THE INFRASTRUCTURE PLANNING
(APPLICATIONS: PRESCRIBED FORMS AND
PROCEDURE) REGULATIONS 2009

Preesall Underground Gas Storage Facility, Lancashire

Construction Report

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1. Halite Energy Group Limited (Halite) is applying for a development consent order to construct and operate an Underground Gas Storage Facility with a total capacity up to 900 million cubic metres of gas at standard temperature and pressure (STP) to provide an operational working capacity of up to 600 million standard cubic metres of gas at STP (the Project). The gas would be stored in up to 19 new underground caverns in the salt body at Preesall and the gas would be supplied from and exported to the Gas National Transmission System (NTS) at Nateby.

2. This Report gives an overview of how the Project will be constructed and provides an indicative construction programme. The main construction tasks and the indicative construction programme are set out below.

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3. The construction tasks outlined above are not sequential. For example, some of the construction tasks in Year 1 would run in parallel. Similarly, it is likely that a number of the construction and operational phases would be progressed in parallel. For example, the gas storage caverns that are created early in the programme (from year 2) would be brought into operation whilst the last caverns are being constructed (up until year 8).

4. The buildings required for the construction and operation of the Project would be constructed using traditional construction methods and materials. Similarly, the creation of the caverns and the pipelines use proven technology. There are no special or innovative techniques required for the construction of the Project.

5. The caverns would be created in the underground salt formation at levels between 220 metres and 760 metres below ground. Boreholes would be created to access the salt at the locations identified for the proposed caverns.

6. The caverns are created by dissolving the salt and extracting the brine to create cavities in which gas can be stored. A significant amount of water
is required to dissolve the salt and this would be supplied from the Seawater Pump Station at the Fleetwood Fish Dock. A pipeline would be laid under the River Wyre from the Seawater Pump Station to a Booster Pump Station on the Preesall site. From here water would be supplied to the wellheads and used to wash the salt caverns. The saturated brine would be returned by pipeline to the Irish Sea where it would be disposed at a point some 2.3km from the sea shore at Rossall, Fleetwood.

7. An underground interconnector pipeline would be constructed from the existing Gas National Transmission System (NTS) at Nateby to the proposed Gas Compressor Compound (GCC) at Preesall. The GCC is used to condition and import/export gas from/to the NTS and the underground caverns. Each cavern wellhead is linked to the GCC by underground gas manifolds.

8. The Project requires a safe and secure electricity supply and this would be provided from the Stanah Switchyard through new electricity cables to be provided under the River Wyre.

9. Higher Lickow Farm would be refurbished to provide an administration and security facility for the Project.

10. A new haul road would be provided from the A558 at Preesall to access the site. A number of tracks would also be provided to link the various elements of the Project to the public highway. An existing farm track would act as an emergency access route.

11. It would take approximately 3 years to construct the Project and up to a further 5 years to complete the creation of the caverns and the wellhead compounds. Halite would appoint an Engineering Procurement Construction and Management (EPCM) contractor to provide the detailed design, procurement, construction, commissioning and management of the Project.

12. The Project would have an operating design life in excess of 40 years.
1.0 INTRODUCTION

1.1 This Report has been prepared by the Barton Willmore Planning LLP on behalf of Halite Energy Group Limited (Halite) who are making an application to the Infrastructure Planning Commission (IPC) for a Development Consent Order (DCO) to construct and operate an Underground Gas Storage (UGS) Facility and associated infrastructure (the ‘Project’) at Preesall, Lancashire. This Report gives an overview of how the Project will be constructed and provides an indicative construction programme.

1.2 The construction of the Project should be read in tandem with the drawings and other DCO application documents to which reference is made as appropriate.

1.3 The Report is structured as follows:

Section 2: Construction Overview

Section 3: Construction Logistics
2.0 CONSTRUCTION OVERVIEW

2.1 The proposed Project is to create an Underground Gas Storage Facility with a total capacity up to 900 million cubic metres of gas at standard temperature and pressure (STP) to provide an operational working capacity of up to 600 million standard cubic metres of gas at STP. The gas would be stored in up to 19 new underground caverns in the salt body at Preesall and the gas would be supplied from and exported to the Gas National Transmission System (NTS) at Nateby, approximately 12 km to the east of the main Preesall site.

2.2 The Project includes the development of a number of discrete but closely related elements as follows:-

(i) Creation of up to 19 caverns.
(ii) 7 multiple wellhead compounds to create the underground salt caverns and, once operational, to connect the gas manifolds.
(iii) Gas Compressor Compound comprising pig launchers and receivers; slug catchers; above ground high pressure pipelines; glycol contactors to dry the gas; glycol regeneration system; compressors; compressor knock out separators; compressor aftercoolers; gas filters; gas heaters; utility systems, plant drainage and power supply; emergency/maintenance vent stack; electrical/instrument and utilities buildings; 132kV substation, access roads and car parking areas.
(iv) Seawater Pump Station compound comprising a Pumping Station, standby generator and switchgear building, transformers and ancillary infrastructure, access roads and car parking areas;
(v) Booster Pump Station compound comprising the Booster Pump Station building; control room, a switchgear and standby generator building, transformers, a debrining facility, ancillary infrastructure, access roads and car parking areas;
(vi) Refurbishment of Higher Lickow Farm;
(vii) Gas manifold and distribution infrastructure;
(viii) Seawater pipeline from the Fleetwood Fish Dock to the Preesall site;
(ix) Brine discharge pipeline from the Preesall site to a point approximately 2.3km offshore to a two port diffuser;
(x) Power, communication and control cable routes from the Fleetwood Dock to the Preesall site;
(xi) Power cable routes from the United Utilities Switchgear at the Stanah Switchyard to the new electrical sub-station;
(xii) Temporary drilling compounds at the Fleetwood Fish Dock and at the Stanah caravan park;
(xiii) Extension to sea wall at West Way to accommodate brine outfall and new observation platform;
(xiv) Interconnector pipeline link to the Metering Station and NTS at Nateby;
(xv) Comprehensive landscape and ecological management strategy;
(xvi) New access road from the A588 and new and upgraded internal access tracks within the site.
(xvii) Temporary construction compounds.

An extract from the Masterplan showing the location of the built development at the Preesall site is attached at Appendix 1 for ease of reference.

2.3 Following the receipt of the DCO and prior to the commencement of construction, Halite would need to progress the following:

- Discharge of requirements specified in the DCO;
- Pre Construction COMAH Report for acceptance by the HSE;
- Obtaining other consents such as the Environmental Permit from the Environment Agency;
- Obtaining Licences from Natural England to deal with protected species;
- Prepare Engineering and Construction Drawing and Specifications, particularly for the outfall, seawall, and roads as all are early in the construction programme;
- Building Regulation Approval where necessary;
- Stanah Switchyard Electrical Connection Agreement
- Connection Agreement to the Gas NTS.

2.4 Halite would appoint an Engineering Procurement Construction and Management (EPCM) contractor to provide the detailed design, procurement, construction, commissioning and management of the Project.

2.5 Following the completion of the above and the appointment of a contractor, construction of the development would take place in phases over an 8 year period. The main construction tasks and the indicative construction programme are set out below.

