

Morven Offshore Wind Farm

Morven Hawthorn Pit Grid Connection Project

Preliminary Environmental Information Report

Volume 3, Annex 1.1: Phase 1 Geo-Environmental Preliminary Risk Assessment

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Glossary

Term	Meaning
AC connection cables	Alternating current (AC) cables that will connect the proposed onshore land substation to the National Grid Hawthorn Pit Substation.
Blue Land Substation (LSS) Option Area	Proposed location option for the onshore land substation, located west of the A19 and south of the access road to the Jade Business Park.
Dolostone	A sedimentary carbonate rock which is primarily composed of dolomite (CaMg(CO3)2) mineral.
Green LSS Option Area	Proposed location option for the onshore land substation, located between Jade Business Park (Spring Rd, Murton, Seaham SR7 9DR) and the National Grid Hawthorn Pit Substation.
Landfall	The area in which the offshore export cables make landfall (come onshore) and the transitional area between the offshore cabling and the onshore cabling. This term applies to the entire landfall area between the trenchless technique exit pits and the transition joint bay inclusive of all construction works.
Magnitude	A combination of the spatial extent, duration, frequency and reversibility of an impact.
Mean High Water Springs (MHWS)	The average height of the high water levels of each pair of successive high waters during the periods of about 24 hours when the tidal range is at its greatest.
Mean Low Water Springs (MLWS)	The average height of the low water levels of each pair of successive low waters during the periods of about 24 hours when the tidal range is at its greatest.
Morven Hawthorn Pit Grid Connection (MHPGC) Project Preliminary Environmental Information Report (PEIR)	A report that provides preliminary environmental information in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. This is information that enables consultees to understand the likely significant environmental effects of a project, and which helps to inform consultation responses.
Morven Hawthorn Pit Grid Connection Project	The MHPGC Project is comprised of the offshore export cables in Scottish and English waters from the Morven North or the Morven South offshore substation platform(s) (OSP), landfall, onshore export cables, the onshore land substation (LSS) and AC connection cables. Also referred to in this report as the MHPGC Project, for ease of reading.
Morven North Offshore Wind Array Project (hereafter 'Morven South')	The Morven South Offshore Wind Array Project, which includes the wind turbines and foundations, Offshore Substation Platforms and foundations, inter-array and interconnector cables and associated infrastructure located within the Morven South Boundary.
MHPGC PEIR Red Line Boundary: Onshore	Spatial extent used to define the environmental assessment within the PEIR. The area within which all onshore components of the MHPGC Project will be located landward of Mean High Water Spring (MHWS), including areas required on a temporary basis

Term	Meaning
	during construction and/or decommissioning (e.g. construction compounds).
National Grid Hawthorn Pit Substation	The National Grid substation at Hawthorn Pit, County Durham, which the AC connection cables will connect into from the Onshore Land Substation.
Onshore components	Infrastructure landward of the transition joint bay at landfall, comprising onshore export cable, onshore export cable corridor, onshore land substation (LSS) AC connection cable and AC connection cable corridor and associated temporary and permanent infrastructure including temporary and permanent compound areas and accesses.
Onshore export cables	High Voltage Direct Current (HVDC) cables which bring electricity from the Transition Joint Bay (TJB) to the onshore land substation (LSS).
Onshore export cable corridor	The proposed corridor within which onshore export cables and associated infrastructure will be laid and located, from the transition joint bay (TJB) to the onshore land substation.
Onshore land substation (LSS)	A purpose-built site comprising a compound containing the electrical components for converting the High Voltage Direct Current (HVDC) to High Voltage Alternating Current (HVAC) power. The LSS site associated with the MHPGC Project adjusts the power quality and power factor to meet the requirements of power supply being fed to the National Grid Hawthorn Pit Substation.

Acronyms

Acronym	Meaning
AC	Alternating Current
BGS	British Geological Society
BRE	Building Research Establishment
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
CDZ	Central Development Zone
CIEH	Chartered Institute of Environmental Health
CMRA	Coal Mining Reporting Area
CO_2	Carbon dioxide
CoC	Contaminants of Concern
CPT	Cone Penetration Testing
CSM	Conceptual Site Model
DCC	Durham County Council
EA	Environment Agency
EGL	Eastern Green Link
EIA	Environmental Impact Assessment

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Acronym	Meaning
EIR	Environmental Information Regulations
ES	Environmental Statement
GI	Ground Investigation
GIS	Geographic Information System
GQRA	Generic Quantitative Risk Assessment
HSE	Health and Safety Executive
HVAC	High voltage alternative current
HVDC	High voltage direct current
LCRM	Land Contamination Risk Management
LiDAR	Light Detection and Ranging
LNR	Local Nature Reserve
LSS	onshore land substation
MHPGC	Morven Hawthorn Pit Grid Connection
MLWS	Mean Low Water Springs
MRA	Mining Remediation Authority
NHBC	National House Building Council
NRZ	Northern Remediation Zone
OSP(s)	Offshore Substation Platform(s)
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PEIR	Preliminary Environmental Information Report
PPL	Potential Pollutant Linkages
PRA	Preliminary Risk Assessment
PWS	Private Water Supplies
RMS	Remediation Method Statement
SPRL	Source-Pathway-Receptor Linkage
SSSI	Site of Special Scientific Interest
TPH	Total Petroleum Hydrocarbons
UXO	Unexploded Ordnance
VOC	Volatile Organic Compounds
WFD	Water Framework Directive
ZoI	Zone of Influence

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Units

Unit	Meaning
Bq/m³	Becquerels per Cubic Metre
m	Metre
m bgl	Metres Below Ground Level
m/yr	Metres per Year
km	Kilometre
%	Percent

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1 Introduction

1.1 Overview

1.1.1.1 This report provides the Geo-environmental Preliminary Risk Assessment (PRA) for the Morven Hawthorn Pit Grid Connection Project (referred to hereafter as 'the MHPGC Project'). It forms **Volume 3, Annex 1.1: Phase 1 Geo-Environmental Preliminary Risk Assessment, of the Preliminary Environmental Information Report (PEIR)** prepared for the MHPGC Project, and supports **Volume 3, Chapter 1: Geology, Hydrogeology and Ground Conditions, of the PEIR**. This PRA summarises key geo-environmental information for the onshore parts of the MHPGC Project, develops a Conceptual Site Model identifying the potential contamination sources, receptors, and the exposure pathways by which they may be linked, and provides a preliminary assessment of the geo-environmental risks that the site presents to identified receptors, i.e. future site users and neighbouring occupants, controlled waters, sensitive habitats and the proposed development. The output of the PRA also supports the establishment of baseline conditions and the assessment of potential effects within **Volume 3, Chapter 1: Geology, Hydrogeology and Ground Conditions, of the PEIR**.

1.1.1.2 **Volume 1, Chapter 2: Project Description, of the PEIR** sets out the description of the MHPGC Project and **Volume 1, Chapter 4: Approach to Environmental Impact Assessment, of the PEIR** sets out the overarching approach that has been used in developing the preliminary environmental information.

1.1.1.3 This PRA describes the methods and data sources used to characterise the baseline for onshore geology, hydrogeology and ground conditions, and lists the documents that have informed the baseline.

