



**TEMPORARY EXPLORATORY WELLSITE, INCE
MARSSES, ELTON**

**ENVIRONMENTAL STATEMENT
SCOPING REPORT**

OCTOBER 2017

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1.0 INTRODUCTION AND BACKGROUND

1.1 Introduction

1.1.1 This document has been prepared to aid a formal request for a Scoping Opinion, under Regulation 15 of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017. The opinion will be used to establish the scope of the Environmental Impact Assessment (EIA) that will be prepared to accompany a planning application for the development of a temporary wellsite, circa 2.2 hectares (ha) in area, for an exploratory borehole and testing for the presence of natural gas (“the Proposed Development”), on land off Grinsome Road, Ince. The scoping request will be submitted to Cheshire West and Chester Council (the Council) who will be the local planning authority for the forthcoming planning application.

1.1.2 By way of background hydrocarbon minerals are vested in the Crown and the rights to explore for and develop such resources are granted in the form of Petroleum Exploration and Development Licences (PEDLs) issued by the Department for Business, Energy and Industrial Strategy (DBEIS), formally known as the Department for Energy and Climate Change (DECC).

1.1.3 The Site is located in PEDL 190, which is held by a consortium of INEOS Upstream Limited and Island Gas Limited. Island Gas Limited is now seeking to obtain planning permission to carry out the exploratory work referred to above.

1.2 The Applicant

1.2.1 The applicant will be Island Gas Ltd which is a wholly owned subsidiary of IGas Energy Plc. IGas Energy Plc is a leading British oil and gas explorer, with licences to explore for oil and gas in a number of locations including the North West, the East Midlands, the Weald Basin near the south coast of England and Caithness in Scotland.

1.2.2 IGas has played a key role in Britain’s onshore energy production; safely exploring, developing and producing onshore oil and gas at numerous sites for over three decades. IGas’ management and technical teams have many years of experience in onshore energy production.

1.3 Purpose of Scoping

1.3.1 Environmental Impact Assessment (EIA) is the process culminating in the production of the Environmental Statement (ES). The objective of the process is to identify and evaluate all likely significant, direct and indirect environmental effects of the Proposed Development, during construction, operation and decommissioning, on the environment.

1.3.2 Scoping is the process through which the content and extent of matters to be covered by the EIA are identified by considering the potential impacts that could arise from the construction and operation of the Proposed Development.

1.3.3 Only the 'main' or significant effects of the development should be subject to full environmental assessment within the ES. Planning Practice Guidance on Environmental Impact Assessment states at Paragraph 035:

“Whilst every ES should provide a full factual description of the development, the emphasis of Schedule 4 is on the “main” or “significant” environmental effects to which a development is likely to give rise. The Environmental Statement should be proportionate and not be any longer than is necessary to assess properly those effects. Where, for example, only one environmental factor is likely to be significantly affected, the assessment should focus on that issue only. Impacts which have little or no significance for the particular development in question will need only very brief treatment to indicate that their possible relevance has been considered.”

1.3.4 The process of scoping and environmental assessment ensures that mitigation and enhancement measures are considered at an early stage of the design process. It also provides the opportunity for the Council and other consultees to ensure areas of the environment that have the potential to be significantly affected by the Proposed Development are considered within the ES.

1.3.5 The scoping process also helps to identify potential design constraints at the start of the project evolution. This helps to ensure that environmental protection and sustainability are key factors in the final proposed solution.

1.3.6 Although the scoping process is often regarded as a discrete stage it should continue throughout the development of the EIA. It may be necessary to alter the extent of research required for a particular discipline as the understanding

of the magnitude and significance of an impact is established. This is vital to ensure that resources and efforts are focused on the issues that have the potential to cause the most impact.

1.3.7 This document will be issued to a number of consultees who will be invited to:

- comment on the development proposals;
- the proposed scope of assessment;
- raise any relevant issues for consideration during the EIA process; and
- scope out any issues that are considered unlikely to be significant.

1.4 Requirement for EIA

1.4.1 The requirement for EIA was prescribed by European law under Council Directive 85/337/EEC. This Directive has been amended four times, with the latest amendment, the Environmental Impact Assessment (EIA) Directive (2014/52/EU) entering into force on 15 May 2014..

1.4.2 In England, the Directive 2014/52/EU has been enacted into law by the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 [SI 2017 No. 571] – referred to hereafter as ‘the EIA Regulations’.

1.4.3 Schedule 1 of the EIA Regulations lists those developments for which EIA is mandatory, whilst Schedule 2 describes projects for which the need for EIA is judged on an individual basis through a screening process.

1.4.4 The Proposed Development does not fall within Schedule 1 and therefore EIA is not mandatory. However, the Proposed Development does fall within paragraph 2(d) & 2(e) of Schedule 2 of the EIA Regulations as follows:

2(d) Deep drilling, in particular: (i) geothermal drilling; (ii) drilling for the storage of nuclear waste material; (iii) drilling for water supplies; with the exception of drilling for investigating the stability of the soil.

2(e) Extractive Industry - Surface industrial installations for the extraction of coal, petroleum, natural gas and ores, as well as bituminous shale where the area of the development exceeds 0.5 hectares.

1.4.5 Where a project falls as Schedule 2 development it is necessary to establish whether the project is likely to have a significant effect on the environment by

virtue of factors such as its nature, size or location. Schedule 3 of the EIA Regulations sets out selection criteria that should be taken into account when determining if a project is likely to have a significant effect on the environment.

- 1.4.6 Planning Practice Guidance (PPG) on Environmental Impact Assessment provides a set of indicative thresholds and criteria to help determine whether significant effects are likely. In relation to paragraph 2(d) & 2(e) of Schedule 2 of the EIA Regulations the indicative criteria and threshold is:

2(d) Drilling operations involving development of a surface site of more than five hectares (ha).

2(e) Development of a site of 10 hectares or more or where production is expected to be more than 100,000 tonnes of petroleum per year.

- 1.4.7 The Proposed Development does not fall within these parameters and therefore this indicates that significant environmental effects are less likely, subject to consideration of matters such as effects on hydrology, ecology and emissions to air. Nonetheless, due to the recognised public interest about developments of this nature, IGas has decided to submit an ES voluntarily.

1.5 This Document

- 1.5.1 Following on from this Introduction, Chapter 2.0 of the report briefly describes the Site and its surroundings whilst Chapter 3.0 provides a description of the development. Chapter 4.0 outlines the broad principles of the EIA methodology. Chapters 5.0 to 12.0 describe what the Applicant considers to be the main environmental issues that could arise through the construction and operation of the Proposed Development and how they will be assessed. Chapter 13 identifies the matters which the Applicant proposes should be scoped out of the ES. Finally, Chapter 14.0 sets out the proposed structure of the ES.

2.0 THE SITE

2.1 Site Context

- 2.1.1 The Proposed Development would be located on land within Protos (a significant consented industrial development site) and to the immediate south of Grinsome Road, a private road, which runs from the Pool Lane/Grinsome Road roundabout (circa 1.5km to the west of the Site) east and forms the main access to the Protos development. The centre of the Site is located at National Grid reference SJ 461 764.
- 2.1.2 The Site is circa 2.2ha in area and is located 1km to the east of the village of Ince and 1km to the north of the settlement of Elton. The Mersey Estuary is located circa 1km to the north of the Site. The location of the Site is shown on Figure 1. The development would involve the drilling of horizontal wells and as such the extent of the application would include an area of land circa 1.25km in radius within which the exploration works could take place.
- 2.1.3 The northern half of the Site comprises a hardstanding area, on which sparse ruderal vegetation has established. This part of the Site was developed as a well site compound for drilling works associated with the exploration of coal bed methane. The site has not been actively used for 5 ½ years. A soil mound, formed from the topsoil excavated during the development of the hardstanding area, is located in the northern corner of the Site. The southern half of the Site is fallow agricultural land, which has begun to colonise with ruderal species.
- 2.1.4 The Site is roughly triangular in shape and relatively level, lying at circa 6m AOD. The northern and south eastern boundaries are formed by roads. The western boundary is adjacent to an area of broadleaved woodland. Some semi-mature trees are also present along the northern boundary.
- 2.1.5 The land surrounding the Site is a mix of industrial and agricultural land. Much of the land in the vicinity of the Site forms part of the Protos development area. When constructed Protos will result in an extensive industrial development on this area of Ince Marshes. There are a number of existing major industrial facilities in close proximity to the Site. Encirc Glass Ltd, a bottle manufacturing plant, is located to the immediate west of the Site. This plant includes a 33m high building, 10 hectares in area. The CF Fertilizers UK plant is located 1km to the east of the Site. The plant covers an overall area of circa 50 hectares and

manufactures over 1 million tonnes of fertiliser per year. The plant includes a number of stacks and process equipment in excess of 30m in height. The CF Fertilizers UK plant is registered as an Upper Tier Control of Major Accident Hazards (COMAH) site.

2.1.6 The Ince Biomass Renewable Energy Plant, which is currently in its commissioning period, is located circa 500m to the north east of the Site. The Stanlow Oil Refinery is located circa 1km to the west of Site and is also registered as an Upper Tier COMAH site. A 19 turbine wind farm completed construction in September 2016 to the east of the Site. The closest of the 125m (to blade tip) turbines is located circa 1.56km to the east of the Site.

2.1.7 As well as the industrial sites described above, there are significant areas of agricultural land close to the Site, used for arable crop production and grazing.

2.1.8 The closest properties are as follows and are illustrated on Figure 2:

- Properties on Ince Orchards – circa 740m to the south west of the Site
- Properties on Orchard Park Lane – circa 700m to the south of the Site
- Properties on Station Road/Marsh Lane, Ince – circa 1,000m to the west of the Site
- Home Farm – circa 850m to the north west of the Site

2.1.9 The closest properties to the west are two farms located on Rake Lane, over 2km from the Site.

2.1.10 The Helsby to Hooton railway line runs in an east west orientation approximately 650m to the south of the Site. There are no ponds or watercourses within the Site. There are numerous field drainage ditches in the area, with one located to the immediate west of the Site.

2.2 Planning History

2.2.1 As described above the northern half of the Site has been used as an exploratory well site for the exploration of coal bed methane (planning permission ref. 09/02568/MIN). The permission allowed for the drilling of boreholes for the purpose of coal bed methane appraisal and production, the installation of well, production and power generating facilities, the extraction of coal bed methane and the subsequent restoration of the site.

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- 2.2.2 A single exploratory hole was drilled at the Site in 2011. The well was used to determine the nature of the geological formation. Methane was not extracted for the purposes of flow testing or production. On completion of the drilling operation the well was suspended pending geological data evaluation. No further operations have been undertaken pursuant to the planning permission.
- 2.2.3 The Site falls within the boundary of the Protos development (formerly known as the Ince Resource Recovery Park). Protos comprises an Integrated Waste Management Facility and an Environmental Technologies Complex and facilities to provide multi-modal access to the site as well as landscaping and environmental mitigation. Protos has a complicated planning history. However, the development was granted planning permission (ref APP/Z0645/A/07/2059609) by the Secretary of State in 2009 following a planning appeal. Since the planning permission has been granted there have been a number of amendments to the permission via a series of application under Section 73 and Section 96a of the Town and Country Planning Act 1990.
- 2.2.4 The permission covers an area of 127.2 hectares. The Site falls within Plot 11 which has approval for an Industrial Waste Transfer Centre pursuant to a reserved matters planning permission ref 15/04176/REM. The reserved matters permission includes for a new access to the plot from the southern arm of the newly developed roundabout to the east of the Site. The conditions precedent for the approved reserved matters permission have been discharged and the development has been implemented.
- 2.2.5 In summary it is evident that the Site has a history of planning consents for development. This includes an extant and implemented consent for the exploration, testing and production of natural gas.

3.0 THE PROPOSED DEVELOPMENT

3.1 Introduction

- 3.1.1 IGas propose to expand the existing exploration wellsite compound to enable the drilling of an additional exploratory well that would be drilled to evaluate the Craven Group, including the Holywell shale, Pentre Chert, Teilia Shale and the deeper Carboniferous Limestone Supergroup (CLS). The well (IM2) would be drilled as a near vertical directional exploration well to an approximate true vertical target depth of 2,750m True Vertical Depth Sub Sea (TVDSS).
- 3.1.2 The IM2 directional exploration would be designed to facilitate hydraulic fracturing and flow testing to be conducted in the near vertical wellbore in either the Holywell Shale, Pentre Chert, Teilia Shale or CLS. This testing would be conducted prior to any horizontal drilling.
- 3.1.3 A horizontal section (IM2z) would then be drilled laterally within either the Holywell Shale, Pentre Chert, Teilia Shale or CLS. The drilled horizontal section would be approximately 1000m in length.
- 3.1.4 The drilling would be undertaken to gather detailed information about the geological formation and establish the quantity and quality of natural gas within the rock.
- 3.1.5 The IM2z horizontal well would be designed to facilitate hydraulic fracturing and flow testing of the target formation.
- 3.1.6 Flow testing would be conducted for a period required to determine commerciality of the gas, which could be up to 2 years. Flow testing would involve periods of flaring.
- 3.1.7 The existing well (IM1) would be reinstated and used for the monitoring of the drilling and testing of IM2 and IM2z.
- 3.1.8 Following completion of the drilling and testing, the wells would be temporarily suspended pending appraisal of results. The temporarily suspended wells would be managed in agreement with the Environment Agency (EA), The Health & Safety Executive and Oil & Gas Authority. A decision would then be made as to whether to move to a production phase (which would be subject to a new planning permission) or to plug and abandon the well in accordance with

a well abandonment strategy. If the well was abandoned the Site would then be decommissioned and prepared for the development of an Industrial Waste Transfer Centre pursuant to reserved matters planning permission ref. 15/04176/REM.

3.1.9 This section of the report provides an outline description of the nature and purpose of the Proposed Development. The Proposed Development is described under the following headings:

- Wellsite Compound
- Drilling Operations
- Testing and Evaluation
- Decommissioning and Restoration
- Programme and Hours of Operation
- Risks of Accidents and Hazardous Development
- Resources and Materials
- Alternatives

3.2 Wellsite Compound

3.2.1 The exploratory well would be located within a wellsite compound that would comprise a fenced and lit hardstanding circa 2.2ha in area. The compound would be used for drilling and testing the wells, storage of materials and plant associated with the drilling and testing phases, equipment laydown, offices and welfare facilities. The compound would include measures for the management of surface water runoff.

3.2.2 Access to the wellsite would be from Grinsome Road via the southern spur of the roundabout located to the east of the Site.

3.2.3 Construction of the compound would involve the removal of vegetation and excavation and storage of topsoils and subsoils to a pre-determined formation level (circa 400mm below ground level) on the southern half of the Site.

3.2.4 The surfacing material of the existing compound would be excavated to the subsoil to enable an improved compound formation to be developed on the northern half of the Site.