**Construction Tasks and Indicative Construction Programme**

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2.6 The construction tasks outlined above are not sequential. For example, some of the construction tasks in Year 1 would run in parallel. Similarly, it is likely that a number of the construction and operational phases would be progressed in parallel. For example, the gas storage caverns that are created early in the programme (from year 2) would be brought into operation whilst the last caverns are being constructed (up until year 8).

2.7 In broad terms, construction of the haul road and access roads; the brine pipeline, the works to the seawall crossing and the brine outfall; the Seawater Pump Station; the Booster Pump Station; the Gas Compressor compound (GCC); and interconnector would be carried out and completed in the first year. The Metering Station would be constructed in year 2 along with the commencement of the construction of the wellheads and the caverns.

2.8 Further details of the main construction tasks are provided below.

Construction of the Haul and Access Roads

2.9 In order to gain access to the main Preesall site to allow for the construction of the Project, a new haul road would be constructed from the A588. The haul road would be constructed to a standard to allow for the movement of large items of equipment such as transformers, interconnector pipes and compressors.

2.10 A new junction would be provided with the A588 Hall Gate Lane. The junction layout and the sight-lines require the demolition and replacement of the existing bus shelter on the A588. The re-location of the bus shelter would be agreed with the Highway Authority through a Section 278 Agreement.

2.11 The road would require a junction with Back Lane (adopted highway, unclassified road), the crossing of Grange Pool via a culvert or bridge and the crossing of or modifications to other minor watercourses by piped culverts or realigned ditches. The road would be drained by pipes or ditches to existing watercourses via interceptors where required. The road would be lit at low level (height) to cater for emergency operation and would be fenced to prevent livestock entry. Field access would be provided at appropriate locations. Grass mounding and landscaping would be incorporated as screening where appropriate (Ivy Cottages) as would replacement or improvements to existing hedges.

2.12 Access roads and tracks would be provided within the site linking the main permanent structures and wellheads as follows:

- New access road extending from the Security and Support Buildings at Higher Lickow Farm (Work No 5) to the GCC area (Works No 3). The access road would comprise the construction of a metalled private road between the Security Gatehouse and the GCC (Work No 3). The road would be constructed at grade and would be
drained by pipes or ditches to existing watercourses via interceptors where required. The road would be lit at low level (height) to cater for emergency operation and would be fenced to prevent livestock entry. Field access would be provided at appropriate locations. Replacement or improvements to existing hedges would be included as appropriate. Crossing of or modifications to minor watercourses would be by the use of piped culverts or realigned ditches as appropriate.

- **Permanent access tracks linking Wellhead compounds and the GCC.** New stoned tracks or refurbished existing stoned tracks linking the GCC to each of the Wellhead Compounds (Work No's 2A-2G), of a width appropriate to proposed vehicular usage. No positive drainage would be provided, save where necessary. The tracks would be designed to accommodate construction, maintenance and emergency access vehicles. Work areas would be reinstated, landscaping being provided at appropriate locations where hedgerows and fences where removed.

- **Temporary access/haul roads would be required on the route of the brine pipeline and the gas interconnector pipeline as shown on the Works drawings.** The access roads would be used for the construction of the pipelines and once completed the roads would be removed and the land re-instated.

2.13 The construction of the Project would also require the improvement of existing tracks on the Preesall site to accommodate large vehicles. The construction works, particularly those associated with the brine pipeline and the route of the interconnector, affect and cross a number of bridleways and footpaths as follows:

- Bridleway No 2 Corcas Lane
- Bridleway No 29
- Footpath 4
- Footpath 13
- Footpath 42
- Footpath 43
- Footpath 45
- Footpath 46
- Footpath 53
- Footpath 61

2.14 Footpaths and bridleways would either be diverted for a temporary period during construction or temporary management measures would be put in place to allow their continued use.

2.15 The proposed emergency access route would make use of an existing track, Clods Car Lane, but as it is an existing access no improvement to it is required.
Construction Overview

Construction works at Higher Lickow Farm

2.16 The construction works at Higher Lickow Farm (as shown on Drawings A-7000-001 to 003) include the refurbishment of the existing farmhouse, the rebuilding of a barn, the demolition of a second barn and the construction of a gatehouse.

2.17 The refurbishment of the farmhouse includes external and internal repairs to the fabric of the buildings. The barn which is to be rebuilt is in a poor state of repair and it will be necessary to replace that which exists making use of much of the existing structure and materials as is possible.

2.18 The works to the farmhouse and the barn would take approximately 12 months to complete.

Overview of the Water Washing Infrastructure

2.19 In order to dissolve the salt and create the caverns, a supply of water is required, together with pumps and pipelines to take it to the caverns and from there to the brine disposal point. The amount of water required is very large (up to 80 mega-litres a day) such that the use of freshwater made this an economically and environmentally unviable option. However, since seawater is only 3% sodium chloride, as compared with saturated brine at 26%, seawater is almost as effective as fresh water for this purpose and is available in much larger quantities. Fleetwood Fish Dock has, therefore, been selected as a suitable source of seawater. The Fish Dock, constructed in 1880, was used to supply cooling water to an electricity generating station in the 1950’s and some of this infrastructure is still in place. The proposed construction would make maximum use of this existing infrastructure, which minimises the impact of this part of the Project.

2.20 The proposal is to draw water from the Fish Dock at Fleetwood, through the existing inlet and associated culvert, which is 1.22m in diameter. A Seawater Pump Station is proposed, adjacent to Associated British Ports (ABP) Fish Dock, to pump seawater in a buried and directional drilled pipeline from the West Bank of the Wyre Estuary to the Preesall site. Filters would be incorporated into the inlet to minimise the opportunity for marine organisms to be drawn into the water washing infrastructure.

2.21 The river crossing would consist of four directionally drilled boreholes: one for the seawater passing from the seawater pump station; one for the returning brine; one for power, communications, controls and ancillary uses leaving one in reserve. These would be formed by directionally drilling boreholes from the west bank of the Wyre Estuary, at sufficient depth to minimise the environmental impact. The pipelines would be a minimum of 8 metres below the bed of the River to ensure that the existing silt and sediments are not disturbed.
2.22 The seawater would then be transmitted in a buried pipeline to the Booster Pump Station where the pressure would be increased and the seawater pumped to the various wellhead locations. It would be fed down the well casings for the cavern washing operation at controlled rates, according to industry best practices and the PCSR.

2.23 After the brine has been used in the washing process, it would be returned to the de-brining facility adjacent to the Booster Pump Station to ensure that the brine contains no dissolved gas or sediment from the washing stage. Dissolved gases vent to air whilst the sediment would be collected and disposed of to an existing cavern on the site by tanker or slurry pipeline. Further details are provided in the Section dealing with waste arisings towards the end of this Report. The quality of the brine would be monitored prior to disposal. The brine would be of varying saturation, according to the stage of cavern washing, but as a ‘worst case’ it is assumed for the environmental assessment to be saturated; i.e. approximately 26% weight/weight (w/w) sodium chloride.

