS) or to the Heart-Cut Sweetening Unit. The VHDS is a non-selective HDS unit that removes sulphur, however because it is non-selective it also reduces the octane content, which results in a lower quality product stream. The Heart-Cut Sweetening Unit only converts mercaptans into other forms of sulphur which still remain in the product stream, and therefore results in the MCN stream only meeting high-sulphur gasoline product specifications.

The LSG project will enable the MCN stream to be rerouted to a new SHU for pre-treatment before entering the new HDS unit. Prior to entering the SHU the MCN will be mixed with hydrogen from the existing Humber Refinery reformer and be heated. The hot MCN and hydrogen mix will then flow to the SHU where catalytic reactions will occur to hydrogenate the diolefins to olefins and convert light mercaptans and light sulphides to heavier sulphur compounds. This pre-treatment helps to prevent fouling and poisoning of the catalyst and facilitate the sulphur removal process in the HDS reactor during the next process stage. In addition, it also isomerises the external olefins to internal olefins, which leads to an increase in the octane number in the final product.

On leaving the SHU, the MCN stream will be cooled and sent to the HDS unit, where it will be combined with the HLCN stream. The HLCN currently goes to the FCC Merox Unit which removes mercaptans by converting them to liquid hydrocarbon disulphides. These disulphides remain within the HLCN however and therefore the sulphur content in the product stream remains high, meaning that the HLCN is currently sent to the High Sulphur Gasoline Pool.

Rather than treatment in the Merox Unit, the LSG project will enable the HLCN to be combined with the pretreated MCN stream and sent to the new HDS unit where it will be subject to catalytic chemical processes which removes the sulphur so that a low sulphur product can be produced. The

combined content of the MCN and the HLCN that has passed through the new HDS unit to the Low Sulphur Gasoline Pool will have a sulphur content of 20 ppm wt.

An application for variation of the existing environmental permit to account for this new process will be submitted to the Environment Agency in May 2024. Figure 1 summarises the new process flow which will be covered by this variation and the required new plant proposed to be installed.

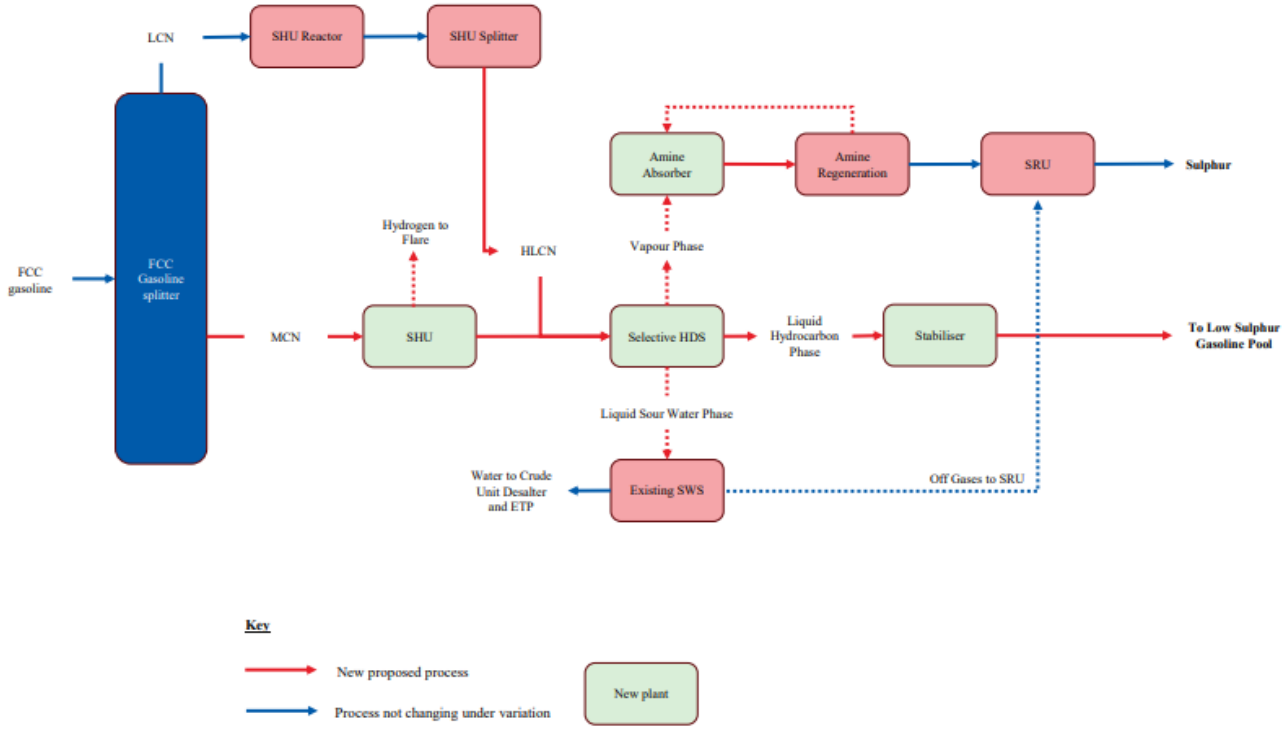

Figure 1 – Process flow diagram showing proposed process flow for the LSG project.

The LSG project requires a new heater as part of the HDS unit to heat the process stream from the HDS Main Reactor to the required inlet temperature for the HDS Finishing Reactor. The new heater will result in combustion emissions being released to air. It is intended that the emissions would be directed through either an existing stack on the Site, which is currently not in use, or through a new stack constructed as part of the project.

The preferred option is to reuse the existing emission point stack (A14) which is 50m high, however, should the existing stack be considered unsuitable for reuse, a new stack would need to be constructed. It is anticipated that this new stack, if required, would be similar dimensions to the existing stack A14.

Construction

2.2.1 Construction Plant and Vehicle

A range of construction plant would be required during the construction of the Proposed Scheme. This includes but is not limited to:

- Excavator;
- Dumper truck(s); and
- Forklifts.

The average total daily Heavy Goods Vehicle (HGV) movements (arrivals and departures) to and from the Site is not anticipated to exceed 30 trips. Given the nature of the works being located within a fairly small area, it is likely that construction vehicle movements would peak around phases of concrete pours and the delivery of the equipment to the site.

The number of Light Duty Vehicle (LDV) trips is not known at this stage of the design. However, the workforce required to deliver the works is currently estimated to be an average of 100-120 personnel on site per day.

2.2.2 Construction Access

Construction access to the Site would be gained via the existing entrance into the Refinery on Eastfield Road, opposite Staple Road. The existing road network within the Refinery would then be used to access the Site directly.

At this stage it is assumed that 100-120 construction staff would be required per day to facilitate the construction of the Proposed Scheme. Parking facilities will be provided within the Humber Refinery site.

2.2.3 Operation

During operation the LSG plant and equipment would be inspected and maintained by the Applicant throughout its lifecycle.

2.3 Environmental Management Systems

The Humber Refinery operates in accordance with the Environmental Permitting (England & Wales) Regulations 2016, and under an Environmental Permit (Ref: EPR/UP3230LR/V014). In addition, the refinery is also an upper tier COMAH site as such the health, safety and environmental risks at the site are carefully managed at all times.

Construction and operational impacts would be managed through the Applicant's own overarching Environmental Management Systems (EMS) which has been designed to comply with the ISO14001:2015[1]. The EMS include requirements for ongoing monitoring of operations at the Humber Refinery site, regular maintenance works and inspection routines to ensure that all plant and processes at the site operate in accordance with the thresholds set under the refineries Best Available Techniques (BAT). Where any operations are shown to be at risk of breaching operational thresholds the EMS ensure that corrective measures are implemented to prevent any adverse impact to environmental, ecological and human receptors.

The Applicant's EMS would be further supported by additional plans and documents including the Humber Refinery COMAH Safety Report, emergency response plans and site waste management plans.

[1] British Standards Institution (2015). Environmental Management Systems – Requirements with guidance for use (BS EN ISO 14001:2015).

3. EIA Regulations

The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (the 'EIA Regulations') require that, before consent is granted for certain 'EIA development' an EIA must be undertaken. The EIA Regulations define what constitutes 'EIA development':

"EIA development" means development which is either –

(a) Schedule 1 development; or

(b) Schedule 2 development likely to have significant effects on the environment by virtue of factors such as its nature, size or location…".

The Proposed Scheme is not considered to fall within Schedule 1 of the Regulations.