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- 3.2.5 A blinding layer of sand would be placed on top of the subsoil above which an impermeable geomembrane would be laid. Above this geotextile and crushed aggregate would be laid to a depth of 300mm and compacted to create a hard standing area. The aggregate excavated from the existing compound would be reused where possible.
- 3.2.6 The compound would be fenced and gated and security lighting would be erected. The existing compound is fenced with a temporary 2.0m high weld mesh security fencing. A 2.0m temporary fence would remain on the outer perimeter of the Site, the inner perimeter would be secured with a 2.5m metal hoarding fence. The entrance into the compound and security clearance area would be secured with a 3m welded wire mesh. Access control and perimeter security maintained through the use of; security clearance areas, manned security, CCTV and Intruder Detection Systems. Light pollution would be minimised through the use of shielded luminaries, low elevation lighting columns and appropriate lighting strength. A gate would be constructed at the entrance to the Site along with a hardstanding area for a security cabin.
- 3.2.7 A perimeter drain would be installed around the boundary of the compound to collect surface water drainage. The perimeter drain would comprise a channel that would include a perforated pipe and would be backfilled with stone. The channel would be lined with an impermeable geomembrane.
- 3.2.8 The water collected in the channel would be piped to an onsite underground storage tank. The tank would be sized to provide sufficient capacity to accommodate site run-off in the event of a 1 in 100 year storm event. The surface drainage system would also have sufficient capacity to contain 110% of the volume of the largest tank on the wellsite used to store materials for, or arising from, the drilling and testing operations. Water collected in the onsite tank would either be tankered offsite for disposal to a waste water treatment facility or discharged into the adjacent surface water drainage network. Water would only be discharge to the existing surface water drainage network if agreed with the Environment Agency, noting that an Environmental Permit would be required for this activity.
- 3.2.9 Two wellhead cellars would be constructed. Wellhead cellars are concrete lined excavations which allow installation and access of wellhead and drilling equipment. The wellhead cellars would typically be 5m x 10m in area and 3-4m

deep. A mass concrete pad would be laid around the wellhead cellar, this would be circa 25m x 15m in area. A 20" diameter steel conductor would be installed into the base of the cellars.

3.2.10 A series of temporary cabins would be installed within the compound to provide site offices, testing facilities and welfare and mess facilities. ISO containers would also be installed for the storage of equipment and components. A suitably bunded area would be constructed within the compound for the storage of chemicals and oils. A staff parking area would also be provided within the compound.

3.2.11 There would be no operational equipment located outside the compound.

3.3 Drilling Operations

3.3.1 A drilling rig would be mobilised to the Site to develop the IM2 well. The drilling rig would be up to 60m in height. As the drill rig used would be dependent on availability, the characteristic elements of different potential drill rigs that may be used will be reviewed in order to ensure the EIA assesses the characteristics and properties of the drill rig that would result in the maximum adverse impacts in relation to particular environmental and amenity effects such as noise, landscape and visual, lighting and cultural heritage (e.g. the tallest drill rig types are assessed in the LVIA, the noisiest for the noise assessment etc.). These parameters would be set out in the ES.

3.3.2 Other ancillary equipment associated with the drilling operations includes:

- Cranes to assemble the drilling rig;
- Containerised diesel power generators, a power distribution unit, a power control room and a hydraulic power unit;
- Drilling workshop, drilling mud laboratory, mud logging unit and well control room;
- Pumps and storage tanks for diesel, water, drilling mud and drilling cuttings;
- Drill casings, drill pipes and pipe racking;
- Well cementing equipment; and
- Testing and calibration equipment.
- Well control equipment, blow out preventers (BOPs)

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- 3.3.3 Any noise mitigation screening measures deemed necessary would be erected / constructed.
- 3.3.4 The wells would be designed to comply with a range of relevant guidance and regulations, including:
- UK Onshore Operators Group (UKOOG): UK Onshore Shale Gas Well Guidelines. Exploration and Appraisal Phase Issue 3, UKOOG, March 2015;
 - Oil & Gas UK Well Life Cycle Integrity Guidelines, Issue 3, March 2016;
 - The Offshore Installations and Wells (Design and Construction, etc) Regulations 1996;
 - The Borehole Sites and Operations Regulations 1995; and
 - OGUK Guidelines for the Abandonment of Wells, Issue 5 July 2015.
- 3.3.5 The operation of drilling consists of rotating the drill bit and applying weight. The drill bit may be steered in three dimensions to access the target zone using downhole tools. Drilling fluid is pumped down the drill string (i.e. the drill pipes that link the drill bit to the drilling rig at the surface) and up the annulus (i.e. the void between the drill string and the drilled wellbore). The drilling fluid, which would be a mix of water/oil, clays, additives, cools the drill bit, provides hydraulic power and lubrication, transports the drilled cuttings to surface and stabilises the wellbore. The fluid also provides hydrostatic pressure to ensure that fluids within the geological formations, through which the drill passes, remain in the formation and provides a mechanism for transmitting information between the bottom of the drill string and the surface. The make-up of the fluid would depend on the nature and sensitivity of the formation being drilled through e.g. whether it is a water bearing rock / aquifer or not. The drilling fluid(s) used will be required to be approved under an Environmental Permit, issued by the Environment Agency.
- 3.3.6 At selected points the drill bit would be pulled from the well and steel pipes called casings would be run into the well. The casing lengths are then screwed or welded together and cemented in place. The cement forms a seal between the casing and the formation, isolating the formations from the well and from each other and providing mechanical support to the casing.
- 3.3.7 A wellhead is installed on top of the casing to provide a seal at the surface. A series of tests are conducted to ensure the integrity of the casing, the casing

joints and the cement surrounding the casing. The assessments of integrity include pressure testing to ensure the casing is leak tight and testing of the cement bond between the well and the borehole. Following testing a new drill bit is inserted into the hole and the next section of the well is drilled.

3.3.8 The process of drilling a section, acquiring information on the formations drilled, casing, cementing, installing the wellhead seal and testing continues to be repeated until the target formation is reached.

3.3.9 The drilling fluids would be circulated in a closed loop as part of the drilling operations. If there is a requirement to purge the well of the drilling fluids or excess fluids need to be removed (e.g. during the casing and cementing operations) then these would be pumped into a dedicated storage tank at the surface and removed offsite by tanker to a suitably licenced waste management facility.

3.3.10 It would take up to five months to drill IM2, following which the drilling rig would be demobilised and removed from Site. This would include 2-3 weeks of preparation works for the drilling and 2-3 weeks to demobilise the drilling equipment.

3.3.11 In order to use the existing well for gathering information such as micro-seismic activity associated with the drilling and testing of IM2, it would be necessary to 'workover' the existing well. This would involve mobilising a 'workover' drilling rig to remove any plugs and backfilled material used to suspend the well. The workover rig would be smaller in size than the main drilling rig used for IM2, approximately 35m in height. The workover operations would take circa 1 month.

3.4 Testing and Evaluation

3.4.1 Following completion of the drilling of the near vertical section of IM2 and demobilisation of the drilling rig various tests would be conducted to understand the nature of the formations through which the well was bored. Tests would be undertaken to establish the propensity of the formation to hold natural gas reserves and to refine and optimise the methods required to enable a successful hydraulic fracturing exercise to be undertaken. Testing of the well integrity and micro-seismic recording would also be undertaken to aid the optimisation and subsequent monitoring of the results of hydraulic fracturing operations. The

testing and evaluation on IM2 is anticipated to take up to 12 months. During this period there would be intermittent operations on site with low numbers of vehicles and staff present. Following completion of IM2 testing and evaluation period the compound would be prepared for hydraulic fracturing operations.

Hydraulic Fracturing

- 3.4.2 Hydraulic fracturing equipment would be installed at the surface of the well. This would include a workover rig (circa 35m in height) to prepare the casing for the hydraulic fracturing process, hydraulic fracturing pumps, storage tanks for freshwater and flowback fluids, coil tubing and coil tubing unit, flow back equipment (storage/treatment) and flaring equipment.
- 3.4.3 The hydraulic fracturing would be undertaken in a series of sections along the near vertical section of the well within target formations of interest. The target section would be isolated and small holes would be created (perforated) within the zone of the well to be fractured.
- 3.4.4 Hydraulic fracturing fluid would then be pumped into the well. The fracturing fluid would typically comprise a mix of water and an inert proppant (e.g. sand or ceramic beads), which together would make up more than 99% of the fluid. A number of additives would be introduced to the fluid (less than 1% of the fluid) to assist with the fracturing process. These additives, which would be from an approved EA list of non-hazardous additives, perform a variety of functions depending on the site specific requirements. They would include agents that help to reduce friction between the water and well casing (increasing the efficiency of the operation) or agents that control the pH of the fluids as it interacts with the geology, inhibit corrosion and scale build-up within the well or reduce the potential for the growth of bacteria in the well casing.
- 3.4.5 The proppant and additives would be tankered to the site and stored in dedicated tanks. Water would be sourced from either the local water main or tankered to the Site.
- 3.4.6 The hydraulic fracturing fluid would be pumped into the well at sufficient pressure to induce fracturing within the rock formation. The proppant contained within the fluid would help keep the fractures open once the fracturing fluid is withdrawn.

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- 3.4.7 Following completion of the fracturing operation in the first section, the next section of the well would be prepared and hydraulically fractured. It is anticipated that there would be up to 5 stages of hydraulic fracturing undertaken in the near vertical section of the well.
- 3.4.8 Having completed the fracturing process the hydrostatic pressure in the well would be reduced allowing a proportion (up to 75%) of the hydraulic fracturing fluid to return back to the surface, a process that is termed flow back. The resultant flow back fluids would comprise fracturing fluid plus any materials mobilised and transported from the rock formation targeted by the fracturing process. Following release of the flow back fluids natural gas contained within the target formation would begin to flow into the well and up to the surface.
- 3.4.9 Flow back fluid would be pumped to a dedicated storage tank where it would be retained prior to being tankered offsite to a suitably licensed water treatment facility.
- 3.4.10 The fracturing process is carefully monitored and controlled using real-time monitoring of injection pressure, flow rates into the well and the concentration of proppants. Microseismic activity would be measured using downhole geophones in IM1. The monitoring would also aid in the interpretation of the fracturing effectiveness and fracture growth. All activities would be carefully logged and recorded.
- 3.4.11 The hydraulic fracturing equipment would be removed from the site for the subsequent flow testing operations described below.

Flow Testing

- 3.4.12 Testing of the natural gas flowing from the well (flow testing) would commence at the point the pressure on the fracturing fluids is released and fluids, and potentially natural gas, returns to the surface. As the fracturing fluid flows out of the fractures developed within the target formation, any natural gas present would flow into the well. The mix of fracturing fluid and natural gas which returns to the surface would be passed through a separator to separate the flow back fluid and the gas. The volume and characteristics of the gas and the flow back fluid would be monitored and recorded prior to the gas being piped to the onsite flare where it would be combusted in accordance with the pertinent EA permit.

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- 3.4.13 Gradually the volume of flow back fluid would reduce and the flow would predominantly comprise natural gas. This would enable the stabilised flow tests to commence. The flow tests would establish the quality, quantity and composition of natural gas present to assist with determining the production potential of the formation. Natural gas extracted would be piped to an on site flare(s) within which the natural gas would be efficiently combusted under controlled conditions.
- 3.4.14 The flare would be similar in nature to those used extensively across the country for the combustion of landfill gases. Such flares are contained within a steel tube or stack that would typically be up to 12m in height. The flame of the combusted gas would be fully enclosed within the flare stack and monitored under the EA permit.
- 3.4.15 The initial flow testing would be undertaken over a period of up to 3 months.
- 3.4.16 If the initial flow testing indicates that the area fractured has the potential to give rise to commercially productive volumes of gas then the testing would be extended (Extended Flow Testing). The purpose of this would be to understand how the gas contained within the formation flows over a prolonged period, ensuring that variations in flow pressures are acceptable and that volumes encountered over the extended testing period remain commercially viable. The extended flow well test would also allow any variations in the quality and composition of the gas to be examined. Potential options for the management of the extracted gas would be explored by the Applicant and described within the ES. This could include potential export of the gas to the local distribution main, converting to power for grid export or tankering offsite for subsequent use.
- 3.4.17 The extended flow test would last up to a period of 12 months.

Horizontal Drilling, Fracturing and Testing

- 3.4.18 On completion of the Extended Flow Test the perforated sections of the well would be plugged and tests would be undertaken on the casing and well integrity prior the horizontal section of the well being drilled.
- 3.4.19 The main drilling rig, and associated equipment, would be remobilised to the Site.

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- 3.4.20 The well would be extended horizontally into either the Holywell Shale, Pentre Chert, Teilia Shale or CLS. The horizontal section would be circa 1000m in length. The drilling techniques would be as described above and would involve the same sequence of drilling, casing, cementing, and testing. The drilling period would take up to 3 months with 2-3 weeks rig mobilisation/demobilisation either side of the drilling.
- 3.4.21 On completion of the horizontal section the drilling rig would be demobilised and the hydraulic fracturing equipment re-installed at the well head. This would take up to 9 weeks.
- 3.4.22 The hydraulic fracturing process would then begin and follow the same sequence described above. The horizontal well would be fractured in up to 10 sections. The fracturing process would be undertaken over a 6 week period.
- 3.4.23 The fracturing equipment would then be demobilised from the Site and the well prepared for flow testing.
- 3.4.24 The testing would follow the same process described above with an initial testing period of up to 3 months during which gas would be flared. An extended flow test would then commence, for the horizontal section this would last up to 24 months. As described previously the ES will describe potential options for the management of the extracted gas.

3.5 Decommissioning and Restoration

- 3.5.1 On completion of the extended well test either the well will be suspended as a long term producer or the process of plugging and abandoning the well(s) would be undertaken. This process would follow the guidelines set out in the Oil and Gas UK (OGUK) Guidelines for the Abandonment of Wells, Issue 5 July 2015. A detailed Well Abandonment Plan would be developed in accordance with well abandonment regulations, The Environment Agency, The Health & Safety Executive and Oil & Gas Authority.
- 3.5.2 Surface equipment would be removed and the top section of the well casing would be cut off to 2m below ground level and the cellar would be broken out. A cement cap would then be cast on the wellhead.
- 3.5.3 The wider compound would be demobilised, with all plant, machinery and fencing removed. The stoned surface would be excavated and taken offsite and

geomembranes removed. Any below ground structures, such as surface water tanks, would be removed. The land would be left in a condition suitable for future development.

3.6 Hours of Operation

3.6.1 Planning permission will be sought for a five year period. Site construction and restoration and decommissioning works would be restricted to the following times:

- Mondays to Fridays 07.30 to 18.00 hours
- Saturdays 08.00 to 13.30 hours
- Sundays and Bank Holidays No operations

3.6.2 Drilling operations would be undertaken 24 hours a day, seven days a week.

3.6.3 High Pressure Pumping associated with the hydraulic fracturing operations would be restricted to the following times:

- Mondays to Fridays 07.30 to 18.00 hours
- Saturdays 08.00 to 13.30 hours
- Sundays and Bank Holidays No operations

3.6.4 General operations, not involving high pressure pumping, associated with hydraulic fracturing and flow testing phases of the development would be undertaken 24 hours a day, seven days a week.

3.7 Vulnerability of the Proposed Development to Major Accidents or Disasters

3.7.1 Schedule 4 of the EIA Regulations requires “a description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned”.

3.7.2 The reference to disasters is made in relation to natural events, as indicated by the preamble to the 2014 Directive (2014/52/EU) which states: “*natural disasters (such as flooding, sea level rise, or earthquakes)*”. As described later in this report the Site lies within Flood Zone 1, low probability of flooding, and

this region of the UK is not considered to be at risk from any other natural events. As such consideration of major disasters is proposed to be scoped out of the ES.

- 3.7.3 With regard to consideration of major accidents the 2014 Directive describes that: “it is important to consider their [i.e. the Proposed Development] vulnerability (exposure and resilience) to major accidents and/or disasters, the risk of those accidents and/or disasters occurring and the implications for the likelihood of significant adverse effects on the environment.”. The focus here, as it is within the EIA Regulations, is on the vulnerability of the Proposed Development to major accidents and/or disasters and the likelihood of significant adverse effects occurring.
- 3.7.4 The operators of petroleum exploration sites are required to apply for an Environmental Permit in accordance with the Environmental Permitting (England and Wales) Regulations (2016). Environmental Permits are issued in order to ensure that the necessary controls and working practices are in place to protect the environment and human health in relation to matters such as noise, air quality, groundwater, surface waters and odours. The operator is also required to obtain a series of other permits and regulatory approvals. The Environmental Permit and the other regulatory approvals would include monitoring and reporting protocols which must be complied with by the operator. The EA would be the regulator of the Environmental Permit and would have the power to stop any activities that breached its conditions or requirements.
- 3.7.5 Health and Safety Executive (HSE) regulations require an independent and competent person to examine the well’s design and construction. The operator must notify the HSE of the well design and operation plans at least 21 days before drilling is due to start. The HSE would inspect the well design to ensure that measures are in place to control major hazards to people from well-related activities and accidents.
- 3.7.6 As described later in the report at paragraph 13.4.5 the operator would be required to prepare a hydraulic fracture plan (HFP) that must be agreed with Oil and Gas Authority in consultation with EA. The HFP will describe the various measures that would be put in place to predict, mitigate and monitor the effects of the hydraulic fracturing operations. Only after agreement of the HFP will the OGA consent to complete and test well with a HVHF.