2.24 The saturated brine would leave the de-brining facility at a pressure of up to 7bar. It would then be passed through piping, trench ed in a similar manner to the inlet seawater piping and back through the second river crossing. On the West Bank of the river, it would then pass through similar piping, to the seawall at West Way via a discharge monitoring facility sited adjacent to the Seawater Pumping Station at Fleetwood Dock. All pipework would be underground with the exception of the crossing of the old railway line adjacent to the Jameson Road Bridge crossing where a pipe bridge is proposed.

2.25 From there the saturated brine would be conveyed through an undersea HDPE pipe to the outfall approximately 2.3 km offshore to a two port single diffuser, the design of which is shown on the application plans, where it would be discharged into the sea in accordance with an existing Discharge Consent. The design of the diffuser has been carefully optimised for the marine environment, and its performance would achieve those standards specified by the Environment Agency in its approval.

2.26 The principal use of the seawater and the water infrastructure is for the creation of caverns. Once the caverns are completed, the water washing infrastructure would only be used for the filling of caverns during periods of cavern maintenance. Generally, the caverns may be filled with brine every 10 to 15 years for the testing and inspection of the gas storage caverns if required.

**Constructing the Brine Pipeline**

2.27 Starting at the western end of the pipeline, the two port single diffuser would be located on the sea bed in accordance with the requirements of the Discharge Licence. The HDPE pipe between the diffuser and the Mean Low Water (MLW) mark at the beach would be laid in a trench excavated by barge. The pipe would be weighted by concrete collars and
anchored to the seabed before the trench is backfilled. Between the MLW mark and the Sea Wall, the pipeline would be laid in a trench excavated by a digger which would access the beach from the existing ramp from the Sea Wall. An area either side of the pipeline would be reserved for construction compounds and the storage of spoil.

2.28 From the Sea Wall to The Strand/Broadway junction, the pipeline would run through an area of open land. In this area, the pipeline would be sited in an excavated trench. A working width of 37 metres is proposed to allow for the construction of a temporary haul road, the excavation of the trench and the storage of spoil. The working width would be fenced and access provided from the existing gates to West Way. The pipes would be delivered to the site by lorry in 12 metre lengths; welded together on-site and lowered into the excavated trench. The trench would then be backfilled and marker posts erected at the field boundaries.

2.29 The pipeline would be thrust bored under The Strand/Broadway junction to avoid disruption to traffic and utilities. A drive pit of approximately 8 metres by 4 metres would be constructed on the west side of the junction and the pipeline would be driven under the junction approximately 3.5 metres deep to a reception pit on the east side of the junction. The reception pit would be approximately 8 metres by 8 metres. Access to this land would be provided from the existing gate on the South Strand.

2.30 A drive pit would be constructed to the south of the former railway and the pipe would be thrust bored to the reception pit at The Strand/Broadway junction referred to above.

2.31 The pipeline would continue south eastwards and then eastwards to Amonderness Way. The pipeline would be thrust bored under Amonderness Way from a drive pit on the west side of the road. A temporary access for construction would be required from Rossall Lane. The reception pit on the east side of Amonderness Way would be in a compound that would also accommodate a drive pit to allow the pipeline to be thrust bored under Fleetwood Road. A reception pit would be provided adjacent to Jameson Road from which it would be routed eastwards in an excavated trench. The pit would cross the former Fleetwood-Poulton railway by way of a pipe bridge before turning north to run parallel with the route of the former railway. The pipe would be located in an excavated trench with access from Jameson Road.

2.32 The pipe runs adjacent to the Waste Water Treatment Works prior to following the southern boundary of the Redrow housing development that is currently under construction. Sleeves under the new roads within the Redrow Estate have already been provided and these would be used to accommodate the pipeline. A construction access would be provided through the Redrow development to allow for the pipes to be bought to the site.
2.33 As the pipeline approaches the west bank of the River Wyre, it would be laid on the ground and covered. Halite has agreed a Licence with ABP to directional drill from a compound on the west bank of the River Wyre under the estuary to the Preesall part of the site.

2.34 The directional drilling of the pipeline route would exit at a reception pit close to the site of the proposed Booster Pump Station. The brine pipe, along with the other pipe routes, would be continuously ‘pulled’ through the directional drilled borehole from the east bank to the west bank. The brine pipeline would be connected to the Booster Pump Station through an excavated trench.

2.35 The construction programme for the brine pipeline would be approximately 12 months.

**Constructing the Seawall Crossing**

2.36 The construction of the sea wall crossing is summarised above but the detailed schedule of works includes the following:

- Temporary construction compound installed landside of existing seawall, south of planned pipe crossing.
- The access ramp from West Way would be closed to pedestrians for installation of pipe, removal of existing ramp and foundations for observation platforms for up to 12 weeks. Access would be restricted for up to an additional 12 weeks subject to control during site deliveries.
- The existing ramp from the foreshore to the seawall would be used to allow heavy equipment access.
- The marine contractor would install a cofferdam on the seaward side.
- The marine contractor would install HDPE pipe from inside the cofferdam to the low water mark.
- Relevant sections of the existing seawall would be removed without affecting the efficiency of the continuing sea defence.
- Installation of a steel S-bend pipe through the top section of (over the main body of) the seawall would occur with a foreshore connection made inside the cofferdam.
- Marine contractor would withdraw and continue with laying the 2.3 kms outfall pipe.
- Installed pipe sections would be hydro-tested.
- Re-modelling of sea defence with observation deck in keeping with Cleveleys esplanade.
- Once complete, demobilisation, clean up and re-instatement to the previous condition.
- The finished new seawall would remain visually in keeping with the length of the new sea defences along this part of the Lancashire coast.
2.37 The work would take place during the summer in the first year of construction and this part of the Project would be completed within 9 months.

**Constructing the Brine Outfall**

2.38 The brine outfall pipe would be constructed in the summer months. The pipeline would be ‘floated’ out to sea and buried within a trench to be excavated in the sea bed. The pipeline would be anchored and the trench would be backfilled. The diffuser would be attached to the seaward end of the pipe as shown on the application drawings. A marker buoy would be located at the western end of the pipeline. During the laying of the pipeline, the consent of the maritime agencies would be required to ensure that there were no issues for navigation.

2.39 The construction of the outfall would form part of the works to the brine pipeline and would be carried out in the first year of construction.

**Constructing the Seawater Pump Station**

2.40 The construction of the Seawater Pump Station is shown on Drawings No A-5000-001 to 004 and access would be from Herring Arm Road. The first stage would be the construction of the compound, access road and temporary site offices/utilities and the installation of the dewatering system. Second, the seawater extraction pit would be excavated and lined and the building foundations provided. The exterior structure and roof would then be constructed, followed by the interior walls and build out. On completion of the building, the electrical equipment, pumps and manifolds would be provided along with the control systems.

2.41 Following completion of the building and structures, the landscaping scheme would be implemented. The construction programme for the Seawater Pump Station would be approximately 12 months.