An assessment of the requirement for an EIA, pursuant to Schedule 2, requires consideration of whether the development is likely to have 'significant effects on the environment'. Schedule 2 development is defined in the EIA Regulations as meaning:

'Development other than exempt development, or a description mentioned in Column 1 of the table in Schedule 2 where –

(a) any part of that development is to be carried out in a sensitive area;

(b) any applicable threshold or criterion in the corresponding part of the column 2 of that table is respectively exceeded or met in relation to that development.'

For the purposes of defining whether the development falls within Schedule 2, the Regulations define sensitive areas as including;

(a) 'Sites of Special Scientific Interest (SSSI);

(b) National Parks;

(c) the Broads;

(d) properties appearing on the World Heritage List;

(e) Scheduled monuments;

(f) Areas of Outstanding Natural Beauty (AONB); and

(g) European sites for conservation.'

The Proposed Scheme is not located within a sensitive area as defined within the EIA Regulations.

The Proposed Scheme does, however, meet the type of development listed in Schedule 2, Part 13 (a) of the EIA Regulations, namely '*any change to or extension of development of a description listed in Schedule 1(other than a change or extension falling within paragraph 24 of that Schedule) where that development is already authorised, executed or in the process of being executed'.*

Under Schedule 1, the Proposed Scheme is considered to be a change or extension of '*Crude Oil Refineries (excluding undertakings manufacturing only lubricants from crude-oil) and installations for the gasification and liquefaction of 500 tonnes or more of coal or bituminous shale per day.'*

Schedule 2, Part 13(ii) sets out thresholds for types of development where EIA is more likely to be required. It states that '*in relation to development of a description mentioned in a paragraph in Schedule 1…, the thresholds and criteria in column 2 of the paragraph of this table indicated below*

applied to the change or extension are met or exceeded'. Under these thresholds, EIA is considered more likely to be required if the area if new floorspace exceeds 1,000 square meters.

The indicative development footprint for the Proposed Scheme is 1,200 square meters.

As the Proposed Scheme constitutes a Schedule 2 development, an assessment of whether the development is likely to have significant effects on the environment by virtue of its scale, nature or location has been completed. The purpose of this report is to provide NLC with the relevant information to determine whether the Proposed Scheme constitutes EIA development.

4. Aspects of the Environment with the Potential to be Significantly Affected by the Development

4.1 Environmental Considerations

The following sections consider the Proposed Scheme in the context of those elements of the environment which could potentially be affected by the associated works. The outcomes of the initial assessment of the likely significant effects are summarised to provide NLC with the relevant information to determine whether the Proposed Scheme constitutes EIA development.

4.2 Ecology and Biodiversity

Environmental Baseline

Statutory Designated Sites

There are three designated sites within 10km of the Proposed Scheme including:

- the Humber Estuary Site of Special Scientific Interest (SSSI), Special Protection Area (SPA) and Special Area of Conservation (SAC) (2.3km east);
- North Killingholme Haven Pits SSSI (3km north-east); and
- Kirmington Pits SSSI (7.4km south-west).

There are no National Nature Reserves within 10km of the Proposed Scheme. The closest National Nature reserve (NNR) is Far Ings located 15km north-west. Based on the distance of these sites from the Proposed Scheme, there is not considered to be any risk of impacts.

Non Statutory Designated Sites

There are six Local Wildlife Sites (LWS) within 5km of the Proposed Scheme:

- Eastfield Road Railway Embankment (approximately 400m north-west)
- Burkinshaws Covert (approximately 1.1km north)
- Rosper Road Pools (approximately 1.3km east)
- Chase Hill Wood (approximately 2.1km north)
- Mayflower Wood Meadow (approximately 950m south)
- Homestead Park Pond (approximately 2.3km south-east)

There is one Local Nature Reserves (LNR) within 10km of the Proposed Scheme. Paull Holme Strays Nature Reserve is located approximately 7.5km to the north of the refinery, on the opposite bank of the Humber Estuary.

Habitats

The Site for the Proposed Scheme comprise an area entirely covered by hardstanding within the centre of the existing Humber Refinery.

Protected/Notable Species

As the Site is within the centre of an existing operational refinery site within areas of hardstanding there are not anticipated to be any protected/notable species located within the boundary of the Proposed Scheme.

4.2.1 Potential Impacts, Effects and Mitigation Measures

Construction

Although the Proposed Scheme is located within 10km of three designated sites and within 2km of six non-statutory designated sites, there are no impact pathways likely between these sites and the Proposed Scheme's construction, as such it is unlikely that there would be any significant effects on the designated sites or their associated qualifying features during construction.

Due to the absence of any suitable habitats within the Site or surrounding refinery, there are not anticipated to be any impacts to habitats or protected/notable species as a result of construction. As such there are not considered to be any significant effects on ecology or biodiversity as a result of construction.

Operation

Given the absence of protected/notable species and habitats on the Site, once operational there are not anticipated to be any adverse impacts to ecology and biodiversity on the site. The Proposed Scheme is not anticipated to result in significant changes to existing emissions (see Section 4.8) or operations (see Section 4.9) within the wider Humber Refinery as such there is not anticipated to be any adverse effects generated on the habitats or protected/notable species surrounding the Humber Refinery site.

As the Site is currently covered with sealed hardstanding there is a negligible baseline biodiversity value. As such, the development would meet the conditions of the de minimis exemption whereby the development would not need to achieve the mandatory 10% biodiversity net gain requirement set out under Schedule 7A of the Town and Country Planning Act 1990[2].

4.3 Cultural Heritage

Environmental Baseline

A 1km Study Area buffer was established around the Proposed Scheme to assess the known historic environment baseline within the surrounding area.

There are two Grade II listed buildings within 1km of the Proposed Scheme:

- Baptist Chapel, Grade II, 1km south-west
- The Nook, Grade II, 600m south-west

There are no Scheduled Monuments, world heritage sites, registered battlefields or registered parks and gardens within 1km of the Proposed Scheme.

The Heritage Gateway website identifies 139 non-designated assets within 1km of the Proposed Scheme, none of which intersect with the red line boundary of the Site area.

[2] Department for Levelling Up, Housing and Communities, 2024. Biodiversity Net Gain Guidance. Available at: https://www.gov.uk/guidance/biodiversity-net-gain [last accessed 22/03/4]

4.3.1 Potential Impacts, Effects and Mitigation Measures

Construction

As the Proposed Scheme would be located within an area of existing hardstanding within the Humber Refinery site, it is likely that any buried archaeological remains would have already been subject to disturbance during the original development of the Humber Refinery. As such it is not anticipated that any buried archaeological remains would be at risk of disturbance as a result of the Proposed Scheme.

In addition, based on the located of the Proposed Scheme within a refinery and the distance of the development from known heritage assets, it is not anticipated that there would be any risk of impacts on heritage assets as a result of the construction of the Proposed Scheme.

Operation

During operation, the new plant and equipment associated with the LSG project would be entirely contained within the wider Humber Refinery site. Although there would be a minor change to the view of the refinery linked to the presence of additional tanks/infrastructure this is unlikely to be a significant change in the context of the wider refinery. As such there is unlikely to be an impact on surrounding heritage assets or their settings during the operation of the LSG project.

4.4 Landscape, Townscape and Visual Appraisal

4.4.1 Environmental Baseline

Landscape and Townscape

The Proposed Scheme lies in National Character Area (NCA) 41: Humber Estuary. The Humber Estuary NCA is characterised by expansive, flat, low-lying estuarine landscapes dominated by the open water of the Humber Estuary. The area is predominantly formed from reclaimed, formerly intertidal landscape with high quality soils providing an area of productive agriculture. The quieter rural areas are a direct contrast to the urban and industrial influences around Hull and Immingham and with the estuary itself forming an important shipping and trading route.

The Landscape Character Type (LCT) 39: Humber Estuary – Industrial Landscape, occupies the very eastern edge of North Lincolnshire and is contained by the county's administrative boundaries to the south and east. The area extends from Halton Marshes in the north to South Killingholme, North Killingholme and East Halton in the west.

The key features, characteristics and land use of this LCT include:

- Low-lying flat topography;
- Heavily industrialised;
- Pockets of farmland, woodland and naturalised coastal habitats;
- Expansion of hard-surfaced vehicle storage areas;
- Disaggregated settlement pattern;
- Major transport corridors for the distribution of freight, including the Ulceby to Immingham railway and the A160 bisect the area to the south; and
- Lighthouses and engineered coastal defences are prominent along the coastline.