3.7.7 In this regard there are considered to be sufficient safeguards in place to prevent any major accidents from occurring. It is considered highly unlikely, with these measures in place, that any significant adverse environmental effects would arise from the vulnerability of the Proposed Development to major accidents or disasters. Accordingly, it is proposed to scope out an assessment of the effects of major accidents and/or disasters. However, detail on the measures which would be put in place to safeguard against major accidents occurring will be provided within the ES.

3.8 Resources and Materials

3.8.1 In accordance with Schedule 4 of the EIA Regulations the ES will include a description of the nature and quality of materials used in the operations and also an estimate of the expected type and quality of residues and emissions arising from the operations. Details of the following materials and residues will be provided:

Materials Used

- Well pad construction materials including geomembranes and aggregates;
- Concrete;
- Water for hydraulic fracturing fluid;
- Proppant for hydraulic fracturing fluid;
- Oils, fuels, chemicals and lubricants;
- Well casings.

Waste residues

- Drilling muds;
- Drilling cuttings;
- Cements and bentonite slurry;
- Flowback fluids;
- Waste oils / chemicals;
- Construction materials;
- General office and welfare wastes;
- Foul water from welfare facilities;
- Surface water collected from compound.

3.8.2 The proposed methods of storage, treatment and disposal of wastes will be described, including the capability of waste management facilities to accept the wastes predicted to arise.

3.9 Alternatives

3.9.1 The EIA Regulations indicate that the ES should include an outline of the main alternatives considered and the reasons they were discounted, taking into account environmental effects.

3.9.2 With regard to the Proposed Development the main topic areas where alternatives are being considered include the following:

- Site selection;
- Alternative site layouts; and
- Alternative methods for the management of extracted gasses.

3.9.3 For each of the above topics the ES will provide an explanation of the main alternatives considered and will outline the key reasons why options were discounted or taken forward into the final proposed scheme solution.

4.0 EIA METHODOLOGY

4.1 Introduction

4.1.1 This chapter provides a brief description of the approach to the environmental assessment process and describes the broad principles that will be applied within each technical assessment. Each technical assessment will follow a similar approach as follows:

- an introduction describing the basic scope and approach undertaken to the assessment;
- a description of the methodology applied to the assessment both in terms of any surveys carried out and also the criteria used in the impact assessment, any limitations to the assessments will also be described;
- a presentation of the baseline conditions relevant to that discipline;
- an impact assessment that describes the effects that are likely to arise from the Proposed Development. The assessment will include a description of the nature, extent and significance of these effects. The assessment will take into account mitigation measures that have been incorporated into the Proposed Development;
- a description of mitigation measures will be provided, this will include any enhancement or compensation proposed to either further reduce the negative effects of the development or to provide benefits to the local environment; and
- finally each chapter will include a section on the residual impacts and conclusions of the assessment. This section will describe the residual effects of the Proposed Development following the implementation of any additional mitigation or enhancement and will summarise the findings of the assessment.

4.1.2 Planning permission is being sought for a temporary development and as such the ES will address effects the construction, operational and decommissioning effects.

4.2 Determining Impact Significance

4.2.1 Each of the technical disciplines will describe the predicted environmental effects of the project on the baseline conditions of the Site and the local

environment. The assessment will include a description of the nature, extent and significance of these effects. The assessment will take into account any mitigation measures that have been specifically incorporated into the development proposals to reduce the environmental effects of the project.

4.2.2 The EIA regulations do not provide definitive methods for the assessment of significance and a variety of methods are employed within EIAs. The method used to assess the effects will be specific to each discipline. Where available and appropriate the assessments will follow impact assessment criteria and methodology set out by relevant professional institutions e.g. Institute of Ecology and Environmental Management, Landscape Institute etc. Where such guidance is not available or prescriptive methods are not set out by the relevant professional body then assessment criteria will be developed by the technical specialists to enable a clear and structured assessment to be undertaken.

4.2.3 The nature of the effect of the Proposed Development on the environment will, in general, be derived by considering the magnitude of the impact and the sensitivity of the receptor to a change resulting from the project.

4.2.4 Depending on the discipline there will be a number of factors that will need to be taken into account when establishing the type and magnitude of impact, including:

- whether the impact is adverse or beneficial;
- whether it is temporary or permanent;
- extent or spatial scale of the impact;
- duration of the impact;
- whether the effect is reversible; and
- probability/likelihood of the impact.

4.2.5 Similarly the sensitivity of a receptor will be the function of a number of elements dependent on the discipline and impact being assessed, these could include:

- designation and legal status;
- quality;
- rarity; and
- ability to adapt to change.

4.2.6 Having established the magnitude of the impact and the sensitivity of the receptor, the level of the effect will then be defined. For some disciplines a matrix will be used to classify the level of effect by correlating magnitude and sensitivity, an example matrix is shown in Table 4.1 below.

Table 4.1 – Example Level of Effect Matrix

		Magnitude of Impact			
		High	Medium	Low	Negligible
Receptor Sensitivity	High	Major	Moderate	Minor to Moderate	Negligible or Minor
	Medium	Moderate	Minor to Moderate	Minor	Negligible
	Low	Minor to Moderate	Minor	Negligible or Minor	Negligible
	Negligible	Negligible or Minor	Negligible	Negligible	Negligible

4.2.7 Where a matrix is not used the magnitude of change and the sensitivity of the receptor will be used to make a reasoned judgement to establish the level of the effect and whether it is considered to be significant or not significant. For some topics e.g. ground conditions and hydrogeology, an environmental risk assessment approach may be used to establish the potential environmental effects of the Proposed Development.

4.2.8 It should be noted that there is no statutory definition of what level of effect is considered to be significant and there is often not a single, definitive, correct answer as to whether an effect is significant or not. However, it is considered that a significant effect is one which is likely to be a key material factor in the decision-making process. A significant effect does not necessarily mean that such an effect is unacceptable to decision-makers. This is a matter to be weighed in the planning balance alongside other factors. What is important is that the likely effects of any proposal are transparently assessed and described in such a way to enable the relevant determining authority to bring a balanced and well-informed judgement to bear as part of the decision-making process.

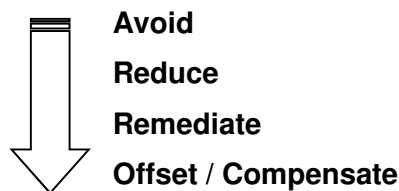
4.2.9 Where the findings of an assessment are set out as different levels of effect (e.g. major, moderate, minor, etc) the assessment will clearly set out where an effect is considered to be significant. This approach will be used to assist the

decision maker, consultees and other interested parties in establishing the most critical environmental effects of the project.

- 4.2.10 In all instances the assessment will set out the basis of the judgements made so that the readers of the ES can appreciate the weight attached to the different factors and understand the rationale of the assessment. In this sense the ES clearly explains how the impact significance has been derived.

Mitigation

- 4.2.11 It is a requirement of the EIA regulations to describe the measures envisaged to prevent, reduce and where possible offset any significant effects on the environment. Mitigation can be achieved in a number of ways as listed below. This approach is often referred to as the mitigation hierarchy with mitigation being selected as high up the hierarchy as possible.



- 4.2.12 Certain mitigation measures may be incorporated into the Proposed Development as a result of decisions undertaken during the design of the scheme. These measures will be clearly described within the ES.
- 4.2.13 The mitigation section of each technical chapter will provide a description of additional mitigation and enhancement measures proposed to prevent, reduce or offset adverse effects unavoidable through design, or to provide benefits to the scheme / local environment. An explanation will be provided of how these measures will mitigate / reduce the identified effects of the Proposed Development.

4.3 Residual Effects and Conclusions

- 4.3.1 This section will provide a textual description of the residual effects of the Proposed Development following the implementation of any additional mitigation or enhancement measures.

4.3.2 The conclusions will summarise the key elements of the assessment and include a statement on whether the Proposed Development is considered likely to result in any significant environmental effects.

4.4 Cumulative Effects

4.4.1 The EIA regulations require that a description of the likely significant effects of the development on the environment should be included in the ES, including cumulative effects. The EIA regulations do not define cumulative effects, however, a commonly accepted description is:

“Impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project” (European Commission, 1999)

4.4.2 There is no defined methodology in the UK as to how cumulative effects should be assessed. In determining the approach to be adopted reference will be made to the following guidance:

- Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions (European Commission 1999);
- Cumulative Effects Assessment Practitioners Guide (Canadian Environmental Assessment Agency 1999);
- Guidelines for Environmental Impact Assessment (Institute of Environmental Management and Assessment 2006);
- The State of Environmental Impact Assessment Practice in the UK (Institute of Environmental Management and Assessment 2011); and
- Advice note seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects (The Planning Inspectorate 2015).

4.4.3 The assessment of cumulative impacts associated with the development will encompass the effects of the proposal in combination with:

- approved development under construction;
- approved development awaiting implementation; and
- proposals awaiting determination within the planning process with design information in the public domain.

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- 4.4.4 Projects to be considered for inclusion in a cumulative assessment are major projects falling within the above categories. Major projects are considered to be developments of 10,000m² in size or greater and projects that have been subject to EIA. Projects that fall outside the above criteria will only be included in the assessment if specifically identified by the Planning Authority or other statutory consultees.
- 4.4.5 At present the only project to be included within the cumulative assessment is Protos.
- 4.4.6 The cumulative effects of operational projects are considered to already form part of the baseline and as such would be assessed within each of the discipline chapters.
- 4.4.7 Each topic will have a different spatial zone where potential cumulative significant effects could occur. However, a preliminary search area of 2.5km from the Site would be used to identify projects to be included in the cumulative effects assessment.
- 4.4.8 Information on the environmental effects of these projects will be obtained from the ES for these developments, where this is available. Each technical discipline will consider the likelihood of significant cumulative effects initially through a qualitative assessment and if necessary through quantitative modelling. Where significant cumulative effects are identified these will be clearly reported and if possible mitigation measures will be recommended.

5.0 ECOLOGY AND NATURE CONSERVATION

5.1 Introduction

5.1.1 The Ecology Chapter of the ES will consider the likely ecological effects relating to the Proposed Development during its construction, operation and restoration phases. An ecological impact assessment will be undertaken to establish the likely presence or likely absence of protected or notable species, identify statutory and non-statutory designated sites for nature conservation in the vicinity of the Proposed Development and evaluate the overall conservation value of the Site. The potential for the Proposed Development to have an effect on designated sites and protected and notable species will be assessed and mitigation measures identified where relevant.

5.2 Baseline

5.2.1 Ecological surveys have been undertaken in 2016 to establish baseline information on the Application Site and its local context. These have followed recognised methodologies and have been completed by suitably qualified and experienced ecologists. The surveys have comprised:

- Extended Phase 1 Habitat survey;
- Bat Activity survey; and
- Breeding Bird survey.

5.2.2 The Multi Agency Geographic Information for the Countryside (MAGIC), Joint Nature Conservation Committee (JNCC) and Natural England (NE) websites were accessed to obtain information on statutory sites within a 5km radius of the Site boundary. The nearest statutory designated site is the Mersey Estuary SPA, Ramsar Site and SSSI located approximately 900m to the north with qualifying features of notable water bird assemblages including black-tailed godwit, dunlin, golden plover, pintail, redshank, shelduck and teal. Helsby Quarry Local Nature reserve (LNR) lies 3km to the south-east and Dunsdale Hollow SSSI a little under 5km east.

5.2.3 As part of the assessment, reference will be made to Ordnance Survey maps of the wider area using on-line aerial images (including www.google.co.uk/maps) in order to identify features of nature conservation interest in the surrounding landscape. The Cheshire West and Chester Council

interactive mapping tool will be used to identify locally-designated sites of wildlife value and locations covered by Tree Preservation Orders (TPOs)¹ in conjunction with desk study work to gather and review information relating to Local Wildlife Sites and other sites of local biodiversity interest. Biological records for the area, within a 2km radius of the Site, will be requested from the Cheshire biological records centre (rECOrd) and other species recording groups as appropriate.

Extended Phase 1 Habitat Survey

- 5.2.4 An extended Phase 1 habitat survey was undertaken on 31st March 2016. The survey followed the methodology detailed in the 'Handbook for Phase 1 habitat survey' (JNCC, 2010)² and included the Site and immediately adjacent land where this could be viewed from within the Site or from public roads.
- 5.2.5 The Site comprised a roughly triangular area of land bordered on two sides by roads and on the third by a large industrial facility. A broad-leaved woodland lay immediately to the north of the Site. The woodland included willow species, alder, sycamore, ash, poplar and holly and had an understorey of nettles, Himalayan balsam, greater willowherb and ground elder, with broad-buckler fern, male fern and hart's-tongue fern. A wet ditch ran through the woodland (but was not flowing at the time of the survey). The woodland contained some trees which had low potential to support bats, with cracks and fissures and ivy cover, and at least one bat box was in place.
- 5.2.6 The majority of the land within the Site comprised hardstanding with some adjoining agricultural (cultivated) land and improved grassland. Tall ruderal vegetation and trees bordered the Site and adjoined the roads. New road and roundabout construction was underway at the time of survey along the eastern and southern boundaries of the Site, involving tree removal and vegetation clearance.
- 5.2.7 There were no ponds or surface water features within the Site. The only pond within 250m is an operational lagoon associated with the nearby industrial site. Access to the lagoon was not possible. However, aerial images indicate that its

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<http://maps.cheshire.gov.uk/cwac/interactivemapping/?e=350962.000&n=363241.000&s=300000&layers=LWS&bm=SM>
² JNCC (2010). *Handbook for Phase 1 Habitat Survey – a Technique for Environmental Audit*. JNCC, Peterborough

location (industrial complex with roads around) and its construction (steep sided constructed banks lacking natural vegetation) would render it unsuitable for GCN. Two other ponds shown on OS mapping were no longer shown as present on recent aerial imagery. A network of field drainage ditches is present around fields in the area. The Site provides very limited suitable terrestrial habitat for amphibians if present in the area. On the basis of the foregoing no amphibian survey is proposed.

5.2.8 Japanese Knotweed has been recorded as being present within the Site, and Himalayan balsam is present within the adjacent woodland.

5.2.9 As a result of the findings of the Extended Phase 1 habitat survey, no further detailed botanical surveys are proposed in relation to the assessment.

Bat Surveys

5.2.10 Although the Site did not contain any trees or structures suitable to support bat roosts, within the nearby woodland there were several trees considered to have low bat roost potential, displaying some features suitable for roosting bats (e.g. cracks in limbs, loose bark, and ivy growth).

5.2.11 Bat activity surveys were undertaken following the approach set out in current Bat Conservation Trust Guidance (BCT, Collins 2016³). Bat survey methods also made reference to the Bat Workers Manual and the guide to British Bat Calls⁴. Three surveys were completed within the period April-October in appropriate weather conditions. These comprised transect surveys undertaken at dawn or dusk. Each transect route was interspersed with listening Points (LPs) where five minutes of static monitoring was undertaken. The transect surveys encompassed land around the Site (i.e. focused on the boundary scrub and tree lines) and their purpose was to identify bat species present, and the distribution and activity levels of bats across and around the Site at the time of survey.