**Constructing the Booster Pump Station**

2.42 The construction of the Booster Pump Station is shown on Drawings No A-6000-001 to 004. The first stage would be to establish the construction compound, offices and utilities. Groundwork would follow including the preparation of the foundations of the building, the excavation of the debrine pond and the preliminary works for the construction of the access roads and hardstandings. Spoil removed from the site would be used to landscape the surroundings of the compound. Once the excavation works were complete the bottom and walls of the debrine pond would be constructed along with the foundations of the building and structures. The walls and the roof of the building would be created followed by the internal works including the installation of the pumps, manifolds and filters, the electrical installation and controls. The control facilities would be created in two phases. The first stage would provide for the control of the leaching
process for cavern creation. The second phase would include the GCC control which would be commissioned in the third year of construction.

2.43 The final stage would be the grading of the site, the implementation of the landscape scheme and the erection of the perimeter fence. The construction period for the Booster Pumping Station is programmed for 18 months.

Overview of the Gas and Electrical Infrastructure

2.44 The gas infrastructure for the Project consists of a Gas Compressor Compound (GCC), the gas distribution pipelines and manifolds connecting the wellheads to the GCC and an interconnector pipeline which links the GCC to the NTS near Nanteby, approximately 12 km away. The interconnector pipeline is designed as a 42 inch diameter pipe but there may be an opportunity to reduce this to a 36 inch diameter pipe. A connection is proposed to National Grid Gas pipelines (No.21 and/or No 15 Feeder) to ensure maximum flow rate and availability. At the connection point there would be a shut-down valve under National Grid Gas control. A gas metering station is proposed, adjacent to National Grid Gas’s existing valve installation on Feeder 21.

Constructing the Gas Compressor Compound

2.45 The construction of the GCC is shown on Drawing No A-2000-001 to 006. The first stage would be the creation of the construction compound and the provision of temporary offices, utilities and parking. The Compound would contain the following buildings, structures and equipment:

- Pig Launchers and Receivers;
- Slug Catchers;
- Large diameter above ground high pressure pipelines;
- Glycol Contactors to dry the gas;
- Glycol Regeneration system;
- Gas Compressors;
- Compressor Knock Out Separators;
- Compressor Aftercoolers;
- Gas filters;
- Gas Heaters;
- Various utility systems, plant drainage and power supply;
- Emergency/maintenance vent stack;
- Electrical/instrument and Utilities buildings; and
- Vent Stack provided within the centre of a new pond.

2.46 Excess spoil generated from the creation of foundation and pipe trenches would be used adjacent to the Compound for landscape purposes.
2.47 Following site preparation works in the first year of construction, the construction period for the GCC is programmed for an additional 24 months.

2.48 For a strategic project such as this, it is a requirement that there is a robust high integrity electricity supply. The installation would be supplied from the connection point at the Stanah Switchyard via 100% dual circuits, so that, if one supply is not available, the load can be supplied by the other circuit. Additional switchgear would be required at Stanah and this would be included within the existing Sub Station building. No changes are required to the layout and external appearance of the existing building.

2.49 Cables would be laid underground from United Utilities (UU) switchgear in the Stanah Switchyard, beneath the Wyre Estuary and north through to the Sub Station at the GCC. Crossing of the Wyre Estuary would be achieved by directionally drilling two pipes for two circuits. The pipes would be a minimum of 8 metres below the bed of the River to ensure that the existing silt and sediments are not disturbed.

2.50 Cable ducts and ultimately the electricity cabling would be drawn from the Preesall side across to the Stanah Switchyard. This would entail cable ducting being laid out across the field on the Preesall side so that a continuous pull can be achieved. The cables would be delivered on cable spools which would feed the cable out as the pull progresses.

2.51 From the GCC would run 3 underground gas pipeline manifolds inland of the river embankment. From these manifolds, gas distribution pipes would be connected to the individual wellheads.

2.52 The construction of the GCC may require the re-location or undergrounding of existing overhead electricity lines that cross the Preesall site. Electricity North West Limited (ENWL), the local electricity distribution company, is seeking to upgrade two existing 33Kv overhead lines that cross the site. The two lines run in parallel and the proposal is to upgrade the line by providing new wooden poles to replace those existing. ENWL would provide the new poles to the north of those existing and would relocate the overhead line to the new poles prior to removing the old poles. This work is programmed to be completed in 2012 and would be undertaken irrespective of the implementation of the Project. Ideally, Halite would like that part of the overhead line that is near the site of the GCC to be undergrounded so that it did not affect or constrain the construction of the Compound or the use of cranes. Halite is in discussion with ENWL but the timescales are such that the works may be carried out in advance of the DCO.

**Constructing the Interconnector Pipeline**

2.53 The ‘Gas Interconnector Pipeline to the NTS Report’ (Document Ref 9.2.6) provides details of the route and construction of the interconnector pipeline. The pipeline would involve the construction of a 42-inch (or 36-
inch) diameter pipe connecting the GCC to the NTS at Nateby. The pipeline would be a buried high tensile steel pipe designed and constructed in accordance with British Standard 8010 – Code of Practice for Pipelines (BS 8010) and the Pipelines Act 1962. Radiographic testing of all welded joints would be performed prior to pipeline burial and the pipeline would be hydrostatically tested in-situ.

2.54 A cleared area approximately 37m wide would be required to install the pipeline. This area is commonly referred to as the pipeline working width. The working width would decrease in confined or sensitive areas as shown on the DCO application drawings. A description of the proposed construction method is provided below:

2.55 **Clearing:** The 37m working width for each stage of the pipeline construction would be cleared of vegetation.

2.56 **Grading:** The working width would be levelled to the required gradient using graders, backhoes and bulldozers. In agricultural areas, the topsoil would be stripped from the working width in consultation with landholders. In other areas, topsoil would not be stripped, but removed from the trench line. Topsoil would not remain exposed for longer than three months at any one place.

2.57 **Trenching:** Either a wheel trencher or an excavator would be used to dig the trench in which the pipe would lie. A wheel trencher can dig approximately 1,200m per day but can only be used on level ground with suitable soil. Excavators or back hoes can dig approximately 210m per day and can be used in all terrain. The distance covered per day would be dependent on terrain, equipment availability and weather conditions. The minimum practical distance of trench would be left open, which would be likely to be between 2.5km and 5km. Soil from the trench would be stockpiled on the working width separate from the topsoil.

2.58 **Stringing:** The pipeline would be transported to the site on trucks in 18m joints and off loaded using side boom tractors. The access to the pipeline corridor would be provided from existing roads but, in places, it is necessary to remove hedgerows on field boundaries to access all the land in the pipeline corridor. The removal of the hedges would take place in those areas where the pipeline trench would be provided and hedgerows would be replanted once the pipeline was laid. The pipe would be strung adjacent to the trench and held off the ground on skids, which protects the pipe coating from damage.

2.59 **Bending:** Generally, changes in pipeline direction for smaller diameter pipes can be catered for within the inherent flexibility of the pipe. However, in most cases the pipeline would have to be “cold bent”. The pipe would be cold bent using a hydraulic bending machine, to the appropriate angle (determined by the surveyors) to match the vertical and horizontal alignment of the trench. Bends should not exceed 1.5 degrees of arc per pipe diameter of length measured along the longitudinal axis of the pipe.
2.60 **Line-up and welding**: Once the pipe is strung, a line-up crew would position the pipe using side boom tractors and internal line-up clamps in preparation for welding. Pipes would be welded in several layers. Initially, individual pipes would be held by a pneumatic line-up clamp and welded (Stringer or Root Bead weld). Closely following the Root Bead weld the second weld, known as a Hot Pass weld, would be applied. Fill and Cap passes would be applied to complete the welding operation to the full thickness of the pipe. The pipes would be welded together to form 1km lengths prior to laying in the trench. Suitable measures would be taken to prevent any health and safety risks to members of the public and workers due to welding activities.