1.1.1.4 The report covers the MHPGC Project PEIR Red Line Boundary: Onshore, as shown on **Figure 1.1** in **Appendix A**.

1.2 Background

1.2.1.1 The MHPGC Project will connect the offshore substation platform(s) (OSP(s)) of Morven North Offshore Wind Array Project or Morven South Offshore Wind Array Project, located approximately 61 kilometres (km) at its closest point from the Aberdeenshire coast in Scottish waters, to the National Grid Hawthorn Pit Substation, south of Seaham, on the Durham Coast.

1.2.1.2 The onshore components of the MHPGC Project will extend landward of Mean High Water Springs (MHWS) at the landfall and will continue to the existing National Grid Hawthorn Pit Substation. The landfall is the point where the offshore export cables transition from the offshore marine environment to the onshore terrestrial environment.

1.2.1.3 The onshore components will consist of:

- The onshore export cables (high voltage direct current (HVDC) cables), which will run from a transition joint bay (TJB), located in the vicinity of the onshore side of the landfall, to the onshore land substation (LSS) (note an element of the offshore export cable sits within the onshore side of the boundary between MHWS and the TJB);
- The onshore LSS, which will contain the electrical components for converting the HVDC to high voltage alternating current (HVAC) power;
- The HVAC connection cables, which will connect the onshore LSS to the National Grid Hawthorn Pit Substation.

1.2.1.4 The National Grid Hawthorn Pit Substation is not being developed as part of the MHPGC Project but is located within the MHPGC Project PEIR Red Line Boundary: Onshore as the connection point.

1.2.1.5 The proposed landfall will be located west of the coastal railway line between Seaham and Peterlee. There are two option sites for the LSS within the MHPGC Project PEIR Red Line Boundary: Onshore, these are shown on **Figure 1.1** in **Appendix A** as the Green LSS Option Area and the Blue LSS Option Area.

1.3 Sources of information

1.3.1.1 This desktop study is based on the review of publicly accessible sources of information, purchased geo-environmental data packs ('Groundsure' reports) and previous reports provided for the MHPGC Project PEIR Red Line Boundary: Onshore. Full references are provided in Section 10.

1.3.2 Groundsure reports

1.3.2.1 The desktop study is underpinned by the information and assessments provided in the following Groundsure reports.

- WSP-Y2J-X4K-3O8-K1Z – Groundsure Geographic Information System (GIS) Data, 2026;
- WSP-QB1-HLO-H9L-3VR – Groundsure Historical Mapping GIS Data, 2026.

1.3.2.2 The Groundsure GIS data covers the MHPGC Project PEIR Red Line Boundary: Onshore, plus a 500m buffer, which aligns with the Land Contamination Study Area in the PEIR Chapter). The boundary for the MHPGC Project PEIR Red Line Boundary: Onshore area is shown without buffers on **Figure 1.1** in **Appendix A.** The 500m buffer is shown on all other figures.

1.3.2.3 The Groundsure GIS data includes the following information:

- General information regarding the environmental setting of the MHPGC Project PEIR Red Line Boundary: Onshore including geology, hydrogeology, hydrology and conservation designations;
- Groundwater abstraction licences;
- Current and historical landfill sites;
- Current and historical waste sites;
- Pollution incidents;
- Discharge consents;
- Current and historical land-use;
- Historical ordnance survey maps;
- Mining and ground working areas (coal and non-mining);
- Geotechnical constraints

1.3.3 Other Desktop data sources

1.3.3.1 Sources utilised during the desktop data search are:

- British Geological Society (BGS), 1965. Geological Survey of England and Wales, New Series 1:63,360/1:50,000 geological map series. Sheet Number 27. Durham. Drift;
- BGS, 2008. Geological Survey of England and Wales, New Series 1:63,360/1:50,000 geological map series. Sheet Number 27. Durham. Solid;
- EA, 2025, Request for information – Ref: EIR2025/37122, email to Ramboll;
- Natural England, 2025, Designated Sites View;
- Defra, Magic Maps Interactive Mapping (accessed June 2026);
- BGS Onshore GeoIndex Map Viewer, (accessed 2026);
- Mining Remediation Authority, Mining Remediation Authority Map Viewer (accessed July 2026).

1.3.4 Previous Third-Party Reports

1.3.4.1 Third party reporting utilised to inform this PRA are:

- Dunelm 2018 Geoenvironmental Appraisal for land at Hawthorn Business Park (Report Number: D8669),
- Jade Business Park, Murton, Preliminary Geoenvironmental Assessment (Phase 1 Desk Study), Cundall, 2019
- Cundall, 2021. Jade Business Park. Preliminary Geoenvironmental Assessment (Phase 1 Desk Study);

- Cundall, February 2021Jade Business Park, Murton detailed remediation and verification strategy, Cundall,
- National Grid, May 2022 Scotland England Green Link 1 – English Onshore Scheme environmental appraisal report volume 2.
- Cundall, June 2022 Jade Business Park – visual attenuation preliminary geoenvironmental assessment,
- AECOM, 2023. Morven Offshore Wind Geohazards Desk Study and Terrain Evaluation;
- Fugro, 2024. Geological & Geotechnical Desk Studies & Initial Ground Models (Morven Nearshore Landfalls);
- H R Wallingford, 2024. Morven OWF cable landfall coastal erosion survey;
- Sirius, 2024. Phase I (Desk Study) Geoenvironmental Appraisal Report. Land Adjacent to Seaham Garden Village, Seaham, County Durham;
- Tetra Tech Limited, July 2024 Phase 1 Geo-Environmental Assessment Desk Top Study, Murton EGL1.
- BakerHicks, June 2025 4.10 Phase III Remediation Strategy, Eastern Green Link 1 (EGL 1) – Murton Convertor Station,
- Terra Firma, June 2025 4.14 Ground Hazard Desk Study Report, Proposed renewable energy development, Hazel Solar Farm: Land West of A19 and Hawthorn, County of Durham, SR8 3EZ
- SLR Consulting Limited, 2025, Remediation Method Statement, Hawthorn Pit Substation;
- Tetra Tech, 2025. Desk Study for Potential Unexploded Ordnance (UXO) contamination (Morven Export Cable Corridor Grid Connection No. 1).
- Arup, 2026, Morven Offshore Wind Farm: EXC GC-1 Onshore Convertor Station at Jade Business Park, Geotechnical and Geoenvironmental Review;
- Arup, June 2026 Morven Offshore Wind Farm – onshore pre-FEED: stage 2 coal mining review.

1.3.5 Regulatory consultations

1.3.5.1 A request was previously sent to the Environment Agency to obtain environmental information for MHPGC Project PEIR Red Line Boundary: Onshore, specifically on landfills and groundwater abstraction points. A response was obtained under the Environmental Information Regulations 2004 (EIR) on 17 October 2025. This provided information on three historical landfills within proximity to the MHPGC Project however these are located outside of the Land Contamination Study Area. Information was provided on flood risk mapping and stated that there are no main rivers within the area of interest and there is no detailed modelling available for this area. The letter stated that four abstraction licences are present within proximity to MHPGC Project PEIR Red Line Boundary: Onshore. Three of these are located with 2km of MHPGC Project PEIR Red Line Boundary: Onshore and are discussed in section 5.4.2. Information and links to online sources of data was provided for groundwater quality, hydrology, pollution incidents and environmental permitting. This information is provided and discussed in sections 5 and 6 of this report.