Visual Amenity

The visual receptors identified include community, recreational and transport receptors. The key receptors are:

- Industrial and commercial properties located adjacent to the Humber Refinery in the north, south and east;
- Recreational users of Mayflower Wood to the south of the Humber Refinery; and
- Residential receptors located in South Killingholme to the west and south-west of the Humber Refinery.

As the landscape is fairly flat, the larger pieces of infrastructure at the Refinery can be visible from single viewpoints. Vegetation is present along highways and the Refinery boundaries which provides some screening for receptors at the closest proximity to the site.

4.4.2 Potential Impacts, Effects and Mitigation Measures

Construction

During construction there will be an increased presence of construction plant and machinery and construction staff and vehicles and the temporary installation of construction compounds and material storage areas. Given the nature of the site as an operational refinery, it is unlikely that there would be any impact on the overall setting of the Humber Refinery site. As the works would be entirely contained within the main refinery there are limited visual receptors who would be impacted by the works. The residential properties and businesses located to the west are separated from the Proposed Scheme by an agricultural field and hedges, office building and associated car park and additional existing infrastructure associated with the wider refinery. As such it is not considered that the construction works would significantly impact on the visual amenity or overall landscape setting for receptors surrounding the refinery.

Operation

Once in operation, the new plant and equipment associated with the LSG project would be unlikely to be noticeable when viewed from neighbouring visual receptors due to the addition of new equipment which is relatively small in the context of the industrial setting associated with the existing refinery site.

Should a new stack be required, this is likely to be visible to neighbouring visual receptors due to the addition of a new relatively tall structure within the refinery. However, even in this scenario, the change is anticipated to be negligible when considered in the context of the existing refinery infrastructure.

It is therefore unlikely that there would be a significant change to the overall landscape setting or visual amenity. As such the Proposed Scheme is not considered to result in any significant adverse effects on the landscape setting or visual amenity.

4.5 Water Environment and Flood Risk

4.5.1 Environmental Baseline

Water Quality and Resources

The Humber Refinery site has an existing internal drainage system which manages all surface water runoff from the site and is designed to deal with any pollutants from oils and fuels which may be present in surface water due to the nature of the site in the processing and storing of fuels. The

system has incorporated appropriate spill detection equipment where required around tanks, bunded compartments around the tanks and isolation valves for the drainage network to contain leaks. Oil/Water separators and appropriate treatment facilities are in place to manage any minor traces of pollutants that may arise. The drainage system discharge is also controlled under licence from the Environment Agency.

The internal drainage system at the refinery discharges into the South Killingholme Drain from the eastern boundary of the refinery prior to it passing beneath the railway. South Killingholme Drain runs from the west, around the southern boundary of the Humber Refinery, beneath the railway and eventually discharging into the Humber Estuary. The drain is largely an open channel with the exception of the section beneath the railway which is culverted. The section of the drain between the railway and the Humber Estuary is under the control of the North East Lindsey Internal Drainage Board (IDB)[3].

The Proposed Scheme falls within the footprint of the North Beck Drain Water Environment Regulations (WER) Waterbody (GB104029067575) and overlies the 'North Lincolnshire Chalk Unit' groundwater body. North Beck drain is located approximately 4.5km south-east of the Proposed Scheme, as such no impacts are anticipated to impact this waterbody. There are also no significant below ground workings associated with the Proposed Scheme therefore it is unlikely that the works would generate any impacts on the North Lincolnshire Chalk Unit groundwater body.

There are a number of land drainage ditches which surround the Humber Refinery site and run across the agricultural fields. The closest drainage ditches to the Proposed Scheme are present along Eastfield Road, approximately 150m from the Site.

The refinery drainage system was designed to accommodate flows in excess of its current capacity to enable it to appropriately manage future flows associated with further development at the site.

Flood Risk

The banks of the Humber Estuary are protected by flood defences. According to the Environment Agency Flood Risk Information, in the absence of the flood defences the Proposed Scheme would be located in Flood Zone 1, an area described as having a low probability of flooding (1 in 1,000 or less annual probability of flooding).

4.5.2 Potential Impacts, Effects and Mitigation Measures

Construction

During construction, it is anticipated that excavation and piling may be required to install the new equipment which has the potential to introduce a contamination pathway to groundwater. Best practice construction methods including but not limited to the safe storage of materials and waste during works, refuelling activities to be undertaken away from excavations and equipment to contain and clean up spillages to be made readily available at all times.

In addition, the presence of the existing drainage system on site would further ensure that any spillages and leaks which occur during construction are captured to prevent their accidental release to groundwater or surface water.

Based on the location of the Proposed Scheme, the presence of the existing drainage system and the implementation of best practice construction methods, it is not anticipated that there would be any impacts to surface watercourses or groundwater as a result of construction.

[3] Find Your Drainage Board. Accessible from: Witham & Humber Drainage Boards (witham3idb.gov.uk) [last accessed 30.03.24].

Operation

As the Site is already covered in hardstanding, it is unlikely that the development would result in any additional increases in surface water runoff.

Based on the presence of the existing drainage system, any accidental spills of fuels/oils from the LSG project would be captured and prevented from entering any surface waterbodies. The Site would be reinstated with hardstanding following completion of any groundworks, removing any potential infiltration pathways which could link the Proposed Scheme to groundwater.

As such it is not anticipated that there would be any impacts on surface water or groundwater bodies during the operation of the Proposed Scheme.

4.6 Climate Change and Greenhouse Gas Emissions

4.6.1 Environmental Baseline

The primary climate change risks relating to the Proposed Scheme itself are increased sea levels and the subsequent risk from flooding and increased air temperatures which pose a risk to cooling processes and the overall operation of the wider refinery.

A review of the UK Local Authority's CO_2 emissions was undertaken which provided an overview of NLC's carbon emissions. It was identified that North Lincolnshire accounted for 45.2 tonnes of CO_2e per capita in 2021. The largest proportion of the CO_2 emissions was derived from industry (6,084.6ktCO_2e) and more specifically large industrial installations (5,677.2ktCO_2e). Between 2005 and 2021, North Lincolnshire has decreased its overall carbon emissions by 66%.

4.6.2 Potential Impacts, Effects and Mitigation Measures

Construction

Given the short-term and temporary nature of construction activities, risks associated with climate change are negligible. Therefore, beyond the management measures identified elsewhere within this EIA Screening Report, no further climate change resilience and adaptation measures are necessary.

Construction materials used in the Proposed Scheme would have associated embodied carbon. The Proposed Scheme includes the installation of new process plant and equipment which would include use of steel and concrete. The Applicant is committed to reducing carbon, and has developed a decarbonisation strategy in support of the Paris Agreement

The construction of the Proposed Scheme would also result in temporary additional LGVs, HGVs and plant visiting the Site, generating greenhouse gas (GHG) emissions. However, it is anticipated that any additional emissions would be temporary in nature during specific activities.

Whilst construction of the Proposed Scheme would generate GHG emissions, measures would be adopted to minimise these as far as practicable. It is not considered likely that the Proposed Scheme would result in significant effects upon GHG emissions or associated climate change, in the context of wider regional and national targets

Operation

During operation, the LSG project would require additional steam and power. To minimise the emissions which would be produced by the Proposed Scheme, the design is exploring opportunities to maximise efficiency in operation in accordance with the Refineries Best Available Techniques (BAT).

To maximise the efficiency of the Proposed Scheme, opportunities to integrate it within existing electrical, steam and water circuits present at the Humber Refinery are being explored as part of the

detailed design stage of the project. However, specific energy efficient measures have already been built into the design. This includes but is not limited to:

- The plant components will be sized appropriately for the design capacity of the plant, so that each element is operating optimally and efficiently;
- Use of high efficiency motors and drives to minimise electricity load;
- Effective insulation of hot surfaces; and,
- Regular planned maintenance in order to maximise the efficiency of the equipment and plant, with performance monitoring with audits to optimise the maintenance schedule.

Adoption of such techniques would ensure that the emissions and subsequent impact on the climate would be minimised as far as practicable during the operational lifecycle of the Proposed Scheme.