2.61 **Radiography**: Each weld would be 100% radiographed to test for compliance to specifications. Radiography would be carried out in accordance with relevant safety standards using reputable and qualified contractors to ensure the safety of the public and workers.

2.62 **Joint Coating**: The pipe would be coated during manufacturing and prior to stringing and each length would be checked for holes, abrasions or minor defects. Any imperfections in the coating would be repaired. Joint welds, which are not pre-coated, would be coated with a three-layer coating on site and any waste created would be disposed of in an appropriate manner.

2.63 **Lowering In and backfilling**: Soil and padding from borrow pits would be replaced in the bottom of the trench where required. The pipe would then be lifted off the skids and lowered into the trench using side-boom tractors operating in a “leap-frog” fashion. The trench spoil would then be returned to the trench and topsoil replaced.

2.64 **Fabrication**: Pipe fabrication includes fittings, valves and connections, which would be welded to the pipe. Where possible, these installations would be prefabricated and then installed after the main construction crew has moved through an area.

2.65 **Testing**: The pipeline would be hydrostatically tested for strength and potential leaks by being filled with water and the pressure increased to a minimum of 125% of the operating pressure. The water would be held in the pipeline under this pressure for a period of 24 hours. The water for testing would be sourced from rivers or town supplies. No corrosion inhibitors or biocides would be added to the water. No water would be returned directly to watercourses. Where approved the water would be spread across vegetated areas.

2.66 **Clean-up and rehabilitation**: Clean-up and rehabilitation would be conducted in accordance with the requirements of the Construction Environmental Management Plan (CEMP) to be provided as part of the DCO requirements. Generally, clean up and rehabilitation would involve removal of foreign material (construction material and waste), spreading topsoil, surface contouring, seeding, restoration of hedges and
landscaping. In certain areas a low “crown” may be allowed to remain over the trench line to allow for possible subsidence. The crown would be broken at regular intervals to prevent disruption to surface water flow.

2.67 Following the construction and pressure testing the pipe would be purged of all remaining water using a foam pig. The pipeline would be dried using either a vacuum drying or air drying method. Once completely dried, the pipeline would be stored under nitrogen gas if not immediately required for operation. If however the pipeline is commissioned, natural gas would pass through the pipeline at low pressure to purge the air out of the pipe. The air would be vented through a vent stack designed and tested in accordance with Health and Safety Executive (HSE) requirements at the GCC. When most of the air has been purged from the pipeline, gas would be detected. Venting would continue until the content of the gas being purged reaches approximately 90%. The vent valves would then be closed and the gas pressure in the pipeline raised to normal NTS pressure completing the commissioning of the pipeline.

2.68 On the NTS pipeline corridor, there are no major river crossings, no rail crossings and the A588 is the only significant road crossing. In all, there are 7 road crossings, 9 track crossings and 4 stream crossings as follows:

Road Crossings :  RDX 1 Back Lane  
RDX 2 Hall Gate Lane (A 588)  
RDX 3 Lancaster Road  
RDX 4 Bradshaw Lane  
RDX 5 Bone Hill Lane  
RDX 6 Black Lane  
RDX 7 Station Lane

Track Crossings :  TX1 Unnamed path  
TX2 Track near Hackensall Barn  
TX3 Track at White Lane  
TX4 Path at Shaws Lane  
TX5 Track at New Lane  
TX6 Unnamed Track  
TX7 Unnamed Track  
TX8 Unnamed Track  
TX9 Unnamed Path

Stream Crossings :  SX1 Grange Pool west of the A588  
SX2 Grange Pool east of the A588  
SX3 Ridgy Pool  
SX4 Pilling Water

2.69 In addition to the above there are numerous drains which will be traversed by the pipeline route. These are mostly shallow, largely seasonal in terms of flow and are not significant in the context of pipeline construction. **Figure 2.1** shows the interconnector pipeline route and the road crossings.
Figure 2.1 Interconnector Pipeline Route and Road Crossings
2.70 It is proposed to access the pipeline route from the 7 road crossings and the GCC. It is anticipated that the western third of the route will be served by the A588 with direct access to the pipeline from:-

- GCC
- Back Lane at RDX 1
- Hall Gate Lane at RDX 2
- Moss House Lane at RDX 2

2.71 The mid-section and the eastern section of the pipeline route are most likely to be served by Garstang Road / Black Lane / Cartmel Lane and Longmoor Lane with direct access to the pipeline from:

- Lancaster Road at RDX 3
- Bradshaw Lane at RDX 4
- Bone Hill Lane at RDX 5
- Black Lane at RDX 6

2.72 At road crossings, the width of the wayleave would be increased to 45 m (on both sides of the road) so as to provide a laydown area for pipe and ensure that pipe delivery vehicles will not have to park on public roads. The length of the widened section of wayleave will be 30 m. The access opening at road crossings will generally be a double gate width of approximately 12 m. This width, together with a set-back, will provide adequate turning radii for HGV’s at access points to the right-of-way.

2.73 The estimated construction period for the NTS interconnector is approximately 6 months.

Construction of the Metering Station

2.74 The construction of the Metering Station would be at the connection point with the Gas NTS at Nateby and is shown on Drawing No A-3000-010 and 001. The first stage of the construction of the Metering Station would be to establish the construction compound, offices and utilities. Groundwork would follow including the preparation of the foundations of the building and hardstandings. Once the excavation works were complete the foundations of the building, the walls and the roof would be created followed by the internal works including the installation of the meters, valves and pipework.

2.75 The site would be accessed from the existing installed track which provides access to the existing Block Valve Station.

2.76 The Metering Station would take approximately 6 months to construct.
Construction of the Wellheads

2.77 The areas identified for the wellheads would be cleared and graded. The spoil would be stored to provide landscaped bunds around the wellheads on their completion. The wellhead area would be built up with stone chippings to provide a platform for the drilling rig for vertical and S-shaped drill caverns. Around the outside of each platform a catchment area would be excavated for the storage of drilling muds.

2.78 Once drilling is complete, a 4 metre by 4 metre pit would be excavated to house each wellhead. The pit would be approximately 3 metres deep. A sheet pile coffer dam would be created around the well cap to allow for excavation. The arising from the excavations would be stored to provide the landscaped bunds as shown on the application drawings.

2.79 For directionally drilled caverns, a 4 metre by 6 metre by 3 metre deep pit would be formed by sheet piling and a reinforced concrete bunker formed incorporating a thrust block. The bunker will be formed on the drilling axis to the cavern in order to minimise the complexity of the drilling process. The drilling machine is installed in the pit and the operation would start with a tunnelling process at approx. 15 degrees to the horizontal. The drilling sleeves would be left in place at the end of the tunnelling process which penetrates the glacial material. Then drilling would continue arching down into the mudstone to enter the salt vertically. It is intended to drill two wells into every cavern and some of the wellhead compounds would have a mixture of vertical and directionally drilled or S drilled caverns.