1.3.5.2 Environmental information is awaited from Durham County Council (DCC) with regards to the presence of any additional landfills, presence of contaminated land sites under Part 2A, radon, prosecution or endorsements and environmental permits within the MHPGC Project PEIR Red Line Boundary: Onshore. Information on private water supplies has been received and is discussed in section 5.4.2.3. However, without this information it is still considered that the assessment is based on a comprehensive data set provided within the Groundsure report and supported by reliable online data sources. Often the information provided by the councils is only anecdotal and therefore cannot be relied on. Information on private water supplies has been received and is discussed in section 5.4.2.3.

1.4 Data limitations and assumptions

1.4.1.1 At the time of writing, information requested from DCC has not been received for inclusion in the PRA. This includes potential information on contaminated land sites, landfills, environmental permits and groundwater abstraction points. However as discussed in section 1.3.5 above, a comprehensive data set has been provided within the Groundsure report (Groundsure GIS Data, 2026) and reliable online data sources.

1.4.1.2 No site walkover has been undertaken to date as part of this assessment. Consequently, land use activities, surface features and comprehensive evidence of potential contamination within the MHPGC Project PEIR Red Line Boundary: Onshore, not included within desktop data, may not be fully represented. However, in the absences of the confirmatory walkover, the assessment herein is still considered to be robustas it is based on a comprehensive data set provided within the Groundsure report and supported by reliable online data sources and previous reports.

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2 Site information, use and setting

2.1 Site description and current use

2.1.1.1 Information on the setting and current land use of the MHPGC Project PEIR Red Line Boundary: Onshore is presented in **Table 2.1.**

2.1.1.2 The observations presented in **Table 2.1** are based solely on a review of recent aerial and satellite imagery and therefore are limited to features visible remotely at the time the imagery was captured. A targeted confirmatory site walkover will be completed during the subsequent phases of the assessment, and the findings of this report will be reviewed and updated as necessary to incorporate any additional information obtained.

Table 2.1: Site description and current use

Detail	Comment
Name and address of site	The site boundary applied in this report is the MHPGC Project PEIR Red Line Boundary: Onshore, as shown on **Figure 1.1** in **Appendix A.**
Approximate National Grid Coordinates	NZ 41255 46043
Boundary Area	The MHPGC Project PEIR Red Line Boundary: Onshore is a large linear site, covering approximately 500ha, extending from the coast, south of Seaham, westwards mainly through agricultural land. This includes the landfall in the far east of the site (where the offshore export cables come onshore), the proposed cable route corridor (inclusive of the onshore export cable corridor and AC connection cable corridor), two potential substation sites, the Blue LSS Option Area and the Green LSS Option Area and the National Grid Hawthorn Pit Substation.
Site description and current use	The MHPGC Project PEIR Red Line Boundary: Onshore comprises predominantly agricultural land with limited areas of woodland (although some of note particularly in the west including Coop House Wood) as well as road and railway network infrastructure in the proposed onshore cable route which extends from landfall to the Point of Interconnection (PoI) at Hawthorn Pit Substation. The Green LSS Option Area is currently undeveloped. Jade Business Park lies to the southeast and National Grid substations are located to the north and west. The Blue LSS Option Area comprises undeveloped agricultural land and is located to the immediate west of the A19.
Significant on-site activities	Agricultural activities are evident across much of the MHPGC Project PEIR Red Line Boundary: Onshore. Existing industrial/commercial activities are present adjacent to the Green LSS Option Area. Jade Business Park is present to the immediate southeast and National Grid substations are present to the north and west of Green LSS Option Area. The National Grid Hawthorn Pit 275kV Substation is located at grid coordinates 438349, 545726. A smaller National Grid substation is located at grid coordinates 438349, 545726. The Hawthorn Pit BESS is located at grid coordinates 438680, 545912 (other minor substations and utilities infrastructure exists but is unlikely to be significant with respect to contaminated land receptors). Various industrial units are located within the Jade Business Park at grid coordinates 439313, 545786. A caravan storage area is located in the southwest of the MHPGC Project PEIR Red Line Boundary: Onshore, adjacent to Coop House Wood. Where the above activities give rise to a significant potential source of contamination they are shown on **Figure 1.11.**

Detail	Comment
Site setting and surrounding land uses	Surrounding land uses comprise agricultural fields, areas of woodland, residential development at Murton and Hawthorn, industrial/commercial facilities, transport infrastructure including the A19 and A182, and the North Sea coastline. A former quarry/extractive area appears present near the eastern coastal section of the MHPGC Project PEIR Red Line Boundary: Onshore.
Topography and ground cover	Ground cover is predominantly agricultural fields, and improved grassland, with some areas of hardstanding associated with industrial premises. Woodland belts and vegetated areas are present across the MHPGC Project PEIR Red Line Boundary: Onshore (shown in **Figure 1.1**). In the vicinity of Jade Business Park there are extensive areas of Brownfield land. Ordnance Survey mapping (Ordnance survey, 2026) indicates the MHPGC Project PEIR Red Line Boundary: Onshore to have its highest elevation at approximately 100m AOD in the west, with a gentle slope (undulating) downwards towards the coast in the east. The coast is at an elevation of 50m AOD, with a steeper incline and cliffs present by the beach at the eastern section of the MHPGC Project PEIR Red Line Boundary: Onshore.
Boundaries	No continuous perimeter boundary is present around the MHPGC Project PEIR Red Line Boundary Onshore. Boundaries are typically formed by field boundaries, hedgerows, woodland edges, roads, drainage features and existing property boundaries.