In addition, currently the gasoline produced at the Refinery has a high sulphur content and as such is typically used to supply markets where there are limited environmental controls on the sulphur content in fuels. Reducing the sulphur content of the gasoline produced at the Humber Refinery through the use of the LSG project is expected to lead to a reduction, on average, of 1,050 tonnes of sulphur dioxide emissions from the combustion of the gasoline at the point of use. The reduction in sulphur content of the gasoline would enable the Applicant to supply markets where more stringent environmental controls are in place, such as the UK, which will not only reduce emissions from the fuel at the point of use, but will also reduce the emissions from transporting fuels, reducing the carbon footprint of the Refinery operations.

Overall, it is anticipated that the Proposed Scheme would support the Applicant's overall decarbonisation strategy. Through adoption of BAT in the design and the reduction in sulphur content of the gasoline which would be produced as a result of the LSG project it is considered that the Proposed Scheme would have a beneficial impact. As such, there is not considered to be any significant adverse impacts in relation to climate change or greenhouse gas emissions.

4.7 Geology and Soils

4.7.1 Environmental Baseline

Hydrogeology

The Proposed Scheme is located within:

- Principal Aquifer (bedrock); and
- A medium groundwater vulnerability zone.

Geology

There are no sites designated for their geological importance within the Proposed Scheme boundary.

The British Geological Survey (BGS) outlines that the geology underlying the Humber Refinery includes Devensian Till which overlies the Burnham Chalk Formation.

Contaminated Land

The current land use of the site is as an oil refinery is a potentially contaminative land use as there are tanks and pipelines on the site. The site is also designated under Notification of Installations Handling Hazardous Substances (NIHHS) and Control of Major Accident Hazards Sites (COMAH).

There is one historical landfill site noted on the Humber Refinery site (Ref: EAHLD34415) which was closed in October 2003. The landfill site was operated by ConocoPhillips. There is also one historical landfill site located immediately to the west of the site (Ref: EAHLD01576). This site was operated by JW Stanley between 1975 and 1988 and is noted as having accepted inert, industrial, commercial, household, special and liquid sludge waste streams.

4.7.2 Potential Impacts, Effects and Mitigation Measures

Construction

During construction, piling and excavation works have the potential to introduce new pathways by which upward and downward migration of contaminants could enter the ground and groundwater. The detailed design and construction methodology is still in development however, the foundation design and materials specification would be informed by risk assessment and ground conditions to minimise the risk of potential contamination.

Any import or export of material from the Proposed Scheme would be in compliance with best practice guidance, local waste policies and waste licenses to ensure compliance with Definition of Waste: Code of Practice (DoW:CoP) and Contaminated Land: Applications in Real Environments (CL:AIRE).

The contractor would also produce a method statement for the proposed construction works, outlining any required mitigation measures to prevent contamination. These measures would include but are not limited to the following:

- Storage of fuels in bunded areas, with an impermeable base, in accordance with the Applicant's EMS, thereby limiting the potential for migration of contaminants into groundwater following leaks/ spillages; and
- Potentially contaminated ground encountered during construction works would be investigated and assessed as to whether there is a need for containment or disposal of material and whether any additional health and safety measures are required.

In support of the planning application for the Proposed Scheme, a Phase 1 ground conditions report would be prepared to inform the final design of the LSG project in relation to potential contaminated ground. This report would also inform any required mitigation measures to be implemented during the construction phase.

Based upon the application of construction mitigation measures, risks would be managed appropriately and in accordance with best practice and there is not considered to be potential for significant effects on ground conditions.

Operation

Once in operation, the Proposed Scheme would be situated on hardstanding removing potential pathways to the geology/soils underlying the site. The Site would also be connected into the existing drainage system for the Humber Refinery site which would capture any potential spills or leaks from the LSG plant. This would prevent any impacts on geology or soils underlying the site. As such there are not anticipated to be any significant adverse effects on geology or soils as a result of the operation of the Proposed Scheme.

4.8 Air Quality and Dust

4.8.1 Environmental Baseline

The Proposed Scheme is not located within an Air Quality Management Area (AQMA). The nearest AQMA is located in Scunthorpe approximately 22km south-west of the Proposed Scheme.

The Proposed Scheme is set in an industrial setting, so the baseline air quality is likely to be relatively high. The wider Humber Refinery is surrounded by a mixture of agricultural and industrial land uses but as the Proposed Scheme is located within the refinery, there are limited sensitive receptors present within 500m.

The nearest sensitive receptors include:

- Residential receptors in South Killingholme, 500m west and 800m south-west;
- Ecological receptors and recreational users of Mayflower Wood, 850m south; and
- Ecological receptors associated with areas of woodland, embankments and agricultural land 400-500m north, west and south.

As stated previously, the LSG project requires a new heater as part of the hydrodesulphurisation unit to heat the process stream from the HDS Main Reactor to the required inlet temperature for the HDS Finishing Reactor. The new heater would result in combustion emissions being released to air and it is intended that the emissions would be directed through either the existing A14 stack, which is currently not in use, or through a new stack constructed as part of the project.

The existing stack had previously taken combustion emissions from four Gas Turbines (GTs), however all the GTs have now been decommissioned (November 2022) and will be removed prior to commencement of construction of the LSG plant. Two of the GTs continued to operate up until 2020 and remain within the existing Environmental Permit. These GTs had a thermal input of 42MWth, however the new heater only has a thermal input of 5MWth, and therefore results in much lower mass emissions than the previous GTs and consequently will have lower impacts.

An air quality screening assessment has been undertaken for the Site to understand the impact the LSG project would have on air quality. The results of this assessment have fed into the assessment of operational impacts.

4.8.2 Potential Impacts, Effects and Mitigation Measures

Construction

During construction it is anticipated that HGVs, LDVs and machinery would be accessing the Humber Refinery site. This would likely result in a temporary short term increase in traffic flows and associated emissions.

As detailed in Section 2.3, HGV movements are anticipated to peak at 30 trips per day (inclusive of return journeys) over the duration of the construction phase. In the context of the A160 and A180 the volume of construction traffic associated with the Proposed Scheme would be small.

Best practice construction measures to minimise any adverse air quality impacts would be adopted during construction including measures for the management of dust and vehicle emissions. Such measures would be implemented through the Applicant's and contractors EMS. With proportionate management measures in place, it is not anticipated that the Proposed Scheme would give rise to significant impacts on air quality effects during construction.

Operation

Once in operation the heater associated with the LSG project would need to meet the relevant Best Available Techniques – Achievable Emissions Levels (BAT-AELs) for oxides of nitrogen, carbon monoxide, sulphur dioxide and dust. The BAT-AELs are aimed at minimising emissions and subsequent impacts on the environment. The applicable BAT-AELs are taken from the BAT Reference Document for Refineries and are summarised in Table 1. Based on the current design, the BAT-AELs should be achievable. In accordance with the Applicant's own EMS, regular checks and

assessments on the operational emissions would be undertaken once the LSG project is operational. This would ensure that the Proposed Scheme would continue to meet the thresholds stipulated by the BAT-AELs throughout its operation.

Table 1 – Applicable BAT-AELs

Pollutant	BAT-AEL	Source[4]
Oxides of nitrogen (NOx)	30 - 100mg/Nm^3	New unit gas-fired combustion unit (BATc Table 10)
Carbon Monoxide (CO)	<100mg/Nm^3	Combustion units (BATc Table 15)
Sulphur Dioxide (SO_2)	5 – 35mg/Nm^3	New multi-fuel fired combustion plant (BATc Table 13)
Dust	NA	No limit for refinery off-gas in the BATc.

The Environment Agency H1screening assessment has been used to assess the predicted impacts from the operational emissions as part of the required environmental permit variation. As part of the H1 assessment, predicted process contributions are compared to National Air Quality Standard objectives, Critical Levels or Environment Agency derived Environmental Assessment Levels, where these are not available. Where the process contributions are less than 1% of the long-term environmental standard or less than 10% of the short-term environmental standard the predicted emissions contributions can be considered 'insignificant'.

The intention is that the heater required for the LSG project would use existing Emission Point A14. The predicted emissions of nitrogen dioxide, carbon monoxide and sulphur dioxide from this stack were shown to be insignificant against the long and short term environmental standards at human health receptors. In addition, the impacts at ecological receptors, for oxides of nitrogen and sulphur dioxide, including depositional impacts and acid depositional impacts, were also shown to be insignificant. Based on the results of the H1 screening assessment, air quality impacts are not anticipated to generate significant adverse impacts on air quality or ecological receptors.

If it is not possible to reuse the existing stack, then it is intended that new stack would have similar dimensions to the existing A14 stack. It is therefore considered that, unless the stack height differs from the 50m used in the current H1 assessment, the impacts from the new stack would be the same as those assessed for the existing A14 stack.