2.80 The wellhead compounds would be constructed on a phased basis as the drilling of boreholes across the site progresses in accordance with the agreement of the HSE. The wellhead compounds would be large enough to accommodate the drilling rig, pipework and ancillary infrastructure. Following the drilling of the boreholes, the water washing infrastructure would be connected to wash the caverns and once these are created the gas manifolds would be connected to allow for the import and export of gas.

2.81 Each wellhead compound would be a high security compound surrounded by palisade fencing with CCTV cameras.

2.82 Once the drilling is complete, the drilling equipment would be removed and the landscaped bunds re-contoured to screen the operational wellheads. These are low structures whose visual impact can be mitigated by earth screening and planting.

Creation of Gas Caverns

2.83 **Overview**: The caverns would be developed and constructed in accordance with BSI BS EN 1918-3 ‘Gas Supply Systems – Underground Gas Storage Part 3: Functional Recommendation for Storage in Solution –
Mined Salt Cavities’ (1998). The design must meet the approval of the HSE following the drilling and testing of the borehole for each cavern.

2.84 Each salt cavern would be developed in a similar manner. A description of the phases of the process is set out below and this should be read in conjunction with the diagrams attached at Appendix 2. To access the salt, boreholes would be drilled from 7 wellhead compounds. The wellhead compounds would be created and landscaped as shown on the application drawings. A drilling rig would be sited at the wellhead and boreholes would be drilled to access the salt bed. The drilling rig would take approximately 4 to 6 weeks to drill each borehole.

2.85 Each compound would contain a number of wellheads and, therefore, as each borehole was completed, the drilling rig would move to the next. Vertical wells would be drilled to access the land based salt body and directional drilling techniques would be used to access the salt under the Wyre Estuary.

2.86 Halite has engaged Baker Hughes to evaluate the required programme to drill and create caverns located in the cavern development area. Because some of the salt formation lies under the Wyre Estuary, most well trajectories would require directional drilling. In some instances, up to a 600 metre ‘step out’ would be required from the well head to the location of the cavern that is proposed to be created. Four distinct well types have been identified; vertical, S-shaped, slant and extended reach slant wells. Details of the drilling programme are set out in the ‘Review of the Proposed Drilling and Completion Programmes for the Preesall Underground Gas Storage Project’ (Document Ref 9.2.5) prepared by Baker Hughes. The objective of this Review is to provide a technical assessment of the conceptual drilling and completion programmes having particular regard to a 600m step out well, using industry standards and guidelines. As all of the wells in this first phase of the Preesall development are similar in design but have less horizontal displacement than the 600m step out well, the resultant findings can be considered for all well types required to complete this first phase of cavern construction. A full examination of the engineering design for the conceptual ‘600m step out’ well was completed and the outcome of the technical risk assessment concluded that no significant risks remained after mitigation measures were put in place. The risk assessment considered all well types required to complete the 19 proposed caverns.

2.87 The caverns would be created and accessed by two boreholes drilled from separate wellheads. Following the creation of the boreholes, the surface casing would be cemented back to the surface and the cement allowed to cure. This means that the casing would be sheathed in cement so as to create an impermeable barrier between the casing and the surrounding rock in accordance with industry best practice. The cement casing of the boreholes would be impermeable to gas penetration and erosion.
2.88 The drilling process would continue with casing set in the first 15 – 25 metres of the salt bed. Where the cavern to be created in the salt is directly under the drill pad the borehole into the salt would be vertical. Where the cavern is to be created in a position laterally displaced from the drill pad, the borehole above the casing shoe would be drilled using a directional drilling technique.

2.89 To ensure well integrity, the accepted modern method is the use of two casing strings in each borehole. This means that instead of a single steel pipe ('casing') there are two casings; one inside the other. The space between the two casings, called the annulus, would be used for the monitoring of the integrity of the well casings. If one casing fails, the gas would be retained by the other. In the event of a failure the cavern can be emptied or taken out of operation. Investigative and remedial work can safely be carried out thereafter. This method, together with the blanket method of cavern creation enables a high degree of well integrity to be achieved.

2.90 The production casing would be run into the well with a stab-in float collar between the 1st and 2nd casing joints. A float guide shoe would also be placed on the end of the lowermost joint to guarantee that cement would not migrate back up into the casing when pumping of cement is completed. After the casing is cemented back to the surface, the cement would be allowed to cure. After curing the cement, the float collar and float shoe, which are made of cement, would be drilled out and a smaller borehole drilled vertically to the proposed total depth of the cavern (See Drawing 1 of Appendix 2).

2.91 The well would be logged to verify the predicted geology of the roof rock and salt. This would be undertaken using an electric wire logging device which would be lowered into the well to measure the electrical resistivity of the roof rock and the salt bed. The results of this measurement would be analysed and would provide additional information about the characteristics of the salt body.

2.92 The brine production tubing would be hung in the wellhead to the level of the proposed bottom of the cavern. The injection tubing would be hung at the required depth and the wellhead would be completed in preparation for the solution mining process (washing) of the cavern. This would complete the well installation. As set out above, each cavern would be accessed from two wellheads.

2.93 A solution mining process, using seawater, would dissolve the salt in order to create the cavern in the salt body. Seawater would be pumped down the borehole, which would dissolve the salt, and the resultant brine would be returned to the surface. In order to protect the material over the salt bed from the effects of the washing process and to protect the cement casings, it would be necessary to ensure that a layer of salt is left unwashed. A depth of salt equal to the radius of the cavern is always retained between the final cemented/production casing during solution mining in order to
protect the casings and to aid in controlling the inert gas blanket depth. The thickness of salt is known as the salt head and is determined in each case for the specific requirements of each cavern.

2.94 The inert gas blanket, in this case nitrogen, would prevent the dissolution of salt around the cemented production casing. This blanket would be injected and the depth would be verified by interface logging which measures the brine/nitrogen interface that is determined by the difference in the density of brine and of nitrogen at a certain depth. The blanket interface would be calculated individually for each borehole. Seawater injection would be through the injection tubing using the direct method of washing. The brine produced as a result of the washing process would be brought to the surface through the annulus between the different sized tubing within the borehole (Drawing 2 in Appendix 2). The two boreholes would also allow seawater to be pumped down one and returned to the surface in the other.

2.95 A sump would be created at the bottom of the cavern to contain the insoluble substances liberated by the washing process. Sonar surveys of the cavern would be carried out during the washing process to reveal its size and shape.

2.96 The important blanket interface would be periodically verified with an interface survey and would be continuously monitored by recording the nitrogen wellhead pressure. The amount of cavern storage space that would be washed each day would be calculated from the volume of brine withdrawn and the temperature corrected specific gravity of that brine.

2.97 Washing would continue with intermittent sonar surveys verifying the cavern shape and volume until the required storage space is achieved (Drawing 3 in Appendix 2). The washing system would be designed to eliminate excessive water injection pressures. The use of centrifugal pumps provides an extra safety measure for not overpressuring the salt body during cavern creation. The casing shoe is the bottom of the casing in the well. If the injection tubing or brine production tubing used in the washing process becomes blocked or plugged by insoluble material or if there is a reduction in flow caused by, for example, salt crystallisation a surface alarm would sound and an automatic shut down valve would operate stopping the injection pumps.