5.2.12 In addition to the transect surveys, two automated detector monitoring stations (MS) provided nights of continuous recording over three separate survey

³ Collins, J. (2016). *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edition)*. The Bat Conservation Trust, London

⁴ Mitchell-Jones, A. J. & McLeish, A. P. (2004). *Bat Workers Manual. 3rd Edition*. Joint Nature Conservation Committee, Peterborough; and

Russ, J. (2012). *British Bat Calls: A Guide to Species Identification*. Pelagic Publishing, Exeter.

periods. Monitoring was undertaken between the time period spanning approximately half an hour before sunset and half an hour after sunrise, with all of the detectors set up to record simultaneously, to allow a comparison of activity recorded across different habitats/locations.

5.2.13 The survey results indicated that bat activity around the Site was low overall.

5.2.14 The surveys were undertaken to provide an indication of bat activity and the range of species using the Site and immediate surrounds and were not intended to identify specific roost locations unless as an incidental observation.

Breeding Bird Surveys

5.2.15 Three breeding bird survey visits were undertaken in spring and summer 2016 following a simplified version of the Common Bird Census (CBC) method. The surveys were carried out in suitable conditions. Birds were located by walking, listening and scanning by eye and with binoculars across the Site and adjoining land.

5.2.16 The Site is not suitable for any species associated with the nearby statutory designated sites. A peregrine was recorded flying overhead but the Site does not provide suitable nesting habitat or good quality foraging habitat for this species. No evidence of ground nesting birds was observed. Some species of local conservation value (e.g. Eaton et al., 2015⁵) were observed in the locality, as would be expected, associated with the boundary scrub and trees.

Other Species

5.2.17 No evidence of badger, or other species including species of Principal Importance listed under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006, was recorded during field surveys. The Site largely lacks habitat suitable for badgers, brown hare or hedgehog, although these species, along with other small mammals, have the potential to be occasionally present in the wider area. The boundary scrub and trees will support a limited suite of invertebrate species.

⁵ Eaton MA, Aebischer NJ, Brown AF, Hearn RD, Lock L, Musgrove AJ, Noble DG, Stroud DA and Gregory RD (2015) *Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. British Birds* 108, 708–746

5.2.18 Overall the baseline surveys indicate that the Site (comprising mainly bare ground and hardstanding) has very limited ecological interest or biodiversity value. Most biodiversity value lies at the boundaries, where scrub, ruderal vegetation and trees provide some structural and species diversity, habitat connectivity with the wider area, and foraging, breeding and commuting opportunities for some species.

5.3 Potential Effects

5.3.1 The main effects likely to arise from the Proposed Development and which will be assessed within the ES Chapter relate to:

- direct land take (habitat loss);
- direct and indirect disturbance or harm to protected or notable species within the Proposed Development area, including ancillary infrastructure;
- fragmentation or severance of habitat corridors or ecological networks; and,
- indirect disturbance, displacement effects, or harm to habitats and species beyond the development footprint (e.g.as a result of pollution, site runoff, noise, dust, lighting etc.).

5.3.2 These will be considered in relation to the construction, operation and restoration phases of the Proposed Development.

5.3.3 The baseline data gathered to date will help inform the design of the project and impacts on features of ecological interest will be avoided where possible.

5.4 Assessment Methodology

5.4.1 The Chapter will contain an impact assessment which refers to the Chartered Institute of Ecology and Environmental Management (CIEEM) 2016 guidance⁶ and will cover:

- evaluation of identified important features; faunal species, habitats and vegetation (as appropriate) on an international, national and regional basis;
- description and evaluation of the potential effects of the Proposed Development on statutory and non-statutory sites designated for nature conservation;

⁶ Chartered Institute of Ecology and Environmental Management (2016). *Guidelines for Ecological Impact Assessment in the UK and Ireland*. CIEEM, Winchester

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- description and evaluation of the potential effects of the Proposed Development on species, habitats and vegetation, in accordance with current guidelines Where uncertainties exist, professional judgment will be used to inform the ecological assessment;
 - detailed species-specific assessment of effects;
 - mitigation and enhancement measures to address the identified effects and identification of any residual effects following mitigation;
 - description and evaluation of residual effects of the Proposed Development and,
 - cumulative assessment.

5.4.2 As part of the information gathering and assessment process, consultation will be undertaken with relevant statutory and non-statutory bodies and the Cheshire West and Chester Council Ecologist, and biological records will be requested from the local records centre (rECOrd) and local species groups as appropriate. No additional field surveys are proposed in addition to those undertaken in 2016.

5.4.3 The Ecology Chapter for the ES will be accompanied by figures and technical appendices, as required.

5.4.4 The assessment will refer as necessary to relevant legislation and national and local planning policy, including but not restricted to:

- Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora (hereafter referred to as the 'Habitats Directive');
- Directive 2009/147/EC of the European Parliament and of the Council on the Conservation of Wild Birds (codified version of Directive 79/409/EEC as amended) (hereafter referred to as the 'Birds Directive');
- The Conservation of Habitats and Species Regulations 2010, as amended (hereafter referred to as the 'Habitat Regulations');
- The Wildlife and Countryside Act 1981 (as amended);
- Countryside and Rights of Way Act 2000;
- Protection of Badgers Act 1992;
- Hedgerow Regulations 1997;
- Natural Environment and Rural Communities (NERC) Act (2006);

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- The National Planning Policy Framework (NPPF);
 - Cheshire West and Chester Local Plan (Part One) Strategic Policies January 2015;
 - The United Kingdom Biodiversity Action Plan (UK BAP);
 - BS 42020:2013 Biodiversity – Code of Practice for Planning and Development; and,
 - The Cheshire Biodiversity Action Plan⁷.

5.4.5 The 'UK Post-2010 Biodiversity Framework' succeeds the UK Biodiversity Action Plan (UK BAP) and 'Conserving Biodiversity – the UK Approach'. The lists of priority species and habitats agreed under UK BAP still form the basis of much biodiversity work and are therefore considered within this report in the context of the objectives of the Biodiversity Framework. BAPs identify habitats and species of nature conservation priority on a UK (UK BAP) and Local (LBAP) scale. UK BAPs formed the basis for statutory lists of priority species and habitats in England under Section 41 (England) of the Natural Environment and Rural Communities (NERC) Act 2006, and so are also relevant in the context of this legislation.

5.4.6 The assessment will consider direct, indirect, permanent and temporary effects. A review of the likely activities associated with the Proposed Development and the context of the Application Site has been used to identify '*zones of influence*' for the assessment. These help inform the desk study and field surveys, the valuation of ecological features and the scope of the assessment. Zones of influence vary in accordance with the typical distribution and movements of individual species and the likely mobility of qualifying interests of statutory designated sites and the extent and nature of potential effects upon them. Zones of influence for the Application Site and Proposed Development that have been considered to date are as follows:

- Desk study designated sites – 5km, and 10km for SPAs;
- Desk study protected and notable species(e.g. NERC S41 Species of Principal Importance);
- Field survey habitats – land within the Site and immediately surrounding habitats where these could be viewed from accessible land;

⁷. <http://www.cheshire-biodiversity.org.uk/>

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- Field survey badgers – the Site and at least 30m around where access permitted;
 - Field survey bats – the Site and boundary habitats;
 - Field survey breeding birds – the Site and adjoining visible land; and
 - Field survey otter and water vole – ditch habitat (adjacent ditch in woodland) suitability appraisal and searches for evidence of presence as part of Extended Phase 1 habitat survey of the Site.

It is proposed the scope of the ES will include a detailed assessment of the ecological effects of the Proposed Development.

6.0 LANDSCAPE AND VISUAL IMPACT

6.1 Introduction

6.1.1 Landscape and visual effects are separate, although closely related and interlinked issues. As such, the assessments of the effects of the Proposed Development upon the landscape and upon visual amenity will be carried out under separate headings within the Landscape and Visual Impact Assessment (LVIA).

6.1.2 The assessment of landscape effects considers the potential effects of the Proposed Development on the landscape as an environmental resource. Landscape effects are caused by physical changes to the landscape, which may result in changes to the distinctive character of that landscape and how it is perceived.

6.1.3 The visual assessment is concerned with the potential effects that may occur resulting from the Proposed Development upon the population likely to be affected. It assesses the change in visual amenity experienced by people arising from the presence of a development in the view.

6.1.4 Both assessments include consideration of night time effects that might be brought about by the development by virtue of the addition of light sources.

6.2 Baseline

Study Area

6.2.1 As set out later in this section of the Scoping Report, the methodology followed for the LVIA will be a project specific methodology that follows the principles set out in the current (third) edition of Guidelines for Landscape and Visual Assessment published in 2013 (GLVIA3). GLVIA3 emphasises that assessments should be proportionate to the development under consideration, with more detailed and wide-ranging assessments being required for projects that are likely to bring about distinct or widely felt long term changes and with less detail being required for development that is of a temporary nature or which will bring about only limited or localised change.

6.2.2 Initial assessment of the proposed development site and consideration of the project details indicates that changes relevant to LVIA would be of a temporary

nature, that they would be of a limited scale and extent, and that they would be visible from only a relatively localised area. In addition, the nature of the receiving landscape which has been subject to extensive recent and ongoing change is such that it is relatively robust to localised visual changes of the type envisaged

- 6.2.3 These considerations indicate that the appropriate study area for the LVIA is relatively small, extending to a radius of no more than approximately 1 kilometre from the site boundary.

Landscape Designations

- 6.2.4 There are no landscape designations within or close to the Study Area.

Landscape Character

- 6.2.5 The Site is located in an area that is illustrated as being 'urban' on the 2016 Cheshire West and Chester Landscape Character Assessment map. It sits adjacent to the Encirc Glass factory and adjacent to the access road to the CF Fertiliser plant which is less than a kilometre to the east. The Site also forms 'Plot 11' of the recently consented Protos development.

- 6.2.6 Notwithstanding this, the Site does sit immediately alongside and shares some of the characteristics of landscape character type 4 (LCT4) Drained Marsh, more specifically landscape character area 4a (LCA4a): Frodsham, Helsby and Lordship Marshes.

- 6.2.7 The Drained Marsh landscape character type is located on former saltmarsh or mudflats adjacent to the Dee and Mersey estuaries. It is drained by inter-connecting networks of drainage channels arranged in a regular, often linear pattern, and this gives the impression of an open unenclosed landscape. The reclaimed land has predominantly been used as grazing land, with some arable crops. In the case of the part of LCA4a that adjoins the Site, a large proportion of the area is in the process of being developed for industry, including notably the Ince Marshes Resource Recovery Park which includes the Site itself and extends for some distance to the north and east of the Site. The established close proximity of existing and proposed industrial sites can be considered a dominant characteristic.

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- 6.2.8 The landscape type appears as a very flat, and in general open and large scale landscape. The combination of flat topography and low field boundaries such as drainage ditches or post and wire fences allows extensive panoramic views across the character area and in places out to the surrounding character areas. The Site is atypical in this respect, being surrounded by tall mature trees both along its boundaries and associated with the adjacent glass plant.
- 6.2.9 The recently constructed Frodsham wind farm and a number of large scale overhead power lines running parallel with the M56 and railway are dominant features in the wider area.
- 6.2.10 The key Landscape Characteristics of LCA 4a: Frodsham, Helsby and Lordship Marshes are set out in the Character Assessment as follows
- A flat, low lying landscape (up to 13m AOD) of former mudflats and saltmarsh alongside the Mersey Estuary, contrasting with surrounding built development (previously designated as an Area of Significant Local Environmental Value – ASLEV)
 - Strong Interconnection and intervisibility with LCT 16 Mudflats and Saltmarsh to the north
 - Reclaimed as part of the opening of the Manchester Ship Canal in 1894, with further drainage following the Second World War to produce productive farmland
 - The flat landscape is etched with a distinctive pattern of straight drainage ditches which delineates the field pattern of planned 19th century enclosure
 - There is an extensive ditch system, a stronghold for water voles in the borough
 - Incomplete hedgerow boundaries provide partial enclosure along some field boundaries
 - Land to the north of Lordship Lane is used as a deposit ground for dredgings from the Manchester Ship Canal and supports a range of wetland habitats
 - Land to the south of Lordship Lane is in agricultural use a mixture of pasture and arable with incomplete thorn hedgerows
 - Canal dredging grounds defined by high earth embankments
 - The area is of local, national and international importance for its breeding, wintering and passage birds which add movement to the landscape

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- An isolated, bleak and open landscape settlement is limited to isolated farms linked by rough tracks between ditches
 - A system of surfaced tracks and bridleways serve the area, including National Cycle Route (NCR) 5
 - The M56 and railway utilise the flat landscape, crossing the marsh at the base of the Helsby to Frodsham Undulating Enclosed Farmland that gently rises to the south
 - Running parallel to the M56 area a number of large scale overhead power lines which are dominant features in this flat landscape
 - The flat, open landscape provides clear views to and from the adjacent Frodsham Sandstone Ridge and Helsby Hill
 - Industrial works at Ince Marshes, and at Halton and Rocksavage in Runcorn, form a backdrop in views to the west and east respectively
 - Permitted windfarm will become dominant creating a 'windfarm landscape' when constructed (this is now operational)

Visual Receptors

6.2.11 Receptors in the vicinity of the Site that are likely to experience views of the development include, in order of sensitivity:

- occupants of nearby residential properties, notably at the edge of Elton, along Station Lane and at isolated farms on the marshes;
- users of National Cycle Route 5 – a section of which runs adjacent to Grinsome Road to the north of the site, linking to Marsh Lane to the east and west;
- walkers on public rights of way in the vicinity of the site
- other road users on the local highway network – most of whom are workers at nearby industrial premises

6.3 Potential Effects

6.3.1 Potential effects are likely to arise from the proposals due the introduction of new built infrastructure and activity into what is currently a relatively static rural context. More specifically:

- the introduction of a new site access track with gates and signage and potentially some limited temporary loss of site boundary vegetation;

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- creation of a temporary site compound with containers, cabins and storage of materials within a security fence; specific items of plant and equipment;
 - creation of temporary soil bunds to store materials stripped to create the compound and access track;
 - in general the site will consist of relatively low level structures (mostly less than 3m) but there will be some items of plant and equipment that will be taller structures and thus potentially more widely visible, albeit temporary in nature, including a drilling rig which could be up to 60m tall;
 - where the working day extends beyond hours of darkness, there would be some lighting of the compound;
 - there would be activity in the form of traffic and personnel movements, some of which would be eye-catching due to the use of reflective and high-visibility colour schemes for safety purposes;

6.4 Methodology

6.4.1 The LVIA will be carried out in accordance with a project specific methodology prepared in accordance with guidance provided within 'Guidelines for Landscape and Visual Impact Assessment' (GLVIA) 3rd edition 2013 (*The Landscape Institute and Institute of Environmental Management and Assessment*).

6.4.2 The LVIA will aim to provide:

- a clear understanding of the Site and its setting in respect of landscape character and visual amenity;
- an understanding of the Proposed Development in terms of its relationship with the existing landscape character and visual amenity;
- an identification of potential effects of the Proposed Development upon the landscape;
- an identification of potential effects on visual receptors;
- a description of any proposed mitigation measures; and
- a conclusion as to the potential residual effects of the Proposed Development.

6.4.3 The LVIA process will follow a standard approach, namely:

- the establishment of the baseline conditions i.e. the existing character and sensitivity of the landscape, and the type and sensitivity of visual receptors;
- the prediction of the magnitude of change that the Proposed Development will bring, allowing for mitigation measures, upon the landscape and upon visual receptors; and
- an assessment of the significance of effect that would occur, by considering the predicted magnitude of change, together with the sensitivity of the landscape or visual receptor.

6.4.4 The assessment will include a series of photographs from viewpoints representative of this range of receptors. These photographs will be annotated to indicate the extent of proposed works compounds and the approximate proposed locations of key equipment such as drilling rigs. Provisional viewpoint locations have been identified and are set out in Table 6.1 below (with locations illustrated in Figure 3).