A full air quality screening assessment will be completed in support of the planning application however, based on the results of the H1 screening assessment and the application of BAT-AELs within the design, it is not anticipated that significant adverse impacts would be generated on air quality.

4.9 Noise and Vibration

4.9.1 Environmental Baseline

The Humber Refinery is situated in a heavily industrialised area. The nearest residential settlements are the villages of South Killingholme (approximately 0.5 km west of the Humber Refinery) and North Killingholme (approximately 0.75 km north-west of the Humber Refinery and approximately 0.45 km west of Lindsey Oil Refinery).

In relation to the Proposed Scheme, the nearest sensitive receptors that have the potential to be impacted by the LSG project include:

[4] European Commission Joint Research Centre, 2015. Best Available Techniques (BAT) Reference Document for the Refining of Mineral Oil and Gas. Available at: https://eippcb.jrc.ec.europa.eu/sites/default/files/2019-11/REF_BREF_2015.pdf [last accessed: 03.04.24].

- Residential receptors in South Killingholme, 500m west and 800m south-west;
- Ecological receptors and recreational users of Mayflower Wood, 850m south; and
- Ecological receptors associated with areas of woodland, embankments and agricultural land 400-500m north, west and south.

Due to the industrial setting of the area baseline noise levels are anticipated to be relatively high. There are no Noise Important Areas (NIA) within South Killingholme. The nearest NIA is located in Cleethorpes approximately 16km south-east from the Proposed Scheme.

A noise impact assessment has been completed for the permit variation application required for the Proposed Scheme. The results of this assessment have been used to inform the conclusions of this screening.

4.9.2 Potential Impacts, Effects and Mitigation Measures

Construction

During construction, the primary source of noise and vibration nuisance would be associated with proposed piling work and plant machinery movements at the site. At this stage of the project, it is assumed that construction works would be limited to core working hours (07:30 to 16:30 Monday to Friday). It is estimated that the duration of the works would be approximately two years.

As the Humber Refinery site has been in operation for several years the noise levels associated with the refinery operations are considered part of the local noise environment. As such, baseline noise levels are already fairly high. The noise impact assessment indicated that the activities which are most noticeable to neighbouring residential receptors are those associated with maintenance activities however the Applicant has a stringent noise management system in place which includes computer based noise modelling and noise monitoring which enables appropriate measures to be implemented to reduce noise levels.

It is likely that the construction works would generate some adverse noise impacts given the nature of the work required and the duration over which the construction would be taking place. However, during the construction phase best practicable means (BPM) would be implemented to reduce the noise impacts as far as reasonably practicable. Such measures would include:

- Providing advance notice to surrounding landowners and receptors prior to works commencing;
- Switching off machinery and equipment when not in use;
- Avoidance of noisy activities outside of core working hours;
- Screening of construction works; and
- Selection of low noise machinery and construction methods.

Although the works would be taking place over two years it is unlikely that the highest noise and vibration generating activities (i.e., disassembly of equipment, excavation works and piling) would be taking place continuously over this entire period. As such the noticeable noise levels are anticipated to be temporary in nature.

Based on the existing noise levels associated with standard operations at the refinery, implementation of BPM and the Applicant's own noise management system and the temporary nature of construction activities it is not anticipated that significant adverse impacts would be generated as a result of the construction for the Proposed Scheme.

Operation

Based on the results of the initial noise impact assessment, the Proposed Scheme would result in a minor effect on nearby noise sensitive receptors. When considered in the context of the existing baseline noise levels this is not anticipated to be a significant change.

As the design progresses, opportunities to embed Best Available Techniques (BAT) to reduce operational noise further would be considered. Such measures include but are not limited to:

- Operational measures (e.g., avoidance of noisy activities at night, regular maintenance and inspection of equipment);
- Noise attenuation features (e.g., bunds, screening or enclosing of noisy equipment); and
- Noise control equipment (e.g., sound proofing panels, silencers and anti-vibration supports)

As mentioned previously, the Applicant already has a stringent noise management system in place which includes regular noise monitoring, a computer based acoustics model and a noise complaints procedure.

Based on the application of the BAT measures detailed above alongside incorporation of the LSG project within the existing noise management system, it is not anticipated that the Proposed Scheme would result in significant adverse noise impacts. A full noise impact assessment would be completed in support of the planning application for the Proposed Scheme.

4.10 Population and Human Health

4.10.1 Environmental Baseline

Population

60.2% of the North Lincolnshire population (aged 16-64) are economically active (as of September 2023) which is higher than the county average but lower than the national average[5]. The gross weekly pay for full-time workers is £653.80 which is higher than the county average but lower than the national average. The three largest employment sectors are manufacturing (26% of the workforce), wholesale and retail trade (15.1 %) and Human Health and Social Work activities (11%).

Health

Health profiles produced by Public Health England (PHE) provide baseline data on the health of people within the local area, compared with average values for all areas of England[6]. Table 2 below shows the average life expectancy for people living within the North Lincolnshire district (which the Humber Refinery is within) compared with the regional and national average. In North Lincolnshire, life expectancy for males is slightly below life expectancy for the national average but slightly above that of the Yorkshire and the Humber region. Female life expectancy is in line with the regional average but slightly below the national average.

Table 2 – Summary of life expectancy

Location	Female Average (years)	Male Average (years)
North Lincolnshire	82.4	79.0

[5] Labour Market Profile – North Lincolnshire (2023). Available at: Labour Market Profile - Nomis - Official Census and Labour Market Statistics (nomisweb.co.uk) [last accessed 22.03.24]

[6] Public Health England, 2020. North Lincolnshire: Local Health Profile 2019. Available at: https://fingertips.phe.org.uk/static-reports/health-profiles/2019/E06000013.html?area-name=North%20Lincolnshire [last accessed 22.03.24]

Yorkshire and the Humber	82.4	78.7
England	83.2	79.6

The health outcomes for people, when compared against the England average, show that the North Lincolnshire District is above the national average for deaths related to cancer and cardiovascular disease. Smoking rates are also higher than the national average with 37% more people smoking in the District compared to the whole of England.

Public Rights of Way (PRoW) provide opportunities for people to exercise and experience nature, which are known to improve health outcomes. Within North Lincolnshire there are a number of footpaths which cross the county including one which runs alongside the Humber Estuary and several within South Killingholme. There is also Mayflower Woods which provides public access to greenspace.

4.10.2 Potential Impacts, Effects and Mitigation Measures

Construction

It is unlikely that the construction of the Proposed Scheme would introduce a significant number of jobs to the local area. Where possible the contractor would look to use locally sourced materials and construction workers.

There is not anticipated to be any disruption of community facilities or PRoW as a result of the construction of the Proposed Scheme given that all facilities are located outside of the proposed working areas and the Proposed Scheme is located within the Humber Refinery site which is not accessible to the public.

Regular stakeholder consultation events are held with the Killingholme Area Advisory Group (KAAG) during which the Applicant would inform residents of South Killingholme of any planned development or construction works proposed at the Humber Refinery site. As detailed in Section 4.8 and 4.9, based on the distance of human receptors from the Proposed Scheme and the implementation of best practice construction methodologies, it is unlikely that there would be any significant nuisance created for receptors as a result of the construction phase.

Given the temporary, short-term nature of the construction phase and the implementation of construction mitigation measures to reduce the risk of impact on the local population, no significant adverse effects on human health or the local population are anticipated during construction.

Operation

Once in operation it is unlikely that the LSG project would generate any permanent additional jobs for the local area however, the Humber Refinery already employs a large number of local residents so it is not anticipated that the project would generate an adverse impact on the local economy.

The LSG project would generate additional emissions, noise and vibration which have the potential to adversely impact on the health and wellbeing of local human receptors. However, as detailed in Sections 4.8 and 4.9, the operational impacts are not considered to generate significant changes on the existing emissions or operational noise and vibration levels associated with the Humber Refinery. In addition, the application of the Applicant's own EMS throughout the lifecycle of the LSG project would ensure that emissions and nuisance levels are monitored, and corrective actions implemented where required. This would ensure there are no adverse changes to emissions or nuisance levels throughout the operational lifecycle of the Proposed Scheme.

Based on the distance of the local human receptors to the Proposed Scheme, the design of the LSG project in accordance with BAT-AELs and the application of mitigation measures as part of the

Applicant's EMS it is not anticipated that the Proposed Scheme would generate any adverse impacts on the local population or human health during its operation.