2.98 After solution mining is completed, the leaching strings would be removed, a final sonar survey would be performed, the de-brining string would be inserted into the well, and the high pressure wellhead would be installed. Following completion of these steps, a mechanical integrity test (MIT) would be performed using nitrogen gas. Nitrogen would be injected into the well between the production casing and the de-brining string until the gas/brine interface is several metres below the cemented casing seat. The nitrogen gas/brine interface would be verified by the running of a density interface log. The log detects the difference in density between the nitrogen gas and the saturated brine. After the interface has stabilized due
to temperature/brine equalization and pressure, the well would be monitored for a minimum of 24 hours and a new interface log would be performed. If the interface has not moved upward, the well and cavern would be certified as devoid of fluid leakage: that is, the well and cavern have mechanical integrity. If the interface has moved upward, a new test would be required to certify the integrity of the cavern. All tests would be carried out in accordance with the requirements of the HSE.

2.99 If for some reason a well or cavern does not pass the tests, attempts to determine the reasons for failure would be made. If the reasons for the failure cannot be resolved, the cavern/well would not be used and would be decommissioned. Typically, however, the industry experiences very low failure rates of new caverns.

2.100 Following successful completion of this testing, gas from the NTS would be introduced under pressure and used to purge the cavern of brine. The completed well and cavern would be operated as a pressure vessel while in natural gas storage service (Drawing 4 in Appendix 2).

2.101 Initial cavern gas fill and de-brining safety systems would make use of both manual and automatic shutdown valves on the wellheads at the surface. Sensors on the gas injection side would close wellhead valves automatically (fail closed) if pressure on the injection side is higher than necessary to displace brine from the cavern. The shut-down would be recorded in the control room and injection to the well would cease.

2.102 Programme: Subject to approval by the HSE, the programme of work for the creation of the caverns would be as follows. Construction would commence of the surface infrastructure and the first boreholes would be drilled. Each borehole would take approximately 6-8 weeks to drill and work would progress sequentially. Within 12 months, the first six cavern locations should be available for washing. Once the water washing infrastructure is complete, a start would be made on washing the first 6 caverns. The caverns would be washed in parallel and it would take some 15 months to complete all 6.

2.103 Whilst the first 6 caverns were being washed, the boreholes for the next 6 caverns would be drilled. The drilling and the leaching would take a further 12 and 15 months respectively. The last 7 caverns (making 19 in total) would follow in the same manner.

2.104 Caverns could not be filled with gas until the GCC and the interconnector pipeline was complete.

Other Temporary Works

2.105 In addition to the construction works that have been identified in the description of the main plant and buildings above, there is a need for some temporary works including the provision of construction compounds and the crossing of watercourses.
2.106 Temporary construction compounds are shown on Drawings No A-9100-015 to 019 and are proposed at:

- The proposed Seawall Crossing.
- Adjacent to the route of the proposed brine pipeline west of the Wastewater Treatment Works.
- The proposed site of the Seawater Pump Station.
- The proposed site of the Booster Pump Station.
- Adjacent to the site of the proposed Gas Compressor Compound.

2.107 In addition, during drilling operations, the wellhead compounds will be construction compounds and will remain so until the compound infrastructure is completed and the wellhead is operational.

2.108 Temporary ‘launch pits’ and ‘receiver pits’ are required on the proposed route of the brine pipeline to facilitate the boring of the pipe under existing roads and infrastructure at locations as described above and shown on the Masterplan.

2.109 Other than the construction of the north and south river crossings, the proposals do not require the crossing of a navigable waterway. However, a number of streams and drainage ditches are crossed by the proposed roads and pipeline routes. The normal approach would be to install a suitably sized pipe or ‘flume’ in the ditch at the required crossing point. This would be sealed with clay and the pipeline crossing would be dug under the pipe/flume. If the water flow is low it may be sufficient to dam the affected stream/ditch, carry out the proposed works to cross the stream/ditch before re-instating the land required for the diversion. All these works would be carried out within the defined ‘work areas’ shown on the Works Plans.
3.0  CONSTRUCTION LOGISTICS

3.1 This Section provides information on construction logistics including:

- Hours of working
- Construction Workers
- Construction traffic
- Emissions and waste

**Hours of Working**

3.2 Generally construction hours would be between the hours of 08.00 to 18.00 hrs Monday to Friday with no construction works on Sundays and Bank Holidays.

3.3 There would, however, be exceptions to these general hours to facilitate night-time working for those operations that are continuous. This would include the drilling of boreholes and the washing of caverns.

3.4 In order to ease congestion and to meet the requirements of the police, abnormal loads may also arrive at the site outside of normal working hours.

3.5 The draft DCO contains a requirement that seeks to set normal construction hours unless otherwise agreed with the LPA.

**Construction Workers**

3.6 Construction personnel will include the various trades for building works, (piling, concreting, steelwork, brickwork, roofing, electrics, pipework, fitting, welding, plumbing and finishes), together with crews for earthworks, roadworks and pipe laying. Specialist crews will be involved in drilling, high voltage electrical works, compressor installation, pump installation and plant commissioning.

3.7 In Year 1, Halite estimate that the number of construction workers at Preesall and at Fleetwood would peak at 161 declining to a peak of 54 (average 49) in years 2 and 3. In addition, a total of 70 workers would be required during the construction of the interconnector pipeline which means the Project would require approximately 231 workers on the whole Project site at the peak time of construction (year 1). Parking and worker facilities would be provided at the temporary construction compounds during the construction of the project.

**Construction Traffic**

3.8 The proposed access road from the A588 would be constructed as the first phase of the Project on the main Preesall site. Construction vehicles would predominantly enter and exit the main Preesall site from the A558 using the new haul road. Access to the construction works at Fleetwood would be via the A588 with construction traffic for the south Estuary
crossing at Stanah using the B 5412 and then Stanah Road / River Road. Traffic for the construction of the Seawater Pump Station at the Fish Dock would use Herring Arm Road whilst traffic generated by the construction of the brine discharge pipeline would use Fleetwood Road / Amounderness Way / South Strand and West Way. Construction traffic for the Sea Wall Crossing would access the works via West Way.

3.9 The NTS Interconnector Pipeline would run from the GCC (the most western extent) to the connection with the NTS (the most eastern extent). Access for the construction of the proposed pipeline would be from the seven roads that cross the pipeline route, details of which are shown on the application plans and described in the ‘Environmental Statement’ (ES Document Ref 5.1). It is anticipated that the western third of the route would be served from the A588 and the mid and eastern sections served from Garstang Road / Black Lane / Cartmel Lane and Longmoor Lane (See Figure 2.1).