Table 6.1 – Representative Viewpoint Locations

Viewpoint	Location	Receptor Type
1	Orchard Park Lane, Elton	Residents, road users
2	Station Road	Residents, road users
3	Marsh Lane to NW of the Site (NCN 5)	Cyclists, other road users
4	Grinsome Road roundabout (NCN 5)	Cyclists, other road users
5	Marsh Lane to E of the Site (NCN 5)	Cyclists, other road users

Mitigation

6.4.5 The LVIA would include a description of mitigation methods incorporated into the scheme design, including any site planning considerations such as the strategic positioning of soil bunds to screen operations. Other likely mitigation methods include vegetation management (e.g. allowing existing hedgerows close to the compound to grow taller for the duration of the development) and new planting.

It is proposed the scope of the ES will include a detailed assessment of the landscape and visual effects of the Proposed Development.

7.0 NOISE AND VIBRATION

7.1 Introduction

7.1.1 The noise and vibration chapter of the ES will present an assessment of the potential noise and vibration impacts of the Proposed Development on neighbouring noise sensitive receptors during the construction, operational and decommissioning phases.

7.2 Baseline

7.2.1 The site is located in an industrial area just south of the Manchester Ship Canal north of the village of Elton and east of the village of Ince. Stanlow Oil Refinery is located just west of Ince with Ellesmere Port circa 6km west of the site.

7.2.2 The nearest receptors are located to the south off Orchard Park Lane, northwest off Marsh Lane and west off Marsh Lane at Ince as shown on Figure 2.

7.2.3 The assessment will require a baseline sound study. This would include monitoring over a period of a week. At this stage in order to establish typical baseline levels in the area the initial survey would include a fixed monitoring position in the vicinity of Orchard Park Lane and Marsh Lane. Some additional night-time attended spot roaming measurements may also be undertaken in close proximity to sensitive receptors off Marsh Lane during early morning periods when background sound levels are likely to be lowest and movement of people and traffic are low to determine background sound levels.

7.2.4 The fixed position monitoring would be undertaken of the course of a week to identify representative baseline noise conditions.

7.3 Potential Effects

7.3.1 The potential effects likely to arise from the Proposed Development would include:

- The direct and temporary effects of noise on nearest sensitive receptors from the construction and establishment of the wellsite compound during day-time periods.
- The direct and temporary effects of noise on nearest sensitive receptors from Drilling Operations during daytime and night-time periods.

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- The direct and temporary effects of noise from Hydraulic Fracturing Operations during daytime periods.
 - The direct and temporary effects of Flow Testing and Flare Operations during daytime and night-time periods.
 - The direct and temporary effects of vibration from site preparation and operations. Vibration is not expected to be significant at separation distances greater than around 50m. As such it is proposed to provide a brief qualitative assessment to show that vibration levels would be imperceptible.
 - The direct and in-direct temporary effects of any associated vehicle movements to and from Site during site preparation and operations on the local road network and nearest sensitive receptors during daytime periods.
 - The direct and temporary effects of noise on nearest sensitive receptors from Site dismantling and re-instatement of Site during daytime periods.

7.4 Assessment Methodology

7.4.1 All information on the layout of the Proposed Development, detail of the likely plant schedule and any available information from equipment suppliers on plant noise levels would be reviewed and presented within the assessment. Where appropriate, empirical noise level data would be referred to from surveys obtained from similar plant operating at other sites. In respect of the drilling rig it is unlikely that the precise rig will be known at the time of the assessment. As such a review will be undertaken of the potential rigs and the assessment will be based on the equipment likely to give rise to the highest impact.

7.4.2 Following the review of the site layout and data available on plant noise levels, noise prediction calculations would be undertaken of the effect of the plant in operation. This would consist of producing a noise model with using computer-based noise modelling software (i.e. CadnaA) for the operation of the Proposed Development at the various stages. This would include the cumulative effect of the operation of all facilities on Site. The predicted noise levels would assist in establishing the likely impact at the nearest sensitive receptor positions as listed at paragraph 2.1.8 and shown on Figure 2. Where available empirical noise data will be used for all plant being proposed, including the flare operations, to make the assessment meaningful and as accurate as possible.

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- 7.4.3 The nearest sensitive receptor locations, appropriate monitoring positions and the extent of the baseline survey to determine 'representative' background sound levels will be agreed with the Council's EHO prior to undertaking surveys.
- 7.4.4 The results of the initial baseline sound monitoring would be analysed and assessed. The baseline survey would be undertaken in accordance with monitoring conditions and methodology for the assessment of background sound levels found in BS4142: 2014.
- 7.4.5 The main noise sources on Site would be assessed in terms of their contribution to noise radiating from the Site at nearest sensitive receptors and results compared with relevant impact criteria, which are set out below.
- 7.4.6 Where appropriate, noise control measures will be considered to ensure that noise levels are within the agreed noise limits and relevant noise criteria guidance. It will be important for information to be provided to show what measures are available for reducing noise levels and their effect. Where applicable, the issue of proving unreasonable burden in terms of achieving the noise limits during night-time periods would be the responsibility of the developer.
- 7.4.7 Noise arising from road traffic will be determined from the traffic figures provided in the Transport Assessment in accordance with the methodologies provided within 'Calculation of Road Traffic Noise' and the Design Manual for Roads and Bridges' 2011.
- 7.4.8 The impact assessment will be undertaken with reference to the following standards and guidance:
- Night Noise Guidelines for Europe' WHO 2009
 - Planning Practice Guidance (Mineral Operations): March 2014;
 - BS8233:2014 'Guidance on sound insulation and noise reduction for buildings';
 - World Health Organisation (WHO) Guidelines for Community Noise: April 1999;
 - BS4142: 2014 'Methods for rating and assessing industrial and commercial sound';
 - National Planning Policy Framework: 2012;
 - Noise Policy Statement for England (NPSE) March 2010;

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- BS5228: 2009 Parts 1 & 2 'Code of practice for noise and vibration control on construction and open sites';
 - Design Manual for Roads and Bridges: Volume 11 - 2011; and
 - ISO 9613-2: 1996 Acoustics – Attenuation of Sound During Propagation Outdoors.

7.4.9 In summary, the noise impact assessment would include the following:

- background sound measurements at nearest accessible locations relative to nearest sensitive receptors to establish the baseline situation;
- identification of noise generating activities, such as
 - i) operational noise from mobile plant;
 - ii) operational noise from fixed plant;
 - iii) operational noise from flare operations;
 - iv) road traffic movements;
 - v) vibration from mobile plant and fixed plant operations (if this element is not scoped out).
- calculation of predicted noise levels using a computer model;
- assessment of the predicted noise levels from fixed and mobile plant against the agreed noise criteria limits to derive a significant impact;
- identification of mitigation measures to address any significant impacts; and
- ES Chapter providing an assessment of the effects, impacts, mitigation and residual impacts.

It is proposed the scope of the ES will include a detailed assessment of the noise effects of the Proposed Development.

8.0 AIR QUALITY

8.1 Introduction

8.1.1 The Proposed Development has the potential to generate impacts on local air quality at nearby sensitive human health and ecological receptors. An assessment of the potential impacts of the Proposed Development on local air quality will be undertaken to quantify effects and to provide recommendations for mitigation.

8.2 Baseline

8.2.1 The Site is located 1km to the east of the village of Ince and 700m north of the village of Elton. The landuse of the immediate surrounding area is a mixture of industrial and rural/agricultural, with a glass manufacturer located 150m to the southwest and a fertiliser manufacturing works 600m to the east. Stanlow Oil Refinery is located to the west of the Site.

8.2.2 The Site is located within the southwestern section of the Protos development for which outline planning consent is held for a variety of industrial uses including an Energy from Waste (EfW) facility and biomass plant. The biomass plant is currently under construction and is due to start operating in 2017. The timing of the delivery of other elements of the Protos development is unknown.

8.2.3 There are no areas of concentrated habitation or highly sensitive receptors such as schools or hospitals within 500m of the Site. The closest residential properties are located in the outskirts of Elton, on Orchard Park Lane 700m to the south-southwest of the site and Ince Orchards 740m to the southwest. There are properties circa 1,000m to the west of the Site on Station Road / Marsh Lane, Ince.

8.2.4 The nearest statutory designated nature conservation site is the Mersey Estuary Ramsar / SPA / SAC located 1km to the north.

8.2.5 CWACC has declared four Air Quality Management Areas (AQMAs) within the Council area. The nearest of these is in Thornton-le-Moors where an AQMA was declared in 2016 because concentrations of sulphur dioxide (SO₂) exceeded the UK objective due to industrial sources. The AQMA lies to the southwest of the Site and extends to within 1.8km at its closest point to the site boundary.

8.2.6 CWACC undertakes monitoring for air quality across the Council area for a range of pollutants using a variety of automatic analysers and diffusion tubes. No CWACC monitoring stations are located in the vicinity of the Site, the closest being within the village of Thornton-le-Moors 2.7km to the south west where monitoring for NO_x / NO₂, PM₁₀ and SO₂ is undertaken. The concentrations of SO₂ detected have resulted in the recent declaration of an AQMA as noted above; concentrations of NO_x / NO₂ and PM₁₀ are however within the relevant UK air quality objectives.

8.2.7 The air quality in the vicinity of the Site therefore is expected to be within acceptable levels albeit influenced by the industrial activities in the wider area. Reference to predicted background air pollutant concentrations provided by Defra for the grid square in which the Site is located indicates concentrations of key potential pollutants to be substantially below the UK established objectives.

8.3 Potential Effects

8.3.1 The Proposed Development may give rise to the following aerial emissions, which could result in potential impacts on local human and ecological receptors:

- dust (fugitive dust and particulate matter) during the compound construction and restoration phases;
- vehicle exhaust emissions from vehicles (nitrogen oxides (NO_x), PM₁₀ / PM_{2.5}) travelling to and from Site and from on-site non-road mobile machinery (NRMM) during the construction, operational and restoration phases;
- combustion emissions from on-site power generation plant during the construction and operational phases (NO_x, PM₁₀ / PM_{2.5}, carbon monoxide (CO) and sulphur dioxide (SO₂));
- gaseous emissions from the flare (primarily NO_x along with carbon monoxide (CO) and volatile organic carbons (VOCs)); and
- fugitive emissions of natural gas.

8.3.2 The primary operation considered to require detailed assessment is that of gaseous emissions arising from the flare during the flow test period. However, it is noted that the Site is relatively remote from sensitive receptors with the nearest housing being 700m distant and statutory nature conservation sites 1km distant.

8.3.3 Construction and restoration phases are to be short-lived and potential effects arising from dust during these phases are unlikely to be significant, and can be readily controlled through standard mitigation measures. Similarly, potential effects arising from the on-site power generation plant and vehicle emissions during the construction, operational and restoration phases are unlikely to be significant but would nonetheless be assessed.

8.4 Assessment Methodology

8.4.1 The following will be undertaken to inform the assessment:

- site visit to view the site and surrounding land;
- identification of potentially sensitive human health and ecological receptors;
- review of Proposed Development information including details of key plant and operations; review of mitigation measures incorporated within the site layout and facility design; review of operational control and Environmental Permitting requirements;
- review of baseline conditions, potential local air emission sources and LAQM / CWACC / EA air quality data;
- purchase and review of appropriate meteorological data (5 years hourly sequential data will be necessary for dispersion modelling);
- review of expected vehicle movements and routing options as generated as part of the Transport Assessment;
- qualitative construction / restoration dust, vehicle emissions and on-site generation plant and fugitive emissions assessment;
- modelling of flare emissions (NO_x / NO₂ and benzene) using an atmospheric dispersion model (ADMS 5);
- assessment of impacts of flare emissions at appropriate human health receptors (including reference to long- and short-term AQALs);
- assessment of potential impacts associated with radon in flare and natural gas fugitive emissions;
- assessment of impacts of flare emissions at appropriate ecological receptors incorporating Critical Levels and Critical Loads assessment;
- overall assessment of potential effects on human health and ecological receptors; and
- provision of additional mitigation measures, if deemed necessary.

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- 8.4.2 The overall assessment will be undertaken in accordance with the National Planning Policy Framework (NPPF)⁸ and associated Planning Practice Guidance regarding Air Quality⁹ which provides guiding principles on how planning can take account of the impact of new development on air quality. A number of non-statutory guidance documents are published that outline requirements for air quality assessment for a range of aspects. The principle guidance that will be referred to is non-statutory guidance provided by the IAQM¹⁰ which sets out when an air quality assessment is required, and outlines a recommended methodology for carrying out such an assessment and determining the significance of impacts and effects.
- 8.4.3 The expected vehicle movements to and from the site during the construction, operation and restoration phases would be less than the indicative threshold of vehicle movements outlined in the IAQM guidance¹⁴ as indicating the need for the air quality assessment i.e. less than 100 average annual daily traffic (AADT) movements for Heavy Duty Vehicles (HDVs) and less than 500 AADT of Light Duty Vehicles (LDVs). As such a detailed air quality assessment of traffic movements would be scoped out of the EIA.
- 8.4.4 The assessment of potential effects associated with construction dust will be undertaken in accordance with the relevant non-statutory IAQM guidance on demolition and construction dust¹¹.
- 8.4.5 Modelling of key potential emissions from the flare will be undertaken with an atmospheric dispersion model (ADMS 5), a new generation Gaussian plume dispersion model. Modelling will be undertaken for NO_x and VOCs (assessed as benzene). Emissions of CO, SO₂ and particulates are not considered likely to be significant and will be assessed qualitatively. The modelling will require the purchase and review of appropriate meteorological data; the data to be used will be agreed in advance with the Council. The modelling will incorporate local topography information and building effects as necessary.

⁸ Department for Communities and Local Government (March 2012), *National Planning Policy Framework*

⁹ Communities and Local Government, *Planning Practice Guidance: Air Quality*; last updated 06.03.2014

¹⁰ Institute of Air Quality Management (IAQM), *Land-Use Planning & Development Control: Planning for Air Quality*, v1.1, May 2015

¹¹ Institute of Air Quality Management (IAQM), *Guidance on the assessment of dust from construction and demolition*, February 2014

- 8.4.6 Assessment of potential effects on human health arising from the flare emissions will be undertaken in accordance with the IAQM guidance¹⁴. Assessment of potential impacts on ecological receptors will refer to Environment Agency (EA) guidance on air emission assessments for Environmental Permitting operations¹².
- 8.4.7 The assessment will also consider cumulative impacts taking into account existing consented, but not yet operational plants in the area, and in particular the Ince Park EfW facility and biomass plant.
- 8.4.8 It is considered that available background air quality data will be suitable to inform the assessment. Reference will be made to Defra predicted background data and Council monitored data. It is also possible that additional data may be held by the Environment Agency for the locality as part of monitoring undertaken by nearby Permitted facilities and which, where possible, will be referred to.
- 8.4.9 The sensitivity of the receptors to potential impacts from aerial emissions, whether changes in concentrations of pollutants, dust soiling etc, will be determined as detailed in the relevant guidance. The extent of receptors to be considered will be determined by the nature of the air emissions being assessed but will typically comprise sensitive receptors within 2km of the Site boundary and up to 50m of the key roads used to assess the Site. In accordance with EA guidance for Environmental Permitting, consideration will be made for international statutory designated nature conservation sites within 10km of the Site boundary. Receptors to be considered within the assessment will comprise the following:

Table 8.1: Receptor Selection Principles

Human Receptors	
Houses / groups of houses Schools, hospitals, shops, factories Public rights of way, recreational areas Allotments	identified based on distance from site boundaries, operational areas and haulage routes, sensitivity and likely duration of exposure up to 2km of Site boundary and up to 50m of Site access roads
Nature Conservation Sites	
SPAs, SACs and Ramsar sites	within 10km of site boundaries
SSSIs, National Nature Reserves, local wildlife sites and ancient woodland	within 2km of site boundaries

¹² Environment Agency (EA), Air emissions risk assessment for your environmental permit, updated 2nd August 2016

8.4.10 UK and EU legislation establishes a range of air quality objectives and target and limit values for concentrations of pollutants in outdoor air for the protection of human health and ecological systems. The EA also provides environmental assessment levels (EALs) for pollutants where air quality standards are absent. Potential impacts of air emissions at individual receptors will initially be undertaken through determination of the change in a pollutant concentration at the receptor (termed Process Contribution) in relation to the relevant UK objective, EU target and limit value or EA EAL (referred to as Air Quality Assessment Levels (AQAL)). IAQM and EA guidance provides the following threshold values in relation to human health and ecological receptors:

Table 8.2: IAQM³ and EA⁵ Screening Thresholds for Air Quality Impacts at Individual Receptors

<p>Human Health Receptors</p> <p>Potential impact is <i>negligible</i> where:</p> <ul style="list-style-type: none"> • long-term process contribution is <1% of relevant AQAL • short-term process contribution is <10% of relevant AQAL
<p>Nature Conservation Receptors</p> <p><u>SACs, Ramsars, SPAs and SSSIs:</u></p> <p>Potential impact is <i>negligible</i> where:</p> <ul style="list-style-type: none"> • long-term process contribution is <1% of relevant AQAL • short-term process contribution is <10% of relevant AQAL
<p><u>NNRs, local wildlife sites, ancient woodland:</u></p> <p>Potential impact is <i>negligible</i> where:</p> <ul style="list-style-type: none"> • long-term process contribution is <100% of relevant AQAL • short-term process contribution is <100% of relevant AQAL

8.4.11 Exceedance of these screening values does not infer that a significant impact is predicted, but that further assessment will be undertaken with reference to the predicted total pollutant concentrations at a receptor in relation to the Air Quality Assessment level (AQAL).