4.11 Major Accidents and Disasters

4.11.1 Environmental Baseline

Major Accidents and Disasters considers the potential for the presence of the Proposed Scheme to increase the risk of major accidents or disasters occurring within the area. Existing sources of risk assessment are typically taken as informing the baseline of any major accident and disaster assessment. The National Risk Register (NRR) and the Health & Safety (HSE) Control of Major Accident Hazards (COMAH) site registers7 have been used to inform this baseline.

The Humber Refinery is an upper tier COMAH registered site. As such the site has a Safety Report which includes consideration of all the foreseeable accidents and disasters which could occur at the site.

The HSE COMAH site register also confirms that there are a further 11 COMAH sites within 3 miles of the Humber Refinery as summarised in Table 3.

Table 3 – Summary of COMAH sites within 3 miles of the Proposed Scheme

Site Name /Operator	Activities	Location	Distance from Humber Refinery
Humber Refinery – Phillips 66	Petrochemical/oil refineries	Immingham, DN40 3DW	Onsite
Prax Lindsey Oil refinery Limited	Petrochemical/oil refineries	Immingham, DN40 3LW	200m north
Rosper Road VPI Immingham LLP	Power generation, supply and distribution	Immingham, DN40 2DZ	200m east
Humber LPG Terminal – Phillips 66	Fuel storage/distribution	South Killingholme, DN40 3EA	500m east
Killingholme PSD – Exolum Pipeline System Limited	Fuel storage/distribution	Grimsby, DN40 3ED	1.6km north-east
Shed 2/3 Immingham Dock – Associated British Ports	Production and/or storage of fertilisers	Immingham, DN40 2NU	1.9km south-east
Immingham Pipeline Centre and Propylene Storage - Phillips 66	Fuel storage/distribution	Immingham, DN40 2PB	2.2km south-east
Immingham West Terminal - Exolum Immingham Limited	Chemical installations Fuel storage/distribution	Immingham, DN40 2NT	2.9km south-east
Associated British Ports	Production and/or storage of fertilisers	Immingham, DN40 2QW	3.0km south-east
Immingham East terminal - Exolum Immingham Limited	Chemical installations Fuel storage/distribution	Immingham, DN40 2QW	3.0km south-east
Immingham Docks - Associated British Ports	Production and/or storage of fertilisers	Immingham, DN40 2NU	3.2km south-east

[7] HSE, List of Sites under COMAH 2015. Available at: https://notifications.hse.gov.uk/COMAH2015/Results.aspx [last accessed 22.03.24]

Site Name /Operator	Activities	Location	Distance from Humber Refinery
Immingham Docks - Origin UK Operations Limited	Production and/or storage of fertilisers	Immingham, DN40, 2QQ	3.7km south-east

4.11.2 Potential Impacts, Effects and Mitigation Measures

Construction

The health and safety of construction workers on site would be managed by adherence with various legal requirements, codes and standards including:

- Health & Safety at Work Act, 1974;
- The Management of Health and Safety at Work Regulations (1999);
- CDM 2015 Regulations; and
- The Workplace (Health, Safety and Welfare Regulations 1992.

In addition to the above, the construction of the Proposed Scheme would also be undertaken in accordance with the Applicant's own site-specific EMS and emergency procedures. In the event of an accident or emergency at the site, such procedures would ensure the risk to construction workers, site staff and the environment are reduced as far as reasonably practicable.

Based upon the application of appropriate management measures and emergency procedures, in addition to best practice construction methodologies, no significant effects upon the risk of major accidents and disasters are predicted during construction.

Operation

For the management of day-to-day minor accidents, an Environmental Incident Reporting and Classification procedure is in place for the Humber Refinery. This would be amended to include the LSG Plant including all associated equipment prior to commencement of the LSG Plant's operation. A number of environmental protection measures will be implemented on site via the EMS to prevent and control spill events, including but not limited to:

- plans to deal with accidental pollution and any necessary equipment (e.g. spill kits) will be held within the LSG Plant area and all site personnel will be trained in their use. The EMS details how to appropriately deal with accidental spillages;
- implementation of containment measures, including bunding for bulk storage tanks. All chemicals will be stored in accordance with relevant design and containment standards (i.e. CIRIA C736);
- incorporation of interceptors into the drainage system to prevent spilled oils entering the surface water drainage system or local water bodies; and,
- in case of a fire, the firewater will be contained on site and will subsequently be disposed off-site if contaminated or processed through the onsite Effluent Treatment Plant.

As detailed in Section 4.5, the Refinery has an existing drainage system. The Proposed Scheme would also be connected into the system to prevent any spillages from entering surface water. As part of the EMS at the Refinery, the Applicant has procedures and processes in place to ensure that air and water emissions do not exceed normal operating conditions. This includes specific

preventative maintenance plans for all systems, recording and review of emissions and periodic assessment of emissions which includes implementation of corrective actions if necessary.

Based on the implementation of the preventative processes and management measures as outlined above, it is not anticipated that the Proposed Scheme would introduce any significant risk of Major Accidents or Disasters during its operation.

4.12 Traffic and Transport

4.12.1 Environmental Baseline

The highway network in the vicinity of the Site comprises the following key routes:

- A180 – A primary route, dual carriageway running from Cleethorpes in the east to the M180 in the west;
- A160 – Dual carriageway connecting Immingham Docks and South Killingholme to the A180;
- Town Street and Staple Road – single carriageways connecting the residential areas of South Killingholme to the A160 and Eastfield Road. Staple Road is one way from Town Street to Eastfield Road; and
- Eastfield Road – Single carriageway providing access off the A160 to the Humber Refinery and Prax Oil refinery sites.

Construction traffic is likely to access the Site from the A160, via the existing Humber Refinery site entrance on Eastfield Road and existing internal roads. Temporary compounds and parking for construction works would also be established on the Humber Refinery site.

4.12.2 Potential Impacts, Effects and Mitigation Measures

Construction

As set out previously, it is anticipated that during construction, HGV movements would generally remain at 30 return journeys per day but on the one day of concrete pours, HGV movements are anticipated to peak at 40. Construction staff are also anticipated to be between 100-120 personnel on site per day. As such, construction staff travel would also create a number of additional vehicle movements on the local road network. This increases the likelihood of traffic congestion on local roads including the A160 and Eastfield Road (the anticipated construction traffic route). It is not likely that construction traffic flows from the Proposed Scheme would result in any traffic and transport impacts on the strategic road network.

Any effects associated with construction traffic and deliveries would be temporary in nature and would be minimised as required through the implementation of good construction practices. There is not expected to be any significant effects on the surrounding highway network from the construction traffic associated with the Proposed Scheme.

Any required construction traffic management measures would be agreed with NLC in advance to ensure minimal disruption to the highways network as a result of construction.

Operation

Once in operation, the Proposed Scheme would be inspected and maintained regularly by the Applicant as part of its wider operating procedures at the Humber Refinery site. As the Proposed Scheme is located within the Refinery site, there is not anticipated to be any significant impact on the local highways network during the operation of the LSG project.

4.13 Natural Resources and Waste

4.13.1 Environmental Baseline

At this stage in the design process, specific quantities of materials required for the LSG project have not been determined. However, it is assumed that at minimum steel and concrete would be required to fabricate the new plant and equipment.

A review of the current waste generation activities within Yorkshire and the Humber and the wider UK was undertaken. In 2014, the UK commercial and industrial sectors generated 41.9 million tonnes of waste, of which 32.8 million tonnes (around 80%) was produced in England[8].

A position statement for Yorkshire and the Humber was produced in 2016 by seventeen Waste Planning Authorities in the Yorkshire and Humber area to help ensure appropriate coordination in planning for waste[9]. Estimated waste arisings for the Yorkshire and the Humber Region are summarised in Table 4.

Table 4 – Estimated waste arisings in the Yorkshire and the Humber Region

Waste Stream	Estimated Arisings (000 tonnes)
Local Authority Collected Waste	2,490
Commercial and Industrial waste	6,944
Commercial and Industrial minus power and utilities,	4,880
Construction demolition and excavation waste	10,497
Hazardous waste	522

4.13.2 Potential Impacts, Effects and Mitigation Measures

Construction

The construction of the Proposed Scheme would require the use of natural resources and would generate waste.