3.10 A summary of the HGV movements for each construction task in the programme at Preesall and Fleetwood are set out in the Table below:

<table>
<thead>
<tr>
<th>Task</th>
<th>Year</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permanent Access Road (A588 to Back Lane)</td>
<td></td>
<td>1216</td>
</tr>
<tr>
<td>Permanent Access Road (Back Lane to Gas Compressor Compound)</td>
<td></td>
<td>718</td>
</tr>
<tr>
<td>Site Entrance Facilities</td>
<td></td>
<td>114</td>
</tr>
<tr>
<td>Booster Pump Station</td>
<td></td>
<td>484</td>
</tr>
<tr>
<td>River Crossing (North)</td>
<td></td>
<td>286</td>
</tr>
<tr>
<td>River Crossing (South)</td>
<td></td>
<td>116</td>
</tr>
<tr>
<td>Underground Power Lines</td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>Site Pipework</td>
<td></td>
<td>152</td>
</tr>
<tr>
<td>Gas Compressor Compound</td>
<td></td>
<td>1098</td>
</tr>
<tr>
<td>Gravel Track</td>
<td></td>
<td>724</td>
</tr>
<tr>
<td>Wellheads and Manifolds</td>
<td></td>
<td>964</td>
</tr>
<tr>
<td>Total (Preesall)</td>
<td></td>
<td>4804</td>
</tr>
<tr>
<td>Sea Water pump Station</td>
<td></td>
<td>518</td>
</tr>
<tr>
<td>Estuary Crossing (North)</td>
<td></td>
<td>228</td>
</tr>
<tr>
<td>Estuary Crossing (South)</td>
<td></td>
<td>146</td>
</tr>
<tr>
<td>SWPS to Estuary Crossing (North)</td>
<td></td>
<td>104</td>
</tr>
<tr>
<td>Brine Discharge Pipeline</td>
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<td>328</td>
</tr>
<tr>
<td>Seawall crossing</td>
<td></td>
<td>260</td>
</tr>
<tr>
<td>Total (Fleetwood)</td>
<td></td>
<td>1584</td>
</tr>
</tbody>
</table>

| Total (Fleetwood and Preesall)             | 6388 |

Source: Chapter 16 of ES

3.11 It should be noted that all trips in this Table refer to return trips (ie a trip from the point of origin to the site and a return trip to the point of origin). As can be seen from the Table, the majority of HGV movements connected with the construction of the Project occur in year 1, with reduced movements in years 2 and 3. Construction movements reduce further in years 4-8 with an average of one HGV every two weeks.

3.12 In addition to HGV trips, the other major generator of trips would be construction workers travelling to/from the main Preesall site. Halite
estimate that approximately 250 two way trips a day would be generated by construction workers at the peak construction year (Year 1). A more detailed assessment is carried out in Section 16 of the ES. A summary of the HGV movements associated with the construction of the NTS interconnector pipeline is set out in the Table below:

<table>
<thead>
<tr>
<th>NTS Interconnector</th>
<th>Estimation of HGV generation (two way)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipe Delivery</td>
<td>694</td>
</tr>
<tr>
<td>Other Materials (granular material, fencing, etc)</td>
<td>140</td>
</tr>
<tr>
<td>Metering Station</td>
<td>70</td>
</tr>
<tr>
<td>Construction Plant</td>
<td>216</td>
</tr>
<tr>
<td>Sand (provisional)</td>
<td>700</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1820</strong></td>
</tr>
</tbody>
</table>

Source: Chapter 16 of ES

3.13 All of these construction trips would take place in year 1. In addition, the pipeline is predicted to require 60 construction workers with a further 3 supervisory personnel. The construction workers would be split into teams and would work on separate sections of the pipeline with an estimated maximum of 20 construction workers and an average of 10 at any one road crossing. An average of a further 17 construction workers are likely to be required to construct the Metering Station.

**Noise and Dust Control**

3.14 Prior to the commencement of development Halite would agree a noise management scheme and a scheme for the management and mitigation of dust emissions with the LPA. Generic measures for the mitigation of construction noise are set out in the ES as follows:

- Construction works would be confined to the normal working hours where possible. It is however recognised that directional drilling for the north and south crossings on the River Wyre, drilling at the wellheads and washing of the wellheads would by necessity be continuous processes.
- Careful selection of plant, construction methods and programming would ensure that quieter plant is selected. Where possible only plant conforming to relevant national or international standards, directives and recommendations on noise and vibration emissions would be used.
- Construction plant would be located, as far as is reasonably practicable, away from adjacent occupied buildings or as close as possible to noise barriers or site hoardings where these are located between the plant and the buildings. Construction plant would however need to be located at the limits of work and there may be little scope for increasing the separation distance between plant and receptor locations.
- Static and semi-static plant/equipment would be fitted with suitable enclosures where practicable.
• Personnel would be instructed on BPM to reduce noise and vibration as part of their induction training and as required prior to specific work activities.
• When plant is not being used, it would be shut down and not left to idle.
• Vehicles would not wait with engines running.
• Where practicable, all audible warning systems and alarms would be designed to minimise noise. Broadband reverse alarms would be fitted to all vehicles.
• Local residents would be consulted in advance of the works commencing.
• Localised mobile screening would be used where reasonably practicable to reduce the noise levels from handheld tools such as concrete saws.

3.15 Where necessary, applications for "prior consent" under Section 61 of the Control of Pollution Act 1974 would be prepared for any noisy activities, and agreed with Wyre Borough Council in advance of works taking place.

3.16 Dust emissions would be controlled in accordance with the advice set out in ‘The Control of Dust from Construction and Demolition Activities’ as summarised in Chapter 6 of the ES.

Emissions and Waste

3.17 The main wastes that would be generated from the construction of the Project include:-

3.18 Saturated brine produced through the washing of caverns would be disposed of by pipeline to the Irish Sea in accordance with the terms of the existing Discharge Licence granted by the Environment Agency. The Presalsa salt body contains on average an 8% insoluble content and during the leaching operation some 80% of the insolubles would be carried to the surface. Hydrocyclones would separate the insoluble substances from the brine and these, along with other drilling wastes would be disposed of (see below).

3.19 During the de-brining process (first fill of gas into the cavern) no insoluble substances would be carried to the surface

3.20 Drilling wastes would comprise solids (shale, sandstone, chert, etc.) and associated drilling muds. All the drilling wastes would be used on site for landscape buffers and earth mounding or, alternatively, removed from the site. Insoluble’s from the leaching process would be disposed of to an existing cavern on the site; BW 123. This cavern was chosen due to its proximity to the de-brining facility.

3.21 Topsoil/Rock/Earth from the construction of the foundations for the buildings, pipelines, roads and the levelling of compounds would be disposed of on site. The intention is to ensure that no soils need to be exported from the Presalsa site and the application plans show where the
earth mounding is proposed i.e. adjacent to the GCC, the Booster Pump Station Compound and the wellhead compounds.
ABBREVIATIONS

APB  Associated British Ports
BW   Brine Well
DCO  Development Consent Order
ENWL Electricity North West Limited
EPCM Engineering Procurement Construction and Management
ES   Environmental Statement
GCC  Gas Compressor Compound
HSE  Health and Safety Executive
IPC  Infrastructure Planning Commission
LPA  Local Planning Authority
NTS  National Transmission System
RDX  Road Crossing
STP  Standard Temperature and Pressure
SX   Stream Crossing
TX   Track Crossing
UGS  Underground Gas Storage
UK   United Kingdom
APPENDIX 1