8.4.12 IAQM advises that the overall significance of effects of a proposed development with regards to air quality takes into account in number of factors such as:

- the existing and future air quality in the absence of the development;
- the extent of current and future population exposure to the impacts; and,

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- the influence and validity of any assumptions adopted when undertaking the prediction of impacts.

8.4.13 Other factors may be relevant in individual cases.

8.4.14 The ES will set out the detailed methodology used in the assessment, the predicted effects on local sensitive receptors and measures proposed to avoid, reduce or mitigate effects.

It is proposed the scope of the ES will include a detailed assessment of the air quality effects of the Proposed Development.

9.0 GROUND CONDITIONS AND HYDROGEOLOGY

9.1 Introduction

9.1.1 Soils, geology and hydrogeology play an important role in determining the environmental character of an area. Development schemes can have both direct and indirect effects on geology and groundwater. Existing soil conditions, particularly land contamination, can impose constraints on development. Conversely development can create pathways for the migration of groundwater and contamination, both in the short-term, during construction, and in the long-term during operation. Ground conditions can also introduce physical constraints on the construction of structures.

9.1.2 A review of published information sources and data held by the Applicant will be undertaken and used to understand the baseline conditions in and around the Site and to develop a conceptual model of the ground, groundwater and ground gas environment. This will describe any sources of pollution that may be associated with the Proposed Development during the construction, operational and decommissioning phases. The potential migration pathways for those pollutants and their potential impacts on receptors will be examined and the environmental risks qualitatively assessed by analysis of the source-pathway-receptor linkages.

9.2 Baseline

9.2.1 The geology and hydrogeology of the locality on which the Site is located can be briefly summarised as follows;

- The Site lies on the western flank of a rockhead outlier of Permo-Triassic sandstone which forms a small domed topographic high above the surrounding flat agricultural land. The sandstone outcrops at the eastern end of the Site with rockhead sloping underground to the west. The western part of the Site is overlain by post-glacial alluvial deposits covering glacial till, and glacio-fluvial sands/gravels;
- Underlying the Permo-Triassic sediments at depth are Westphalian Coal Measures strata (interbedded sandstones, mudstones and coals).
- The Permo-Triassic sandstone is classified as a Principal Aquifer by the Environment Agency (previously classified as a major aquifer). Principal Aquifers are layers of rock that have a high inter-granular and/or fracture

permeability, meaning they usually provide a high level of water storage. They support water supply and/or river base flow on a strategic scale.

- There are no Groundwater Source Protection Zones (SPZ's) near the Site.
- There are no Drinking Water Safeguard Zones in the area.
- The Site is not in a Groundwater Nitrate Vulnerable Zone

9.3 Potential Effects

9.3.1 The proposed activities include the handling and use of drilling muds, well cleaning fluids, hydraulic fracturing fluids, brine and cement and the recovery of flow back fluids. The flow back fluids will mainly comprise of the materials injected into the well with the addition of drill cuttings (rock fragments), recovered groundwater containing low levels of Naturally Occurring Radioactive Materials (NORM) and potentially also minor quantities of oil. Variable quantities of hydrocarbon gases and small quantities of radon are also likely to be returned to the surface.

9.3.2 The proposed drilling, injection and fluid recovery activities, together with the handling and storage of the above mentioned materials on the surface, have the potential to give rise to effects on soils, groundwater and surface water environment. The potential effects associated with mobilising gases into the sub surface environment will also be considered. The assessment would describe and assess the standard operating procedures and mitigation measures that would be put in place to avoid adverse effects on soils, groundwater and the surface water environment.

9.4 Assessment Methodology

9.4.1 The potential for site activities to impact on local ground conditions and groundwater quality will be evaluated using an environmental risk assessment approach¹³. The initial desk study to obtain baseline information will make reference to a range of published information including geological maps, memoirs and the scientific literature. In addition the Environment Agency will be consulted to provide data on groundwater quality and to identify areas that will require specific assessment. The data collected as part of other sections of the

¹³ Defra (2011) *Green Leaves III: Guidelines for environmental risk assessment and management*. Cranfield University and Defra.

EIA, in particular the assessment of effects on surface water resources will also be taken into account, together with feedback from this scoping exercise.

- 9.4.2 Following the baseline study a conceptual model of the ground and groundwater water environment will be developed based on an analysis of the Source-Pathway-Receptor linkages. The potential pollution sources will be identified and characterised, including the composition of the hydraulic fracturing fluids, recovered fluids & drilling muds, returning hydrocarbon gases, fuel and lubricants for site plant & machinery, brine and cement that are to be handled or stored on the Site. The potential mechanisms for the escape of any polluting substances from the Site will be described e.g. well design, construction and integrity, storage and transport of materials, treatment methods, together with the pathways that the escaped substances could potentially follow which lead to a receptor.
- 9.4.3 The receptors that could be impacted by the Proposed Development will be identified, the sensitivity of those receptors described and the magnitude of any potential impact on them evaluated. This for example will include an assessment of impact to groundwater resources, the surface water system, near surface soils and ecologically important habitats.
- 9.4.4 The mitigation measures that are to be adopted to prevent contamination of the ground and groundwater will be described and the risk assessment will consider the residual risk after mitigation.
- 9.4.5 When reporting on the findings of the ground and groundwater impact assessment reference will be made to the Guidance on the preparation of an environmental risk assessment of shale gas operations in Great Britain involving the use of hydraulic fracturing¹⁴ and Guidelines for environmental risk assessment and management¹⁵.
- 9.4.6 The following legislation, regulations, guidance and policies will be referred to when undertaking the ground and groundwater impact assessment;
- Water Resources Act 1991 as updated and associated regulations;

¹⁴ DECC. (May 2014) *Guidance on the preparation of an environmental risk assessment of shale gas operations in Great Britain involving the use of hydraulic fracturing.*

¹⁵ Defra (2011) *Green Leaves III: Guidelines for environmental risk assessment and management.* Cranfield University and Defra.

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- Water Framework Directive;
 - Groundwater Directive;
 - Environmental Permitting Regulations;
 - Environment Agency (August 2013) Groundwater Protection: Principles and Practice (GP3);
 - National Planning Policy Framework and Planning Practice Guidance;
 - DECC: Guidance on the preparation of an environmental risk assessment of shale gas operations in Great Britain involving the use of hydraulic fracturing (Published by DECC in 2014, now under the responsibility of the Oil and Gas Authority);
 - UKOOG - UK Onshore Shale Gas Well Guidelines.

It is proposed the scope of the ES will include a detailed assessment of the effects of the Proposed Development on ground conditions and hydrogeology.

10.0 SURFACE WATERS AND FLOOD RISK

10.1 Introduction

- 10.1.1 The Surface Waters and Flood Risk chapter of the EIA will consider the potential impacts on surface water quality and the potential flood risk associated with the Site.
- 10.1.2 A desk based review of published information sources and data held by the Applicant will be undertaken and used to provide a description of the baseline surface water and flood risk conditions on and around the Site. A conceptual model of the surface water environment will be developed to consider the risk the development poses to surface water quality, to include an analysis of the Source-Pathway-Receptor linkages. As part of this process consideration will be given to the activities being carried out during the construction, operational and decommissioning phases of the Proposed Development.
- 10.1.3 Consideration will also be given to the potential effects on receiving waters and sensitive receptors designated in accordance with the Water Framework Directive and associated River Basin Management Plan.
- 10.1.4 The Flood Risk Assessment will be undertaken with reference to current national and local policy and guidance. Baseline information will be obtained by desk study and consultation with the regulatory authorities to support the assessment.

10.2 Baseline

- 10.2.1 The Site is located within a wider area extending east from Ellesmere Port towards the River Weaver at Runcorn that is low lying and artificially drained. It is located within the Peckmill Brook, Hoolpool Gutter at Ince Marshes area of the Weaver Gowy River Catchment. The surrounding land is used for a combination of agriculture and industry, with ongoing industrial development to the north. The land is characterised by a network of shallow ditches which flow to the north where they discharge, either via drains under the Manchester Ship Canal or by over pumping, into the River Mersey Estuary.
- 10.2.2 The Site has been developed in accordance with the coal bed methane exploration consent (ref. 09/02568/MIN) and as such the development platform for the site has been raised to reflect the requirements of the permission.

10.2.3 The Site is recorded on the Environment Agency's Flood (from Rivers and Sea) Risk Map as being partly within Flood Zone 3a (susceptible to tidal flooding benefiting from flood defences) and partly within Flood Zone 1 (low probability of river or sea flooding).

10.2.4 This is also reflected within the flood risk mapping provided within the CWACC SFRA for the development area (reference area ID-JBA380). Within the SFRA the Site falls within Site ID JBA380, proposed for 'Mixed Use'. The Site ID JBA380 falls within category 'Recommendation B' which proposes that the Exception Test would be required for developments within this area.

10.3 Potential Effects

10.3.1 The proposed activities include the construction of the wellsite compound, handling and storage of drilling muds, hydraulic fracturing fluids and returned waters; fuel and lubricants for site plant & machinery; brine and cement. The returned waters will contain low levels of NORM and may also contain recovered hydrocarbons.

10.3.2 Standard operating procedures and mitigation measures would be put in place to prevent the pollution of surface water resources. An assessment would be undertaken of the potential for effects on surface water resources, taking into account the mitigation measures adopted in the design and operation of the Proposed Development.

10.3.3 The development of an impermeable hard standing area has the potential to increase runoff rates and cause localised flooding.

10.4 Assessment Methodology

10.4.1 The potential for Site activities to impact on surface water quality will be evaluated using an environmental risk assessment approach¹⁶. The initial desk study to obtain published baseline information will be supplemented by consulting the Environment Agency to provide data on surface water quality and to identify receptors of particular concern. The data collected as part of other sections of the EIA, in particular the Ecological Impact Assessment, will also be taken into account, together with feedback from this Scoping Exercise and other

¹⁶ Defra (2011) *Green Leaves III: Guidelines for environmental risk assessment and management*. Cranfield University and Defra.

stakeholders. The desk study will identify the relevant regulations, policy and regulatory guidance pertaining to surface water.

- 10.4.2 Following the baseline study a conceptual model of the surface water environment will be developed based on an analysis of the Source-Pathway-Receptor linkages similar to that undertaken for the Ground Conditions and Hydrogeology Chapter described above.
- 10.4.3 The receptors that could be impacted by contamination of surface waters will be identified, the sensitivity of those receptors described and the magnitude of any potential impact on them evaluated. This for example will include an assessment of impact to local watercourses, ecologically important habitats and to water resources.
- 10.4.4 The mitigation measures that are to be adopted to reduce or prevent deterioration in surface water quality will be described and the risk assessment will consider the residual risk after mitigation.
- 10.4.5 When reporting on the findings of the surface water quality impact assessment reference will be made to the methodology provided for in Section 10 of the Department of Transport guidance; TAG UNIT A3: Environmental Impact Appraisal.
- 10.4.6 As the Site is located partially within Flood Zone 3 it is necessary to undertake a flood risk assessment. The Site is located within an area allocated for employment uses within the recently adopted development plan (Cheshire West and Chester Local Plan (Part One) Strategic Policies). As such following policy 104 of the NPPF and the guidance provided in the Council's SFRA it will not be necessary to apply the Sequential Test.
- 10.4.7 The Proposed Development is classed as 'Less Vulnerable', being mineral working and processing, as described in Table 2 of the NPPG for Flood Risk and Coastal Change. On this basis an Exception Test is not required.
- 10.4.8 The Flood Risk Assessment will be undertaken in accordance with the requirements of the National Planning Policy Framework and the associated Planning Practice Guidance. The Flood Risk Assessment will be undertaken with due regard to the small scale of the development and its temporary nature and will take the following approach;

-
- undertake desk based review of available information on the surface water regime and flood risks;
 - develop and characterise the site specific flood hazard and risk issues and site location policy constraints with reference to National and Local Policies, the CWACC SFRA, Environment Agency Flood Mapping resources and other applicable forms of guidance and legislation. This will focus on all site and catchment specific flood risks, including from Fluvial, Tidal, Groundwater, Artificial Waterbodies and Sewage Infrastructure sources. It will also take into account of Climate Change factors associated with the potential exacerbation of flood risk over the life of the proposed development;
 - consultation with the Planning Authority (CWACC), Environment Agency and United Utilities;
 - describe the measures that would be put in place to manage surface water flows at the Site, providing necessary calculations and indicative drainage details;
 - assess the existing and post development flood risk to the proposed development and identify any mitigation measures that may be needed to reduce the risk of flooding on and/or off the site.

10.4.9 The assessment will also take account of surrounding surface water bodies and localised infrastructure / environmental constraints.

10.4.10 The following legislation, regulations, guidance and policies will be referred to when undertaking the surface water impact assessment;

- Water Resources Act 1991 as updated and associated regulations;
- Water Framework Directive UK;
- Flood and Water Management Act 2010;
- Water Act 2014;
- National Planning Policy Framework and associated Planning Practice Guidance;
- Environmental Permitting Regulations;
- Environment Agency (August 2013) Groundwater Protection: Principles and Practice (GP3);
- DEFRA “Flood Risk Assessment Guidance for New Developments”;
- Surface Water Management Plan Technical Guidance;
- Cheshire West & Chester (CWACC) Strategic Flood Risk Assessment;

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- Environment Agency Flood Risk Mapping resources;
 - CWACC Local Plan;
 - CIRIA (2007) - The SUDS Manual;
 - North West River Basin District - River Basin Management Plan;
 - Department of Transport - TAG UNIT A3: Environmental Impact Appraisal;
 - DECC: Guidance on the preparation of an environmental risk assessment of shale gas operations in Great Britain involving the use of hydraulic fracturing (Published by DECC in 2014, now under the responsibility of the Oil and Gas Authority);
 - UKOOG - UK Onshore Shale Gas Well Guidelines.

It is proposed the scope of the ES will include a detailed assessment of the effects of the Proposed Development on surface waters and flood risk.

11.0 ARCHAEOLOGY AND CULTURAL HERITAGE

11.1 Introduction

11.1.1 This chapter of the report outlines the baseline archaeological and cultural heritage conditions at the Site and considers the likely significant potential effects from the Proposed Development on heritage assets.