It is anticipated that the plant and equipment required for the LSG project would be fabricated in modular units offsite which would then be assembled on site. The pre-fabrication of the equipment would minimise the generation of excess materials during the construction phase. There may be minor volumes of waste materials generated as a result of the installation works although this would be recycled as far as possible. Where waste is produced this would be managed in accordance with the waste hierarchy and where offsite removal is required the waste materials would be separated and removed from site during construction to prevent the build-up of waste on site.

[8] DEFRA, 2018. Digest of Waste and Resources Statistics – 2018 Edition. Available at: https://assets.publishing.service.gov.uk/media/5e89a3f9d3bf7f1fba0d7095/Digest_of_Waste_and_Resource_Statistics_2018_v2_accessible.pdf [last accessed 22.03.24]

[9] Yorkshire and the Humber Waste Planning Authorities, 2016. Yorkshire and the Humber Waste Position Statement. Available at: https://www.northyorks.gov.uk/planning-and-conservation/planning-policy/planning-policy-minerals-and-waste/minerals-and-waste-joint-plan/evidence-base [last accessed 22.03.24]

Operation

Once in operation it is anticipated that small volumes of general waste and solid wastes would be generated by the Proposed Scheme in operation.

Where general waste is generated, it would be appropriately disposed of via licensed third party waste contractors, in line with regulatory requirements and existing installation procedures. Solid wastes such as catalysts and catalyst fines are also anticipated to be produced. The catalysts required for the LSG project are generally designed to have an operational life of six years, meaning every six years the catalysts will need to be disposed of and replaced. This equates to an estimated 25 tonnes of waste which would be produced every six years. Such waste would be collected and stored onsite prior to disposal off site via a licensed third party waste contractor, in line with regulatory requirements and existing Installation procedures.

The Proposed Scheme would be integrated with the existing environmental management systems at the Humber Refinery to manage raw materials and minimise waste generation in accordance with the Applicant's existing procedures. Existing procedures ensure that waste is minimised, reused, recycled or recovered in accordance with the waste hierarchy. Such procedures will ensure that waste entering landfill is minimised as far as possible. Use of Best Available Technology (BAT) within the design would help further ensure that the project is as efficient as possible during its operation.

Although waste would be generated by the LSG project, the existing management measures employed by the Applicant would ensure this is minimised as far as possible. Where solid wastes are produced, given that this waste would only be created once every six years, this is considered to be a minor change when considered in the context of the waste streams already being produced at a regional level. Overall, it is not anticipated that there would be a significant impact on natural resources and waste as a result of the operation of the Proposed Scheme.

4.14 Cumulative Effects

A search of NLC's planning portal has been undertaken (in March 2024) to identify any other developments within the surrounding area which have the potential to result in cumulative impacts with the Proposed Scheme.

A search radius of 5km has been adopted for this review given that the works are taking place within the site of an existing refinery, in a predominantly industrial setting and the surrounding topography is relatively flat. As such, a larger search area is not considered necessary for assessing cumulative landscape or visual effects.

Planning permissions within 5km of the Humber Refinery are summarised in Table 5 moving from west to East.

Table 5 – Summary of planning permissions within 5km of the Humber Refinery

Planning Reference	Planning Summary
PA/2022/2052	Planning permission to erect a single storey building.
PA/2023/1904	Planning permission for a change of use of part of redundant agricultural buildings to business light industry storage and distribution Use classes E g B2 and B8
PA/2019/893	Planning permission to retain change of use of land from agricultural to storage and distribution Use Class B8 with associated hard-standing.
PA/2023/1795	Hazardous substance consent to store 48 tonnes of propane gas within storage tanks.
PA/2024/236	Planning permission to erect a dwelling and garage

Planning Reference	Planning Summary
PA/SCR/2024/2	EIA screening request for a proposed development consisting of a data centre up to 309 000m consisting of three buildings including ancillary offices internal plant and equipment emergency back-up generators and associated fuel storage internal roads and footpaths cycle and car parking hard and soft landscaping security perimeter fencing lighting drainage an electricity substation a district heating unit horticultural glass house and other associated works and infrastructure.
PA/2023/1913	Planning permission to erect nine bungalows including new vehicular crossovers on Top Road amended vehicular access point and formation of new access road associated car parking new boundary treatments and hard and soft landscaping proposals.
PA/2023/1640	Planning permission to erect four two-bedroomed detached bungalows.
PA/2017/1439	Application for a certificate of lawful development for existing use in respect of opening hours for existing business
PA/2023/323	Planning permission for change of use of land to erect a workshop office accommodation palisade fencing and proposed lorry park.
PA/2023/1651	Planning permission to erect six dwellings
PA/2024/175	Planning permission to demolish existing single storey office building and construct new proposed two-storey office building
PA/2023/422	Planning permission for the construction and operation of a post-combustion carbon capture plant including carbon dioxide compression and metering cooling equipment stacks substations new and modified services connections internal roads new access onto Eastfield Road and maintenance and laydown areas EIA development.
PA/2022/1980	Planning permission for the change of use from garage workshop to an annexe
PA/2024/233	Planning permission for change of use from hotel to residential dwelling
PA/2023/1591	Planning permission to erect a domestic horse riding menage
PA/2024/24	Planning permission for alterations and extension to form first-floor offices and roof terrace and provision of ground floor internal parking Amended Block Plan floor plan and elevations
PA/2024/48	Outline planning permission to erect 2 dwellings with appearance landscaping reserved for subsequent consideration
PA/2021/274	Planning permission to erect 2 storage tanks to store FAME Bio-diesel
PA/2023/421	Planning permission for the construction and operation of a post-combustion carbon capture plant including carbon dioxide compressor and metering cooling equipment stacks substations internal roads partial ditch realignment new and modified services connections accesses maintenance and laydown areas
PA/2023/612	Planning permission for the installation of a 71 28 kwp solar carport and infrastructure for renewable energy generation
PA/SCO/2022/5	EIA scoping opinion for a v net zero pipeline
PA/2024/14	Planning permission for the installation of a Water Draw Off WDO Facility Foam Firefighting Container and associated infrastructure
PA/2023/502	Full planning application with an EIA for enabling works on land east of Rosper Road Killingholme. The proposed development comprises regrading of land with general fill and raising site levels with imported fill, installation of ground drainage as required, installation of boundary fencing, widening of Marsh Lane, vertical

Planning Reference	Planning Summary
	alignment to be retained and construction of new footpath - hedge to be replaced north of road widening upgrades at junction of Marsh Lane with Rosper Road including extending a drainage culvert diversion of a section of Station Road and construction of new road new ditch culvert under Marsh Lane five new entrances to proposed sites to be created. Demolition of buildings, construction of new 33kV substation, new drainage ditch diversion and new ditch crossings, bridge crossings of existing over ground pipe lines, diversion to existing Exolum underground pipeline and construction of new rail sidings.
PA/SCR/2019	EIA Screening request for a proposed new transit storage shed

The majority of the proposals listed above are small-scale or confined within existing residential sites. Therefore, it is not considered that there would be potential for significant cumulative effects.

The EIA screening report submitted for a new data centre (ref: PA/SCR/2024/2) suggests that construction traffic would be accessing the port from the A180 or the Port of Immingham, as such no traffic impacts would be likely along Eastfield Road where the Proposed Scheme construction traffic would be located. The scheme would take 3 years to construct but at this stage no detailed construction information has been provided. The data centre would be located approximately 1.8km from the Proposed Scheme between the A160 and A180 as such, it is unlikely that significant cumulative noise effects would be generated. Although the scheme has not been approved at this stage, standard best practice construction management methods employed at both the data centre and Proposed Scheme would ensure that any potential cumulative construction impacts are mitigated as much as practicable.

The enabling works proposed along Rosper Road (ref: PA/2023/502) are associated with the Able Marine Energy Park which has already received Development Consent. The Environmental Statement submitted to support the enabling works had scoped in air quality, noise and vibration, ecology, landscape and visual, flood risk and drainage and cultural heritage for the construction phase only. It is therefore assumed that the other topics would not generate significant effects which could generate cumulative effects with the Proposed Scheme. Of those topics scoped in only air quality and dust and noise and vibration would pose a potential risk of creating cumulative effects. During construction best practice construction management techniques (e.g., dust suppression techniques, switching off plant and equipment when not in use, noise screening etc.) would ensure the risk of air quality impacts and noise and vibration impacts are reduced. It is considered that the application of standard mitigation measures would be sufficient in managing construction phase impacts, as such no significant cumulative effects are considered likely to be generated.