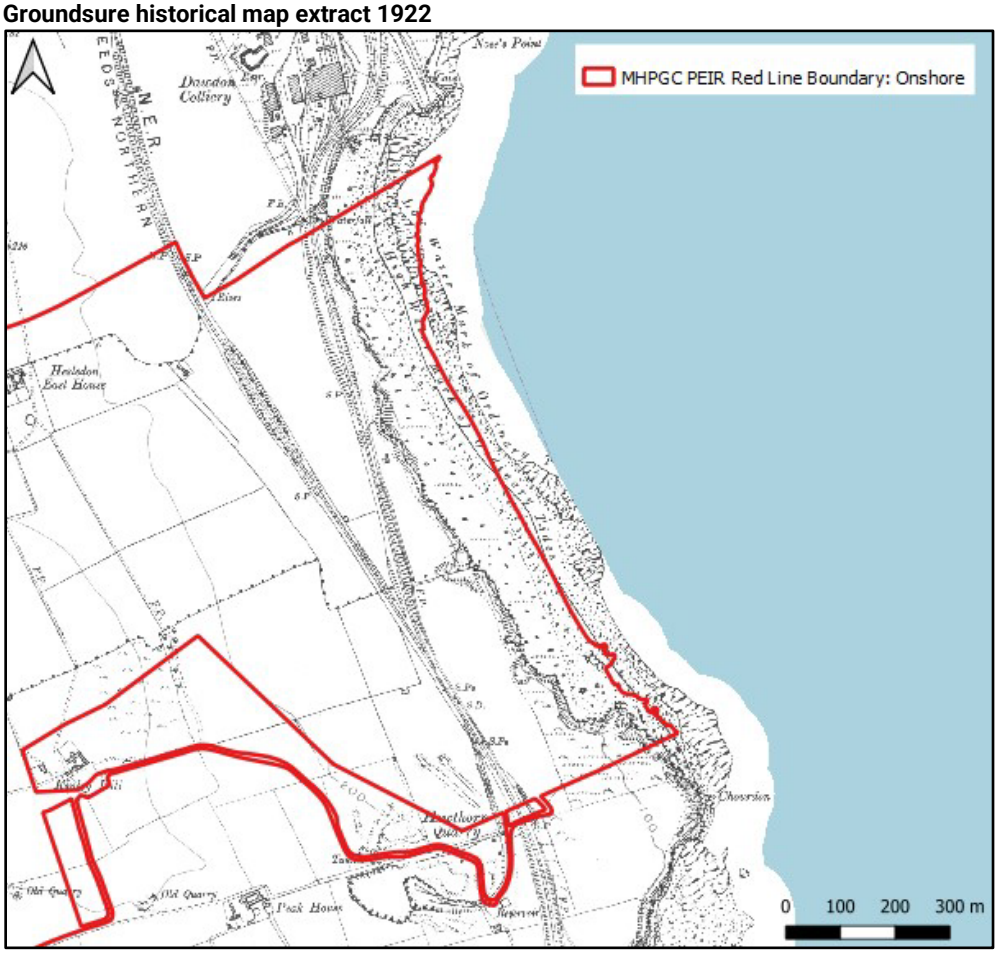
3 Historical Land Use

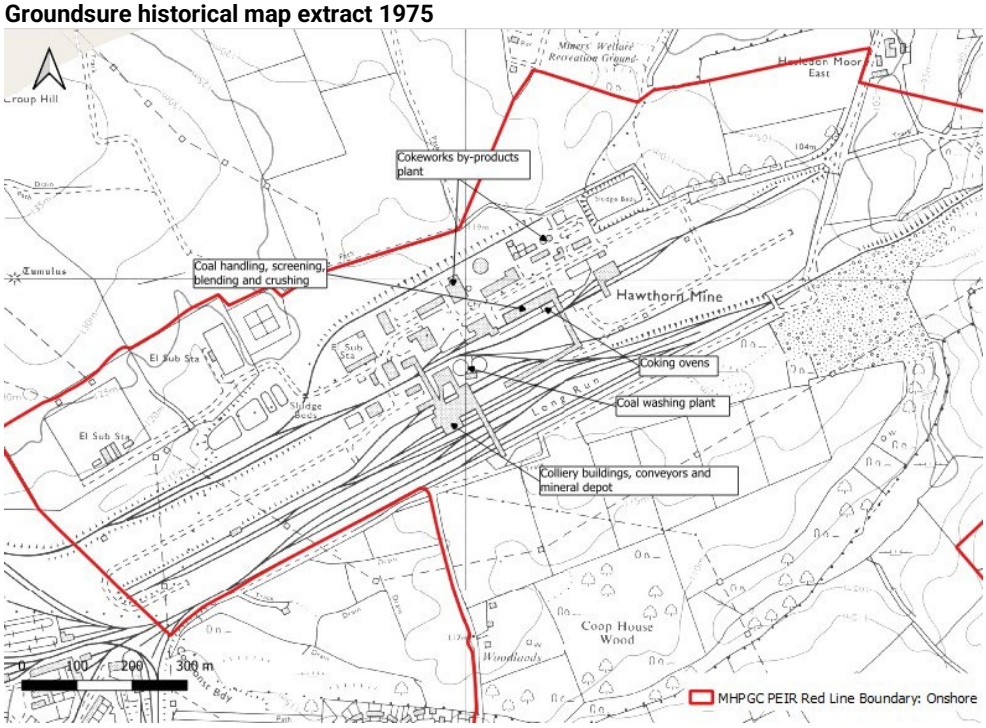
3.1 Site history

3.1.1.1 **Table 3.1** presents a summary of the historical land use within the MHPGC Project PEIR Red Line Boundary: Onshore. The historical land use has been established through a review of historical OS maps provided in the Groundsure GIS data (Groundsure, 2026), and with reference to satellite imagery. Where potential sources of contamination have been identified they have been labelled (i.e. S1.01, S2.05), the locations of these sources are shown on **Figure 1.11** in **Appendix A**.

Table 3.1: Summary of Historical Maps within MHPGC Project PEIR Red Line Boundary: Onshore

Date	Description
1856 -1896	The land is predominately unused or agricultural land with several roads passing through various fields. There are several old quarries in the east, two located around Kinley Hill (S1.07) and (S1.05). A further six are located beyond these at distances of approximately 220m east (S1.11), 250m southwest (S1.03), 230m south (S1.04), 360m north (S1.06), 400m northeast (S1.08) and 400m northwest (S1.10) of Kinley Hill. The coastline (MHWS) is present at the eastern extent of the MHPGC Project PEIR Red Line Boundary: Onshore with reworked ground (S1.21) and an unspecified pit (S1.09) approximately 760m northeast of Kinley Hill. A sandpit (S1.02) is located approximately 880m southeast of the southeast corner of the Blue LSS Option Area and another sand pit (S1.01) is approximately 550m east of the Green LSS Option Area. A railway line, the South Hetton Railway 'Long Run' (S2.03), within a cutting (S1.19) is present onsite approximately 92m to the northwest of the Blue LSS Option Area, oriented northeast to southwest, and passes through the south of the Green LSS Option Area. A branch of the South Hetton Railway (S2.05) running north northeast joins the Long Run approximately 340m to the east of the Green LSS Option Area. A building and a well are shown in the south of the Green LSS Option Area. South Hetton Colliery (S8.02) is located off-site approximately 550m southwest of the Green LSS Option Area. Southwest of the MHPGC Project PEIR Red Line Boundary: Onshore, the town of Hetton is located, comprising several railways and commercial buildings. There is a small area of woodland present in the north of the area labelled Michael's Wood to the immediate north of the Green LSS Option Area and a larger strip located in labelled Coop House Wood (approximately 160m south of the Green LSS Option Area). A magazine is shown to the southwest of the MHPGC Project PEIR Red Line Boundary: Onshore on the map dated 1896.
1919 – 1922	Two further railway lines are now present along the coastline in the east of the area. Blastfurnace Branch (S2.02) is located approximately 160m from the eastern boundary of the MHPGC Project PEIR Red Line Boundary: Onshore and Leeds Northern (S2.04) line is located approximately 100m to the west of Blastfurnace Branch. The quarries S1.04-1.08 and S1.10- S1.11 appear to have been infilled. The Blastfurnace Branch railway leads to Dawdon Colliery (S9.02), located immediately to the north of the most eastern boundary of the MHPGC Project PEIR Red Line Boundary: Onshore on the coastline, comprising two shafts and numerous railway lines along the coastline. The two railway lines cross approximately 750m from the northern boundary and the Leeds Northern continues off-site to the south with the Blastfurnace Branch leading to Hawthorn Quarry (S9.01) located approximately 550m southeast of Kinley Hill.