11.1.2 The methodology that would be adopted to assess potential effects of the Proposed Development on archaeology and cultural heritage is presented.

11.2 Baseline

11.2.1 Preliminary examination of online resources, including the Cheshire HER (Revealing Cheshire's Past), the Archaeological Data Service and the National Heritage List for England indicate that there are no known heritage assets within the Site. Known sites within the 2km study area include evidence for Bronze Age, Roman, medieval, post-medieval and modern activity in the area. These may indicate the potential for remains of a similar date to survive in undisturbed areas of the Site.

11.2.2 There are three Schedule Monuments including a Roman fortlet, a monastic site and a moated site with the 2km study area. There are 31 Listed Buildings within the study area, all but two of these are Grade II Listed and most are located within the Conservation Areas at Ince and Elton. The Grade I Listed Manor House of Abbey of St Werburgh is located within the Scheduled Ince Manor monastic grange and the Grade II* Church of St James is located within Ince Conservation Area.

11.3 Potential Effects

11.3.1 The majority of the site has been subject to ground disturbance through the development of the exploratory well site for the exploration of coal bed methane (planning permission ref. 09/02568/MIN). It is understood that this development did not identify any below ground archaeological remains on the site. On this basis it is proposed that direct effects on below ground archaeology are scoped out of the ES.

11.3.2 Indirect effects can have a variety of forms. The majority of indirect effects result from changes to the settings of heritage assets although there can be indirect

effects such as changes to groundwater levels that could affect buried archaeology.

- 11.3.3 The Proposed Development has the potential to indirectly affect the settings of designated heritage assets including Scheduled Monuments, Listed Buildings, Conservation Areas, Registered Battlefields and Registered Parks and Gardens. Albeit, these effects would be temporary in nature.
- 11.3.4 The assessment will consider the potential for effects relating to visual impact but also non-visual setting effects, such as those which could potentially result from elevated traffic, lighting and noise.
- 11.3.5 All designated heritage assets within 2km of the Site will be identified and following the design freeze those designated assets which could potentially be subject to effects upon their settings will be fully assessed.

11.4 Assessment Methodology

- 11.4.1 The primary source of information for the presence and significance of known non-designated historic/archaeological remains in the area will be the Cheshire Historic Environment Record. Up to date information on Scheduled Monuments, Listed Buildings, Registered Battlefields and Registered Parks and Gardens along with GIS shapefiles recording their locations and extent will be obtained from Historic England's Designation Data Download Area. Information on Conservation Areas, including their boundaries and character appraisals where available, will be obtained from the Council.
- 11.4.2 All heritage assets, whether designated or not, within a distance of up to 2km from the Site boundary will be identified within the ES. It is considered that due to the predicted limited visibility of the development indirect effects are unlikely at a distance of greater than 2km. This will allow for an assessment of direct impacts and indirect impacts upon setting.
- 11.4.3 The submitted ES chapter will fully describe the baseline historic environment conditions, collating the results of desk-based data gathering, map regression, the examination of aerial photographs and a walkover survey. It will identify areas where the Proposed Development may impact upon heritage assets and include a constraints map for direct impacts. The ES chapter will comment further on the identified designated heritage assets in the area surrounding the

Site which could be subject to potential effects upon setting. The assessment will draw upon the findings of the Landscape and Visual Impact Assessment to understand the potential intervisibility between designated assets and the Proposed Development.

- 11.4.4 The methodology for assessing effects upon heritage assets both direct and indirect will take account of the NPPF, its practice guide and Historic England's Good Practice Advice Note 3: the setting of heritage assets.

It is proposed the scope of the ES will include a detailed assessment of the effects of the Proposed Development on cultural heritage and archaeology.

12.0 TRAFFIC AND TRANSPORTATION

12.1 Introduction

12.1.1 The impact of traffic associated with the Proposed Development will be considered through the preparation of a formal Transport Assessment (TA) report, the key findings of which will inform the assessment of transport related environmental effects within the ES. The TA will represent a technical highways review of the proposals in question and will include predictions for development related traffic generation and distribution, along with assessments of the ability of the surrounding highway network to accommodate development traffic movements via appraisals of:

- link impact / link capacity;
- the operation / safety of key network junctions; and
- environmental impact criteria.

12.1.2 The extent of highway network to be assessed will be determined during discussions with the local highway stakeholders, although it is expected that assessment would be limited to the route corridor of Pool Lane and the A5117 School Lane, between the site and Junction 14 of the M56 motorway. The key formal traffic and transport stakeholders for the project would be the Local Highway Authority Cheshire West and Chester Council, and Highways England.

12.1.3 The main transport related effects arising from the Proposed Development would be associated with heavy goods vehicles (HGV) travelling to and from the Site during the various phases of development from construction, through operation to decommissioning. HGVs would be associated with the transport of plant and materials to and from the site, such as (but not limited to):

- Earthmoving equipment;
- Aggregate/soils importation;
- Water/wastewater transportation;
- Drilling equipment;
- Fuel deliveries;
- General waste; and,
- Demolition waste.

12.2 Baseline

- 12.2.1 Highway access to the Site would be taken from Grinsome Road (a private road), which would be accessed via the route of Pool Lane. Approximately 2km to the southwest of the Site Pool Lane forms a four arm signalised junction with the primary route of the A5117 School Lane, and the rural route of the B5132 Cryer's Lane. The A5117 School Lane is of dual carriageway construction and subject to a 50mph speed limit. A further 1.3km to the east, the A5117 School Lane forms the north western approach to the 5-arm grade-separated roundabout Junction 14 of the M56 motorway.
- 12.2.2 A desktop review of the route between M56 J14 and the Site identifies that the access route to the Site would be perfectly appropriate for accommodating the types of vehicles likely to be associated with the development. Indeed, the existing local highway network serves as a primary means of access to the wider commercial/industrial area of Stanlow, and so already accommodates HGV movements associated with land uses in this area. Furthermore, this route is being upgraded to facilitate the Protos development.
- 12.2.3 In order to inform the assessment of transport related effects, it will be necessary to undertake traffic surveys on the local highway network. Surveys at key network locations would provide the data required to identify a baseline set of operational traffic conditions. Given that the proposed routing to and from the Site is likely to be via the A5117 School Lane, from J14 of the M56, surveys are proposed to be undertaken at the signalised junction of A5117 School Lane/Pool Lane/B5132 Cryer's Lane, as well as at J14 of the M56.

12.3 Potential Effects

- 12.3.1 Transport related environmental effects are typically associated with changes in traffic on the highway network, both in terms of total number of vehicles and the type of vehicles generated e.g. the proportion of HGVs. Key impact types to be considered in traffic related environmental assessment are as follows:
- changes in development traffic impacting on prevailing highway safety conditions, accident risk and, network congestion and delay on key links in the immediate vicinity of the Site and further afield;

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- changes in development traffic impacting on other local road network users and the immediate community, resulting in a reduced amenity e.g. community severance, pedestrian delay / intimidation, etc.;
 - changes in development traffic resulting in noise and vibration effects at surrounding / frontage properties to key access road corridors; and
 - changes in development traffic and congestion resulting in local air quality effects at key local network links and junctions.

12.3.2 The majority of the above potential effects are likely to be direct, but would only be temporary in duration – the effects would only be experienced during the various phases of development and, given that the Proposed Development has a relatively short operational lifetime, any such effects would therefore cease once the site has been decommissioned.

12.3.3 The most notable effects are likely to occur as a result of the number of HGVs that are associated with each phase of development.

12.4 Assessment Methodology

12.4.1 The assessment of traffic related effects will be based on guidance given in the Institute of Environmental Management & Assessment's (IEMA) *"Guidelines for the Environmental Assessment of Road Traffic"*, and *National Planning Practice and Guidance – Travel Plans, Transport Assessment and Statements in Decision Taking*.

12.4.2 Baseline conditions will be established by:

- undertaking a review of the existing highway network traffic flows;
- calculation of construction, operation and decommissioning traffic volumes;
- identification of sensitive or vulnerable receptors; and
- review of local traffic accident data.

12.4.3 The traffic related environmental impacts will be established by comparing predicted development traffic demand levels to key environmental impact thresholds as set out in the (IEMA) *"Guidelines for the Environmental Assessment of Road Traffic"*. These thresholds are set out below:

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- Rule 1: Include highway links where traffic flows will increase by more than 30% (or the number of heavy goods vehicles will increase by more than 30%);
 - Rule 2: Include any other specifically sensitive areas where traffic flows have increased by 10% or more.

12.4.4 The secondary threshold identified above, is not considered as being appropriate to the routes forming the local study network to the proposed development – these routes form key local industrial/commercial distributor routes, in particular the A5117 forming a dual carriageway link on the primary route network. Accordingly such routes are not considered sensitive.

12.4.5 In the event that the above guidance thresholds are exceeded, as a consequence of the Proposed Development, further detailed assessment of traffic related effects will be undertaken in relation to:

- Pedestrian delay;
- Pedestrian amenity;
- Severance;
- Driver delay;
- Road safety;
- Traffic related air pollution/dust & dirt; and
- Traffic related noise and vibration

12.4.6 As noted above, the extent of highway network likely to be considered would be that which forms the access route between the site and the M53 at Junction 12, taking in the A56 Warrington Road.

It is proposed the scope of the ES will include a detailed assessment of the traffic and transportation effects of the Proposed Development.

13.0 MATTERS TO BE SCOPED OUT FROM DETAILED ASSESSMENT WITHIN THE ES

13.1 Introduction

13.1.1 It is acknowledged that developments of the nature being proposed are subject to significant public interest. As such there is a potential for assessments to be included within the ES which do not address aspects of the environment likely to be significantly affected by the development proposed but rather are included to address points of interest.

13.1.2 As described in the introduction to this report, Planning Practice Guidance states the emphasis of Schedule 4 of the EIA Regulations is on the “main” or “significant” environmental effects to which a development is likely to give rise. The ES should be proportionate and not be any longer than is necessary to assess properly those effects.

13.1.3 On this basis it is proposed that the scope of the technical assessments to be included within the ES is limited to the topics described in Chapter 4.0 to 12.0 of this report.

13.1.4 Nonetheless, the applicant is aware that there are a number of other matters which may be material to the determination of the planning application or may be of interest to members of the public. A summary of these matters is provided below. A justification for not including the assessments within the scope of the ES is provided. Where these topics are proposed to be considered within other planning application documents this is also described.

13.2 Socio-Economic

13.2.1 The Proposed Development would give rise to employment opportunities, both directly at the Site and by virtue of the supply chain / indirect employment.

13.2.2 It is anticipated that the peak onsite employment would occur during the hydraulic fracturing operations. During this period there would be up to 50 people employed on Site working on a shift basis. During flow testing, which would last up to 24 months, there would be up to 20 people employed at Site. Over the 5 year period of the development it is estimated that the average employment would equate to up to circa 16 full time equivalents per year.

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- 13.2.3 Many of the jobs are likely to be highly specialised and therefore whilst some of the staff may be locally based, many workers may come from outside the Council area.
- 13.2.4 On the basis that the development is temporary in nature and would not provide a particularly high number of employment opportunities locally it is considered that the level of employment would not have a significant effect on the local economy. Nonetheless, the employment benefits of the development would be a material planning consideration and as such these would be further explored within the planning statement.
- 13.2.5 Other relevant factors relating to socio-economic effects include the provision of a community fund in accordance with the UKOOG “Shale Community Engagement Charter”. This will provide a £100,000 payment to the local community situated near to the exploratory (hydraulically fractured) well site and would be paid, regardless of whether or not recoverable deposits of natural gas are found. Again this would be detailed within the planning statement but is not considered to result in a significant environmental effect and as such would not be assessed within the ES.

13.3 Seismicity

- 13.3.1 It is well documented that there are links between hydraulic fracturing operations and the potential for induced seismic events to occur. Such events are not restricted to hydraulic fracturing and are known to occur naturally as well as a result of mining activities and geothermal systems.
- 13.3.2 The most commonly cited seismic event in the UK related to hydraulic fracturing occurred at Cudrilla’s Preese Hall exploration well in 2011. Small tremors measuring magnitude 2.3 and 1.5 on the Richter scale were recorded. The events were attributed to specific conditions at the site and particular working methods employed. Data presented in a report by the Royal Academy of Engineering and the Royal Society¹⁷ indicates that there are 100s of naturally occurring seismic events experienced each year in the UK of a magnitude of up to 2 on the Richter scale.

¹⁷ *The Royal Society & Royal Academy of Engineering (June 2012) Shale gas extraction in the UK: a review of hydraulic fracturing.*

13.3.3 The report by the Royal Academy of Engineering and the Royal Society stated the following:

The energy released during hydraulic fracturing is less than the energy released by the collapse of open voids in rock formations, as occurs during coal mining. The intensity of seismicity induced by hydraulic fracturing is likely to be smaller due to the greater depth at which shale gas is extracted compared to the shallower depth of coal mining. Magnitude 3 ML may be a realistic upper limit for seismicity induced by hydraulic fracturing (Green et al 2012). If a seismic event of magnitude 3 ML occurs at depths of 2-3km, structural damage at the surface is unlikely.

13.3.4 Whilst the potential for significant seismic events to be triggered by hydraulic fracturing operations is considered to be low, the Government have put in place a series of measures to limit the risks posed.

13.3.5 Where hydraulic stimulation is proposed a hydraulic fracture plan (HFP) must be agreed with Oil and Gas Authority in consultation with EA. The HFP must include a number of items in relation to seismicity, including:

- a map and seismic lines showing faults near the well and along the well path, with a summary assessment of faulting and formation stresses in the area and the risk that the operations could reactivate existing faults;
- information on the local background seismicity and assessment of the risk of induced seismicity;
- a comparison of proposed activity to any previous operations and relationship to historical seismicity; and
- proposed measures to mitigate the risk of inducing an earthquake and a description of decision tree for a real-time traffic light scheme for monitoring local seismicity.

13.3.6 The Department for Business, Energy & Industrial Strategy (DBEIS) (formally DECC) require that seismic activity at the site of a hydraulic fracturing operation is monitored. Where a tremor of 0 - 0.5 is detected then measures must be employed to reduce the potential for seismic activity to be induced, monitoring must also be intensified. Where a tremor of 0.5 or more is detected then operations must stop. Magnitude 0.5 events are well below what could be felt

at the surface and events of magnitude 2.0 are unlikely to be felt except under especially favourable circumstances.

13.3.7 On the basis of the research undertaken by the Government and the controls that have been put in place, it is considered that effects relating to induced seismicity are unlikely to be significant. It is therefore proposed to scope out a detailed assessment of these effects from the ES. Nonetheless, given public and regulator interest in this matter the scheme description provided within the ES will provide information in relation induced seismicity and will describe the measures that would be undertaken to manage this element of the exploration operations.

13.4 Greenhouse Gas Emissions

13.4.1 Schedule 4 of the EIA Regulations prescribes the information to be included within an Environmental Statement. Paragraph 5(f) of Schedule 4 requires a description of the likely significant effects of development resulting from the impacts of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change. This section of the scoping report considers the likelihood of the Proposed Development giving rise to significant effects in respect of greenhouse gas emissions.

13.4.2 As with all development, the exploration works proposed has the potential to be a source of greenhouse gas emissions. These include the following:

- emissions associated with transportation of materials, equipment and staff to site;
- emissions from the combustion of fossil fuels on site associated with mobile and static plant and machinery;
- emissions from the combustion of methane extracted from the well;
- fugitive leaks of carbon dioxide and methane from the well;
- emissions associated with the manufacturing and production of materials used at the site;
- emissions associated with the treatment of water used in the hydraulic fracturing process and the treatment of the flow back fluids.