The two planning applications associated with carbon capture plants, one at the Humber Refinery and one at the VPI Immingham Combined Heat and Power Plant to the east of the Refinery (ref**:** PA/2023/421 and PA/2023/422). The two developments are part of the Humber Zero project, and Phillips 66 is the applicant for the carbon capture plant at the Refinery. As the Humber Zero project is aiming to be operational in 2027, it is likely that the construction phases for the carbon capture storage plants and the Proposed Scheme could overlap which has the potential to lead to cumulative traffic and transport impacts along Eastfield Road. As part of the Environmental Statement, the Humber Zero project has undertaken traffic modelling for the junctions along Eastfield Road and has identified mitigation measures to avoid any significant effects on the highway network. Given the relative scale and size of the Proposed Scheme when compared to the Carbon Capture Storage project, it is likely that standard best practice construction traffic management techniques would be sufficient for managing the potential traffic and transport impacts which would arise from the Proposed Scheme. Such mitigation measures when implemented alongside mitigation measures

identified by the Humber Zero scheme are considered sufficient to avoid any significant cumulative effects on the local highways network during construction.

As part of the Humber Zero project and the Proposed Scheme would both be undertaken by the Applicant, the development would be kept under review to ensure consideration is given to potential traffic impacts and any further mitigation measures which would need to be implemented during the construction phase.

Future planning applications within the area would be kept under review as the Proposed Scheme progresses and consideration would be given to policy context set out in the Local Plan. In additional to cumulative impacts with other developments, intra project effects would be considered through the design process where relevant.

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5. Conclusions

The Applicant requests a formal EIA Screening Opinion from NLC to confirm whether proposals to construct a new Low Sulphur Gasoline (LSG) project at the existing Humber Refinery site in South Killingholme would constitute 'EIA development'. This report provides the information required by Regulations 6 of the EIA Regulations.

The Proposed Scheme is a type of development as listed under Schedule 2 Part 13 (a) of the EIA Regulations, namely '*any change to or extension of development of a description listed in Schedule 1 (other than a change or extension falling within paragraph 24 of that Schedule) where that development is already authorised, executed or in the process of being executed*'. It states that '*in relation to development of a description mentioned in a paragraph in Schedule 1…, the thresholds and criteria in column 2 of the paragraph of this table indicated below applied to the change or extension are met or exceeded*'. Under these thresholds, where an extension is required to an existing refinery, EIA is considered more likely to be required if the area if new floorspace exceeds 1,000 square meters.

The indicative development area of the new LSG project is approximately 1,200 square meters. It is therefore considered to constitute Schedule 2 Development. This report considers whether the Proposed Scheme is likely to result in significant effects on the environment by virtue of its scale, nature or location, and therefore provides the relevant information for NLC to adopt an EIA Screening Opinion.

This report considers the likely environmental effects of the Proposed Scheme throughout the construction and operational phases. Potential environmental impacts across a range of topics have been considered, including the key topics of ecology and biodiversity, cultural heritage, landscape and visual and traffic and transport.

The Proposed Scheme is not predicted to result in significant environmental effects. This takes into account measures embedded within the design to reduce impact on the air quality, noise and vibration and surrounding ecological receptors namely, adherence to Best Available Techniques (BAT) and associated Achievable Emissions Levels (AELs) for refineries, adherence to the requirements of the Humber Refineries environmental permit (under which LSG will be included) implementation of the Applicant's own EMS and best practice construction methods. Any impacts which occur during the construction phase of the scheme would be temporary and reversible. Through the ongoing design process and further environmental assessment works proposed within this report, additional opportunities would be identified to minimise the risk of impacts set out in this report as far as practicable.

Once complete, the Proposed Scheme is considered to have a beneficial impact in relation to greenhouse gas emissions and support the Applicant's decarbonisation pledges.

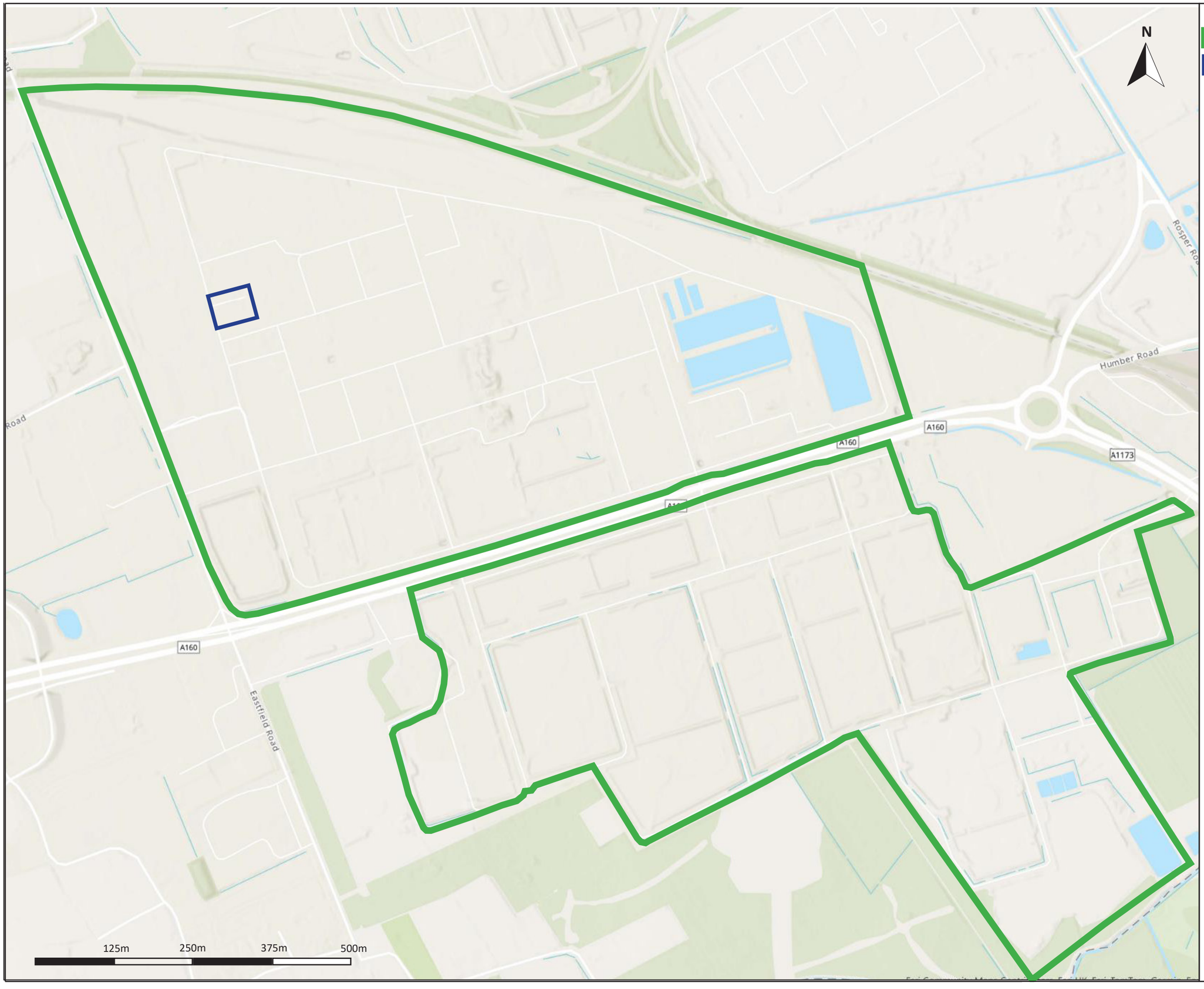
The following standalone environmental reports are likely to be required in support of any future planning application:

- Air Quality Screening Assessment;
- Noise Impact Assessment;
- Flood Risk Assessment;
- Drainage Statement; and
- Phase 1 Ground Conditions Report.

The Applicant is of the view that the proposed LSG project would not constitute EIA development.

Appendices

Appendix A – Development Red Line Boundary



Legend

- Environmental Permit Installation Boundary
- Low Sulphur Gasoline Project Location

Rev	Date	By	Chkd	Appd
01	30/04/2024	IM	HW	RL

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Client
Phillips 66 Ltd

Project Title
Humber Refinery Low Sulphur Gasoline (LGS)

Drawing Title
LSG Plant Location within the Installation Boundary

Scale at A3
1:1000

Role
Planning Application

Arup Job No.
296344-00

Name
296344-00-LSG-RP-DR-0001