Date	Description
	Groundsure historical map extract 1922 
1939	Construction of terraced housing approximately 400m west of the Blue LSS Option Area, north of the Long Run railway (S2.03). The quarries S1.02 andS1.03 appear to have been infilled. The magazine is no longer present on the maps.
1951 – 1952	Expansion of Hawthorn Quarry (S9.01) south of the MHPGC Project PEIR Red Line Boundary: Onshore has occurred towards the northwest and southwest. A refuse heap (S3.03) appears to be present onsite located on the southeast of the Red Line Boundary, thought to be associated with Hawthorn Quarry. Refuse heaps (S3.02) are present approximately 100m north of the Blue LSS Option Area, associated with Murton Colliery located approximately 700m beyond this. The South Hetton Railway (S2.01) branching off to the north is now labelled as dismantled.
1957 - 1959	A mine (Hawthorn Combined Mine) is present in the west of the MHPGC Project PEIR Red Line Boundary: Onshore, within and surrounding the Green LSS Option Area with associated railways (S2.01), tanks (S5.01-S5.21) and buildings. The colliery part of the Hawthorn Combined Mine (S8.01) covered most of Green LSS Option Area, was started in 1953 and first drew coal in 1959 (North East Heritage Library, 2026). The Hawthorn Coking Works (S11.01) was located predominantly in the north of the Green LSS Option Area and was operational from 1959. The sand pit (S1.01) appears to have been infilled by 1955.
1970-1975	The mine (Hawthorn Combined Mine) is now labelled as Hawthorn Mine (S8.01, S11.01) and further development associated with the mine has occurred in this area

Date	Description
	comprising cranes, cooling stations, chimneys, sludge beds (S6.01-S6.02) and electrical substations (S7.01-7.04). A mine shaft is shown on the maps in the centre of the mine area, and a spoil heap (S3.01) is present to the east of the main mine site. Known process areas are shown on the map extract below (North East Heritage Library, 2026). **Groundsure historical map extract 1975** 
1975	Construction of the A19 road has been undertaken to the immediate east of the Blue LSS Option Area. A pond to the immediate east of the Blue LSS Option Area appears to have been infilled as part of the road development (S1.14).
1984-1985	Hawthorn Quarry (S9.01) is shown as disused and its associated railway (S2.02) has been dismantled. Hawthorn Coking Works (11.01) is understood to have ceased operations by 1984 (North East Heritage Library, 2026).
1989-1990	South Hetton Colliery (S8.02) is no longer shown on the historical map and by 1990 the southern area has been redeveloped to comprise an industrial estate, residential properties and allotment gardens. The Long Run railway (S2.03) is now dismantled.
1992 – 1994	Hawthorn Combined Mine (colliery) (S8.01) is now labelled as disused and the associated buildings and structures have been demolished. Hawthorn Combined Mine (colliery) (S8.01) is understood to have ceased operations by 1992 (ARUP, 2026). A scrap yard (S4.01) is present in the southwest. Electrical substations and associated infrastructure (S7.01-7.04) remain in the west although sources S7.02 and S7.04 have increased in size. Construction of pylons crossing disused fields in the west and south parts of the area has occurred by this time.
2001 (satellite imagery)	The Blastfurnace Branch railway (S2.02) in the east is no longer present. The coastal beach is labelled as Blast Beach. Dawdon Colliery (S9.02) has been redeveloped into a business park. A caravan storage area has been constructed approximate 350m south of the Green LSS Option Area on the former scrap yard (S4.01).

Date	Description
	Remediation works were undertaken between 1999 and 2003 in the area occupied by the Hawthorn Combined (S8.01) Mine and Hawthorn Coking works comprising treatment of contaminated soils and large-scale cut-and-fill operation (ARUP, 2026). These works are visible in the 2001 satellite imagery which depicts large scale earthworks/bare earth.
2001 (satellite imagery)	By 2006 the earthworks for the Hawthorn Combined Mine and Hawthorn Coking works remediation are no longer visible in the imagery and ground cover vegetation is well established if not comprehensive. The earthworks topography appears to have resulted in three depressions being formed to the east of the Green LSS Option Area which appear as dark patches in the aerial imagery with different vegetation to their surroundings – these may be ponds. The substations (S7.01-7.04) remain.
2008 - 2015 (satellite imagery)	Development of the access road, from the A19 Junction (to what is currently Jade Business Park), in the same orientation as the former South Hetton Railway line is visible. The road runs across the northern boundary of the Blue LSS Option Area and to the southeast of the Green LSS Option Area then changes orientation to run past the eastern Green LSS Option Area boundary. This includes several areas of cut and material stockpile to the north of the road, as well as other off-site features such as a construction site/laydown area and off-site excavation of land potentially for gravel extraction and or/formation of a reservoir. The access road includes two roundabouts to the east of the Green LSS Option Area.
2020 (satellite imagery)	The first phase of Jade Business Park has been constructed to the immediate south of the Green LSS Option Area. No further changes noted on the available mapping.

4 Previous Reports

4.1.1.1 The previous third-party reports listed in Section 1.3 relating to the MHPGC Project PEIR Red Line Boundary: Onshore and produced for the MHPGC Project have been reviewed and are summarised below.

4.1.1.2 In addition, a search of the DCC planning portal (**Section 6.3**) identified additional reports for the site. Relevant reports have also been reviewed and summarised below.

4.2 Geoenvironmental Appraisal for land at Hawthorn Business Park (Report Number: D8669), Dunelm 2018

4.2.1.1 Dunelm Geotechnical and Environmental Limited (Dunelm) carried out a geoenvironmental appraisal of land at Hawthorn Business Park (now known as Jade Business Park) on behalf of Durham County Council (Planning Application Reference DM/21/02901/OUT) under the specification provided by Cundall. The ground investigation was undertaken across where the Jade Business Park (JBP) is currently situated as well as adjacent land to the north, east and west of the JBP which includes most of the Green LSS Option Area.

4.2.1.2 The site was known to be previously used as a mine with possible contaminants including heavy metals, PAH, TPH, Cyanide, Phenols, Asbestos, MTBE, BTEX and colliery spoil. The ground investigation comprised seventy-seven trial pits, ten plate load tests within specific trial pits, twenty-three mini percussion boreholes, sixteen cable percussion boreholes, nineteen cable percussion boreholes with rotary follow on and eleven road cores.

4.2.1.3 Ground conditions were generally identified as topsoil overlying made ground which comprised reworked clays, the made ground contained a significant proportion of slag, brick, wire, metal, glass, plastic and timber. Natural soils of firm to stiff clays interbedded with sands and gravels were present to depths of at least 20.1m bgl with limestone rock encountered between 10.5 and 20.7m bgl.