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- 13.4.3 Research into the Potential Greenhouse Gas Emission Associated with Shale Gas Extraction and Use¹⁸ has been undertaken by DBEIS (formally DECC). The research was focussed on the overall carbon intensity of shale gas production. The research demonstrated that lifecycle emissions from shale gas used in the production of electricity would be comparable to other sources of gas fuelled generation and significantly lower than the footprint of coal generated electricity. The research stated that “*emissions from drilling and flow testing are expected to be small in comparison to the total lifecycle emissions*”.
- 13.4.4 Research undertaken by Cuadrilla for their temporary shale gas exploration at Preston New Road, Lancashire estimated that the exploration works, which would be similar in nature and scale to those being proposed at Ince Marshes, would result in emission equivalent to 0.002% of the current UK Carbon Budget. The project at Preston New Road was examined by an Inspector at a planning appeal and determined by the Secretary of State. Both the Inspector and the Secretary of State considered the estimate of emissions from the operations to be accurate and concluded that ‘*in the light of the support provided by the national policy for shale gas exploration, the emissions likely to arise from the appeal proposals would be entirely reasonable and fully justified.*’.
- 13.4.5 In light of the above, it is considered that the greenhouse gas emissions associated with the proposed temporary exploration for natural gas is unlikely to be significant. As such it is proposed that a detailed assessment of greenhouse gas emissions from the Proposed Development would be scoped out of the ES.

¹⁸ Mackary, D.J.C & Stone, T.J (2013) *Potential Greenhouse Gas Emissions Associated with Shale Gas Extraction and Use* (Department of Energy & Climate change)

14.0 PROPOSED CONTENTS OF THE ENVIRONMENTAL STATEMENT

14.1.1 The proposed contents and structure of the ES is shown below. It will be produced in four volumes: the first of which is a non-technical summary, the second the main report, the third illustrative figures and the fourth a series of technical appendices containing data and technical assessments undertaken for the ES chapters.

VOLUME 1 - NON-TECHNICAL SUMMARY

VOLUME 2 - ENVIRONMENTAL STATEMENT (MAIN REPORT)

1.0	Introduction
2.0	Scope of the Environmental Impact Assessment
3.0	Alternatives Considered
4.0	Scheme Description and Construction Methods
5.0	Landscape and Visual
6.0	Ecology and Nature Conservation
7.0	Noise and Vibration
8.0	Air Quality
9.0	Ground Conditions and Hydrogeology
10.0	Surface Waters and Flood Risk
11.0	Archaeology and Cultural Heritage
12.0	Traffic and Transportation
13.0	Summary of Effects

VOLUME 3 - FIGURES

VOLUME 4 - TECHNICAL APPENDICES

14.1.2 It is concluded that the scope of the chapters proposed to be included in the ES would enable the likely significant environmental effects of the proposed development to be identified and assessed pursuant to Regulation 4(2), as follows:

The EIA must identify, describe and assess in an appropriate manner, in light of each individual case, the direct and indirect significant effects of the proposed development on the following factors

(a) population and human health;

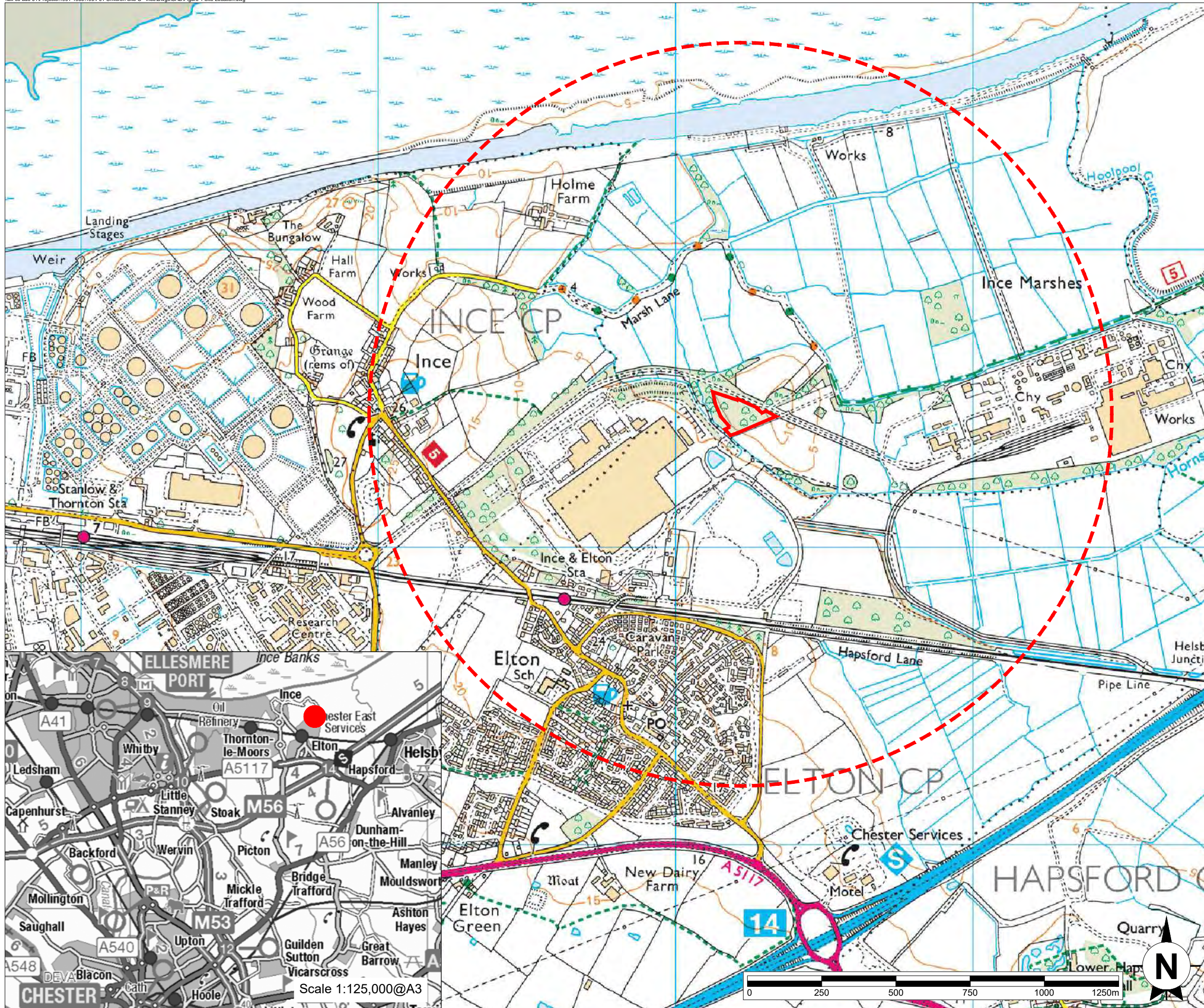
(b) biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;

(c) land, soil, water, air and climate;

(d) material assets, cultural heritage and the landscape;

(e) the interaction between the factors referred to in sub-paragraphs (a) to (d).

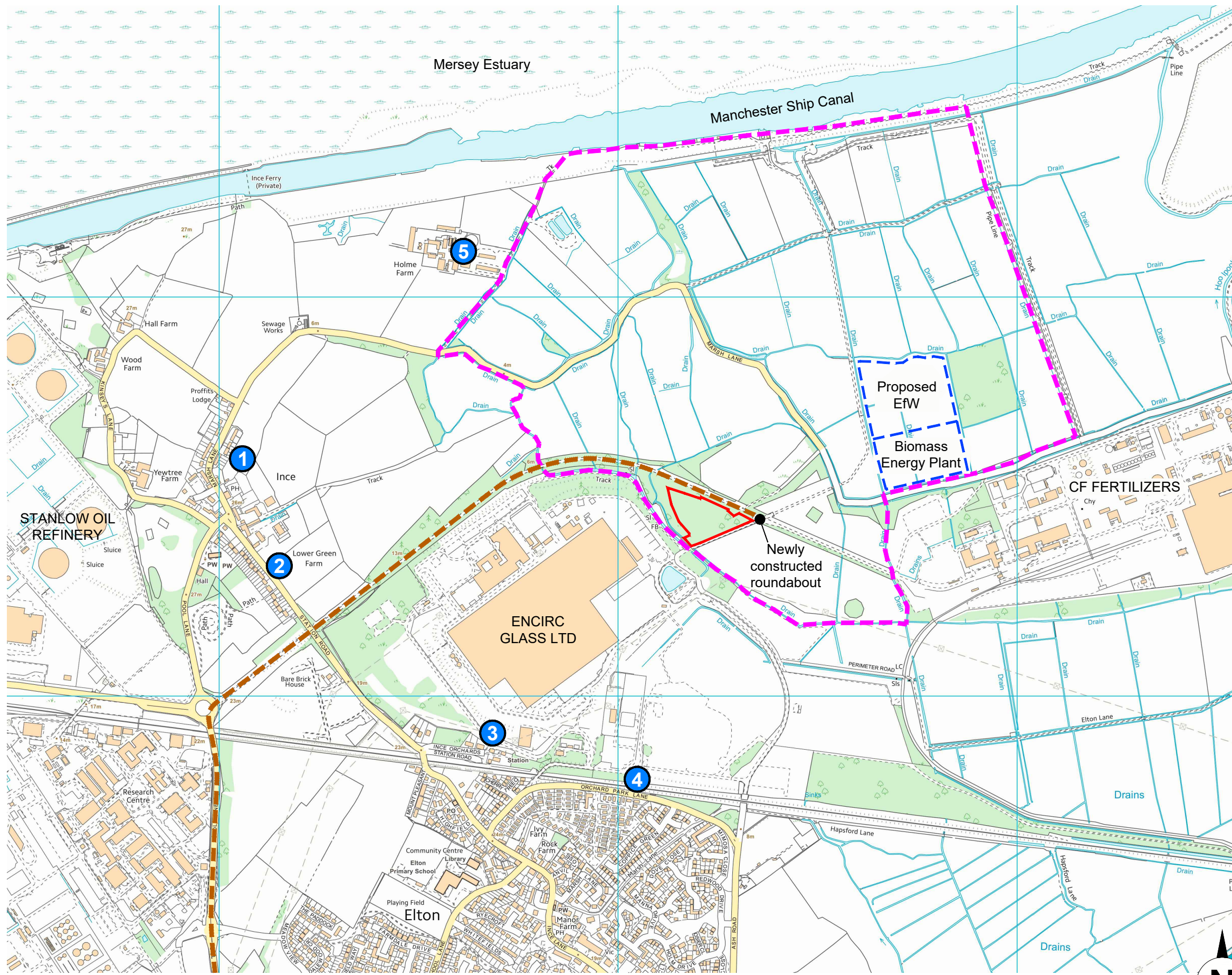
Figures







axis

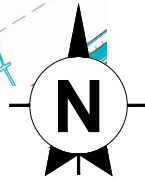
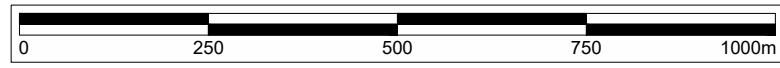
- Site Location
- Site Boundary
- Indicative Extent of Exploration Works

INCE MARSHES TEMPORARY EXPLORATORY WELL SITE	
Figure 1	
Site Location	
Scale 1:12,500@A3	Date October 2017



-  Site Boundary
-  Site Access Route
-  Ince Resource Recovery Park Boundary
-  Nearest Residential Receptors
 1. Marsh Lane
 2. Station Road
 3. Ince Orchards
 4. Orchard Park Lane
 5. Holme Farm

to A5117 & J14 M56



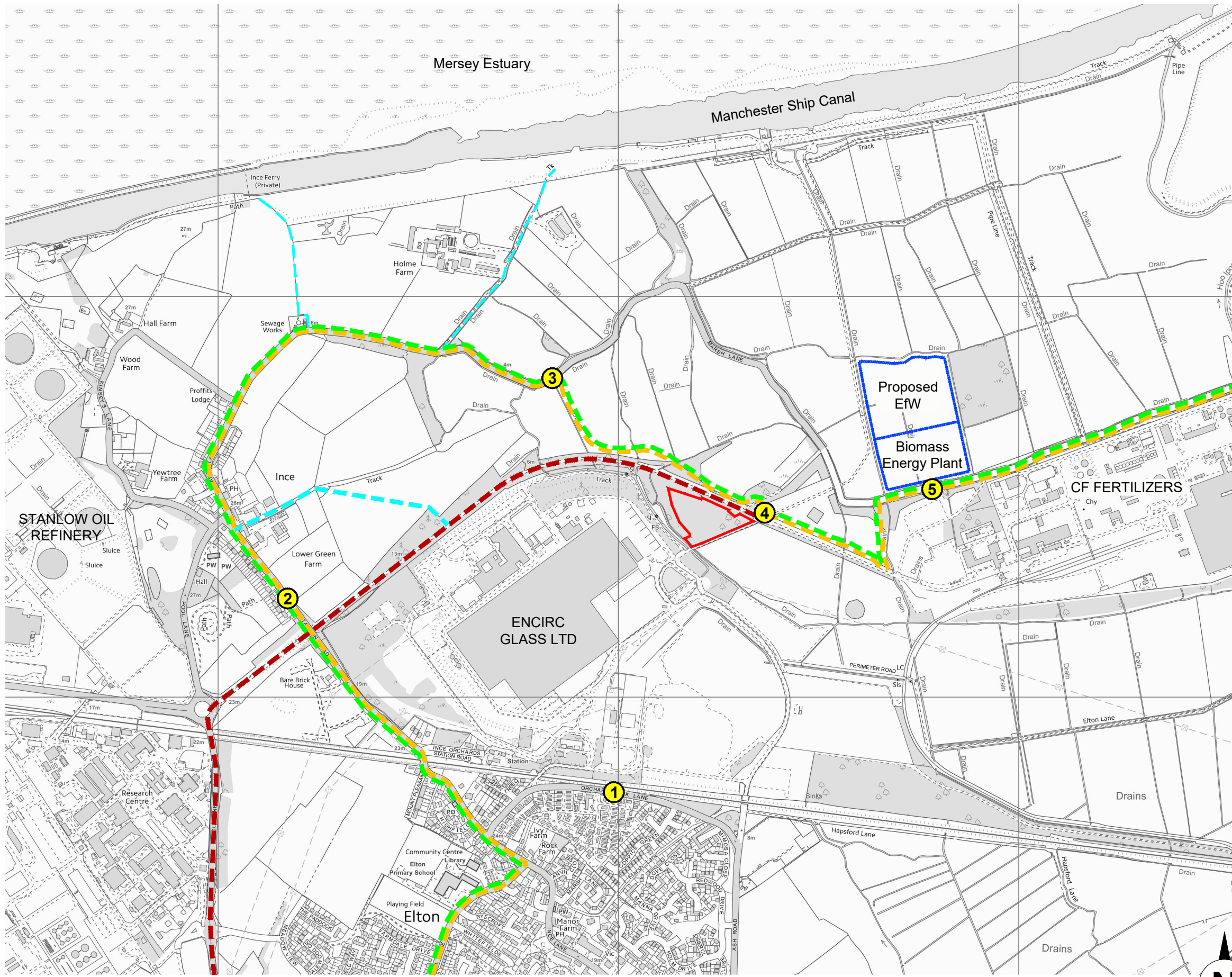
INCE MARSHES TEMPORARY EXPLORATORY WELL SITE

Figure 2

Site Context Plan

Scale
1:10,000@A3

Date
October 2017



- Site Boundary
- Site Access Route
- Public Footpath
- Restricted Byway (public right of way)
- National Cycle Route 5
- 2 Viewpoints
 1. Orchard Park Lane
 2. Station Road
 3. Marsh Lane to NW
 4. Grinsome Road roundabout
 5. Marsh lane to E

INCE MARSHES TEMPORARY EXPLORATORY WELL SITE

Figure 3

Visual Receptors

Scale
1:10,000@A3

Date
October 2017

to A5117 & J14 M56