4.2.1.4 Groundwater strikes were encountered at depths between 1.4 and 11.5m bgl in the boreholes and trial pits during the ground investigation. Groundwater monitoring of the three boreholes installed was undertaken on seven occasions post ground investigation as part of the gas monitoring works. Three of the boreholes were dry with the remaining borehole having a groundwater level between 4.74 to 4.85m with the base of the monitoring pipe at 5mbgl.

4.2.1.5 No asbestos was detected in any samples. Hydrocarbon contamination was noted in several locations between 0.1 and 3.5m bgl with12 of the 13 locations within the west of the site, the other location being in the centre of the site. Laboratory testing was undertaken on topsoil and made ground samples with results assessed against all potential end uses. There were no exceedances of the general acceptance criteria (GACs) for inorganics and metals, TPH and BTEX had no significant concentrations and all samples tested for MTBE were below laboratory detection limits, PAH had one exceedance in the made ground for dibenz(a,h)anthracene (3.8mg/kg at TP33 at 1.38m bgl) when compared to commercial residential with plant uptake end use.

4.2.1.6 Organic leachability testing results showed Mercury exceeded the tier 1 remedial targets and required further consideration, all other organics were below detection limits.

4.2.1.7 Dunelm undertook a pipe material assessment confirming that barrier pipe water supply pipes should be suitable due to elevated mineral oils and SVOCs with the soils tested.

4.2.1.8 Waste Acceptance Criteria testing shows ten of the eleven samples were classified as non-hazardous and the remaining one sample was classified as hazardous due to elevated total organic carbon.

4.2.1.9 Gas monitoring was being undertaken however this report only contains partial results, the gas risk assessment report should be referred to for assessment and recommendations for gas protection measures however the available data indicated that the site would be classed as Characteristic Situation 3 (CS3) and therefore gas protection measures would be required within buildings.

4.2.1.10 The report concludes that due to the heterogenous nature of the made ground that strip or trench fill foundations should be suitable for the proposed structures where made ground is less than 2.5m thick in the southeast of the site. Where made ground has a thickness greater than 2.5m a piled foundation solution is recommended however this should be reviewed by the environment agency to ensure this doesn't open any preferential pathways for gas migration and result in contamination of groundwater beneath the site due to contaminated material being pushed down into the natural strata. An alternative to the piled floor slab would be to remove the made ground and backfill with a blanket of compacted granular fill for a ground bearing slab, the fill would need to be of a suitable engineering specification subject to regulatory approval and validation.

4.3 Jade Business Park, Murton, Preliminary Geoenvironmental Assessment (Phase 1 Desk Study), Cundall, 2019

4.3.1.1 Cundall Johnstone & Partners (Cundall) was originally commissioned in 2018 by Buckinghamshire Properties Limited to prepare and issue a Preliminary Geoenvironmental Assessment (Phase I Desk Study) for the site in the context of the proposed development, a distribution warehouse. This site covered by the Cundall report is shown to be in the west of the MHPGC Project PEIR Red Line Boundary: Onshore and to overlap most of the Green LSS Option Area.

4.3.1.2 The report provides a desk based assessment of the site, no ground investigation data is in included within this report. The report identified pollutant linkages which may present an unacceptable risk and recommended that ground investigation would be required at the site to quantify the risks and determine what remediation would be required.

4.4 Jade Business Park, Murton, Preliminary Geoenvironmental Assessment (Phase 1 Desk Study), Cundall, 2021

4.4.1.1 Cundall Johnstone & Partners (Cundall) was commissioned by Durham County Council to carry out a Preliminary Geoenvironmental Assessment (Phase 1 Desk Study) for a site located between South Hetton and Murton in relation to a new planning application for the continued development of the Jade Business Park.

4.4.1.2 This report provides and update to the preliminary assessment undertaken by Cundall in 2019 and includes the results of the ground investigation undertaken by Dunelm in 2018.

4.4.1.3 Based on the information reviewed, Cundall concluded that there was a need for ground gas protection measure in new buildings, also for upgraded potable water supply pipes due to the risk of permeation of hydrocarbons into new supplies, and that buried concrete in contact with the existing made ground should be compliant with design sulphate (DS) class DS-3 and aggressive chemical (AC) class AC-3.

4.5 Jade Business Park, Murton detailed remediation and verification strategy, Cundall, February 2021

4.5.1.1 Durham City Council (the client) intend to submit a new planning application (Planning Application Reference DM/21/02901/OUT) for the continued development of the Jade Business Park for commercial / industrial uses with the south-central area already being developed with warehouse type structures and associated infrastructure.

4.5.1.2 Cundall were commissioned by the client to prepare a detailed remediation and verification strategy for the as-yet undeveloped parts of the site. This report contains information from reports summarised in sections 4.2 and 4.3 as well as the Dunelm Gas Risk Assessment (D8669/GRA) from May 2019 which is based on the completed gas monitoring previously mentioned in section 4.3.1.9.

4.5.1.3 No widespread contamination was recorded as part of the Dunelm investigation, however, ground gas protection measures, upgraded potable water supply pipes and connections and concrete mixes for aggressive ground were identified by Dunelm as being required.

4.5.1.4 Cundall have reported that the following remedial and control measures are required; installation of 'clean' trenches to allow for new potable water supply pipes that will not be in direct contact with

existing made ground. Gas protection measures as a result of the site being assessed as Characteristic Situation 2 (CS-2) with the following being considered as the most appropriate for current development proposal. Gas resistant membrane as well as a cast in-situ ground bearing floor slab or cast in-situ reinforced ground bearing raft, other combinations of gas protection measures in accordance with Tables 5 to 7 of BS8485 to 2.5 points would be acceptable subject to regulatory and design approval.

4.5.1.5 Imported materials will be required to meet the material import threshold criteria with the possibility of using site won materials that meet the assessment criteria.

4.6 Scotland England Green Link 1 – English Onshore Scheme environmental appraisal report volume 2, National Grid May 2022

4.6.1.1 The environmental appraisal report (EAR) is part of the submitted planning application (DM/22/01663/OUT) to Durham County Council for certain development which forms part of the English Onshore Scheme (EOS) for the Scotland and England Green Link 1 (SEGL1). The purpose of this EAR is to support the planning application for the relevant elements of the EOS by describing the proposed development, documenting the assessment of its effects on the environment, and detailing any mitigation measures proposed.

4.6.1.2 The EAR covers the whole of the EOS thus only information relevant to the site shall be considered and reviewed. Scoping opinions have been sought from relevant consultees, Durham County Council (DCC) including the Environmental Health (Contaminated Land) department, the coal authority and the environment agency. DCC note that the cable route passes though patches of mineral safeguarding areas and the need for a phase 1 preliminary risk assessment which was undertaken as part of this report, the environment agency have commented the need for a ground investigation which has been undertaken along the route and finally the coal authority has indicated a nearby mine shaft which has been investigated and found to not be within the working width of the EOS.

4.6.1.3 The geology within the site is superficial deposits of till with underlying Ford Formation Dolostone, made ground is also expected surrounding the hawthorn pit converter station. A ground investigation was undertaken in 2021 prior to the construction of the converter station and substation, made ground comprised grey clay with sand, gravel and cobbles of sandstone, mudstone, brick, wood and concrete, hydrocarbon odours were noted at four of the nine locations, the underlying strata's match the aforementioned superficial and bedrock formations.

4.6.1.4 Historically, coal mining activities were undertaken in the vicinity of Hawthorn Pit at the southern end of the EOS. The entire EOS lies within a Coal Mining Reporting Area, although no High-Risk Development areas are present within the working width. No designated geological features or sites have been identified in the study area. However, safeguarded mineral sites, in relation to coalfield development and glacial sand and gravel, were identified.

4.6.1.5 In relation to hydrogeology, the superficial deposits are classified as Secondary Undifferentiated (corresponding to Glacial Till) and Secondary A Aquifers (corresponding to alluvium). The dolostone bedrock strata are classified as Principal Aquifers. Groundwater vulnerability is classified as low to medium. Source Protection Zones (2 and 3) are intersected by the EOS, close to Hawthorn Pit.

4.6.1.6 Identified potential impacts from the construction and operational phases are consider negligible to minor. Overall, the mitigation required to address the potential impacts is standard practice. As a result, the overall assessment of effects of the EOS in relation to geology and hydrogeology is predicted to be of negligible significance with respect to geology, human health and infrastructure, and Minor significance with respect to groundwater.

4.7 Jade Business Park – visual attenuation preliminary geoenvironmental assessment, Cundall, June 2022

4.7.1.1 Durham County Council commissioned Cundall to undertake a preliminary geoenvironmental assessment for a parcel of land immediately northwest of the Jade Business Park, the land is proposed to form visual attenuation to screen the village of Murton from the business park.

4.7.1.2 The site was shown to form part of the Hawthorn Colliery between 1950 to 2000 where the site was used for sludge beds and cooling towers. The site underwent earthworks associated with colliery reclamation and by 2006 the site was in its current condition.

4.7.1.3 Potential contamination is considered to be near to surface organic surface soils derived from the colliery reclamation with potential sources of heavy metal and hydrocarbon-based contamination.

4.8 Morven offshore wind geohazards desk study and terrain evaluation, AECOM, October 2023

4.8.1.1 AECOM were commissioned by Continuum Industries Limited to provide an appraisal stage geohazards assessment and engineering terrain evaluation to the Morven offshore wind project (AECOM, 2023). The report reviewed geological, mining and topographical data to make the assessment.

4.8.1.2 Historical land uses within the MHPGC Project PEIR Red Line Boundary: Onshore, and surrounding area include agriculture, quarrying, mining and industrial activities.

4.8.1.3 A preliminary indicative ground model suggests superficial deposits of Glacial Till, Alluvium, Beach deposits and Glaciofluvial deposits of up to 30m overlying bedrock of the Roker formation dolomite or the Ford formation limestone. The Pennine Upper Coal Measures underly the Roker or Ford formations, with previously worked coal seams.

4.8.1.4 With respect to groundwater levels, data is limited but the report states the following: *Examination of data as part of the pre-existing ground investigation undertaken at the nearby existing Hawthorn Dene substation as part of the SEGL 1 English Onshore Scheme* (described within the AECOM report) *recorded water strikes within Made Ground at 5.2 m bgl (at the proposed substation location for this scheme) and 1.3 – 4.6 m bgl (at the proposed converter station location for this scheme). It is worth noting that the above information only represents groundwater levels at the time of investigation, and at the locations specified only.*

4.8.1.5 The geohazards identified by AECOM for the MHPGC Project PEIR Red Line Boundary: Onshore include:

- Mine entries;
- Coastal erosion;
- Geological material contrasts;
- Dissolution features;
- Existing onshore infrastructure;
- Groundwater rise (due to mining);
- Mass movement/landslides;
- Existing utilities;
- Aggressive ground/groundwater conditions;
- Made Ground;
- Colliery spoil;
- Geological faulting;
- Shrink swell properties;
- Compressible ground;
- Running sands;
- Flood risk;
- Shallow bedrock.

4.9 Geological & Geotechnical Desk Studies & Initial Ground Models (Morven Nearshore Landfalls), Geological and Geotechnical Desk Study Report – Central Landfall Option, Seaham, UK, Fugro, May 2024

4.9.1.1 Fugro were commissioned by Morven Offshore Wind Limited to produce a desk study and preliminary geo-environmental risk assessment to establish baseline environmental and ground

conditions within the MHPGC Project PEIR Red Line Boundary: Onshore (Fugro, 2024). The assessment comprised a review of historical mapping, geological, hydrogeological and environmental datasets, previous reports, mining records and a site walkover survey. Historical land uses within the MHPGC Project PEIR Red Line Boundary: Onshore, and surrounding land include agriculture, quarrying, mining and industrial activities, which have the potential to influence current ground conditions. The assessment identified the presence of superficial deposits over bedrock, together with groundwater, surface water and ecological receptors within and adjacent to the MHPGC Project PEIR Red Line Boundary: Onshore.

4.9.1.2 The report states that no groundwater monitoring data is available in the study area of the report and that historical boreholes did not encounter any groundwater strikes during drilling, except one for the BGD borehole near the former Dawdon Colliery (BGS borehole reference NZ44NW13867/2R) which was about 8.5 m below ground level. Fugro suggest that this represents a perched water table within the superficial deposits.

4.9.1.3 A preliminary conceptual site model was developed to identify potential sources of contamination, pathways and receptors. Potential sources identified within the desk study included historical mining and quarrying activities, made ground, industrial land uses and naturally occurring contaminants associated with the local geology. The assessment also considered the potential presence of geotechnical and environmental constraints, including mining-related features, coastal processes, ground instability and variable ground conditions. Recommendations were made for further ground investigation works to confirm site-specific geological, geotechnical, hydrogeological and geo-environmental conditions and to refine the conceptual site model where required.

4.10 Morven OWF cable landfall coastal erosion study, HR Wallingford Ltd, May 2024

4.10.1.1 HR Wallingford was commissioned by Morven Offshore Wind Limited to undertake a cable landfall desktop study (HR Wallingford, 2024) to assess the cliff and beach at the landfall in the east of the MHPGC Project PEIR Red Line Boundary: Onshore, where the cable will connect to the offshore components of the development.

4.10.1.2 They assessed the geomorphology and historical beach retreat rates through historical OS maps and aerial imagery predicting future retreat rates of between 0.07m/yr and 0.21m/yr across the section of coastline in the east of the MHPGC Project PEIR Red Line Boundary: Onshore.

4.10.1.3 The report concluded that no changes needed to be made to the drill exit provided the shaft is angled upwards towards the sea. It also concluded that the top of the drill casing for the cable route needs to be at -3.5m AOD or lower, at a chainage of 215m.

4.11 Phase 1 Geoenvironmental Appraisal Report, Land adjacent to Seaham Garden Village, Seaham, County Durham, Sirius Geotechnical Ltd, June 2024

4.11.1.1 Sirius Geotechnical Ltd was commissioned by Bellway Homes (Durham) Ltd, to undertake a Phase I (Desk Study) Geoenvironmental Appraisal of land adjacent to Seaham Garden Village, Seaham, County Durham for the development of traditional low-rise residential properties and associated infrastructure in the northern part of the site with the majority of the site remaining as landscaping, Public Open OS and parkland.

4.11.1.2 The report summarises the history of the site which has been predominantly farmland with small dwellings from the mid 1800's, land in the west of the site was occupied by small structures and associated earthworks in the mid 1900's and the land and surrounding area was also used as an army camp with ruined buildings still present in the area. A small limestone quarry was recorded in the west of the site and other similar quarries were also recorded within 100m beyond the site boundary.

4.11.1.3 Ground conditions are mainly superficial and bedrock with localised made ground surrounding historical and existing structures. A geological fault is recorded at rockhead shortly west of the site boundary. Due to the fault the proposed residential development within the north and west of the

site has been identified as high risk and future surface deformation cannot be discounted. A second fault within the east of the site orientated approximately parallel to the eastern boundary of the site also identifies as a high risk zone. The site is underlain by several coal seams that have been previously recorded as coal workings, however due to the shallowest coal seam being located at 250m bgl there is not typically considered a risk of instability at the surface.

4.11.1.4 Potential contamination pathways exist to end users, the built environment and environmental receptors (controlled groundwaters and indirectly the nearby SSSI and Local Nature Reserve). These pathways are primarily associated with areas of previous development including the farm area, cottages in the north-east and scrubby land possibly used as an army camp, in the west of the site and, also, localised pockets of infilled former quarry. There is also localised low to moderate potential for ground gas generation associated with made ground and this should be investigated during the ground investigation to inform any requirement for ground gas protection.

4.11.1.5 UXO risk should be considered further and advice from a UXO specialist is advised. Foundation design should be considered further based on the aforementioned faults, localised made ground associated with developments and quarrying.

4.11.1.6 Ground investigation works are recommended to allow for foundation design and determination of potential contamination which includes a detailed UXO desk study, demolition/refurbishment asbestos survey for all farm buildings and relicts, intrusive investigation for near surface ground conditions with geoenvironmental and geotechnical laboratory testing as well as installation and monitoring of gas wells for ground gas risk.

4.11.1.7 An interpretative report on the ground investigation including, as a minimum, a semi quantitative contamination risk assessment, together with outline recommendations for foundations, excavation stability, pavement/road design parameters, and remediation measures, if required.

4.12 Phase 1 Geo-Environmental Assessment Desk Top Study, Murton EGL1, Tetra Tech Limited, July 2024

4.12.1.1 Tetra Tech were commissioned by Metlen Energy and Metals to undertake a combined Geo-Environmental and Geotechnical Desk Top Study for a site known as the Hawthorn Pit Project Area to support the development of a High Voltage Direct Current (HVDC) converter station as part of The Scotland England Green Link, or Eastern Green Link 1 (EGL-1) Project. The assessment comprised a review of historical mapping, geological, hydrogeological and environmental datasets, previous reports, mining records and a site walkover survey.

4.12.1.2 Report provides a summary of ground investigations works undertaken two phases between June 2021 and March 2022. The information provide relates only to the investigation works undertaken within the boundary of this report. Phase 1 comprised the drilling of 5 rotary boreholes to between 40.50 and 45.00m bgl (BHE-01 – BHE-05) which were all backfilled on completion. Phase 2 comprised the drilling of 4 rotary boreholes to between 13.50 (collapsed) and 45.70 m bgl (MW-01 – MW-03) which were installed for groundwater monitoring.

4.12.1.3 Made ground was only identified in two boreholes with a maximum thickness of 0.8m. superficial deposits were encountered to a maximum depth of 33.7m bgl and bedrock was proven to a depth pf 45m bgl. The depth of groundwater strikes ranged from 1.3m bgl to 5.55m bgl. During subsequent monitoring visits groundwater was encountered in all boreholes installed in the superficial clay sand and gravel. The borehole installed within the clay at 26.2-28.2mbgl was dry. Groundwater sampling and analysis does not appear to have been undertaken.

4.12.1.4 Soils sampling and chemical analysis was undertaken, concentrations of all contaminants analysed are reported as below the laboratory detection limit or low with the exception of barium, which was elevated. It is unknown what screening criteria the data has been compared to. No asbestos was detected. Geotechnical testing was undertaken on up to 25 samples.

4.12.1.5 Six rounds of gas monitoring were undertaken between March and May 2022. Ground gas monitoring showed marginally elevated carbon dioxide and depleted oxygen concentrations in all locations with a maximum carbon dioxide reading of 2% and a lowest oxygen reading of 17.1%. Methane was not detected. Flow rates ranged from -3.4 to 6.1l/h.

4.12.1.6 The qualitative risk assessment identified moderate risks from contaminants in the made ground to current site users and the principal aquifer and from off-site waste material to the principal aquifer.

4.12.1.7 The geotechnical risk assessment identified medium risks from buried services and ground obstructions, presence of made ground leading to differential settlement and aggressive ground conditions, potential instances of soft alluvium, shallow groundwater and excavation collapse.

4.13 Phase III Remediation Strategy, Eastern Green Link 1 (EGL 1) – Murton Convertor Station, BakerHicks, June 2025

4.13.1.1 Remediation strategy to mitigate the unacceptable risks from ground gas concentrations for the proposed converter station at Hawthorn Pit as well as an unexpected contamination strategy.

4.13.1.2 Gas data obtained from previous BakerHicks Phase II Geo-environmental assessment classified the site as Characteristic Situation 2 (CS2) meaning that ground gas protective measure are required to be present within any permanent structures on the site. Due to depleted oxygen levels, access to trenches should be limited, or with the use of specific gas alarms.

4.13.1.3 Proposed gas protection measures were determined in accordance with BS8485:2015 and comprised Cast in-situ ground bearing slab (with only nominal mesh reinforcements) and Gas resistance membrane as per Table 7 of BS8485. The report also details the validation measures required CIRIA publication C735:2014.

4.14 Ground Hazard Desk Study Report, Proposed renewable energy development, Hazel Solar Farm: Land West of A19 and Hawthorn, County of Durham, SR8 3EZ, Terra Firma, June 2025

4.14.1.1 ER Project Development Ltd is proposing a solar farm, Terra Firma has been commissioned to carry out a ground hazard desk study report. The report comprised a review of historical setting, geological setting, environmental setting, coal mining desk study.

4.14.1.2 The site history comprised of several fields of varying sizes making up three farms with various buildings from 1857 to current day.

4.14.1.3 Ground conditions match other desk study comprising made ground of fill materials with substantial quantities of sulphates, in addition colliery spoil, slag, clinker and demolition waste, superficial deposits in the form of alluvium, till and glaciofluvial deposits overlying bedrock of the roker and ford formations which are dolostone and limestone respectively.

4.14.1.4 The coal authority report states there were multiple collieries worked within and surrounding the site, primarily in the high main seam (highest level seam at approximately 250m bgl). There are no unrecorded shallow mine workings, of the six coal seams the last seam mined was in 1974. The risk from underground and/or surface mining activity is likely to be low, the report states that reference should be made to the consultants coal mining report.

4.14.1.5 The preliminary geotechnical risk assessment has revealed that a low to moderate risk is present from geotechnical aspects, with particular risk specifically associated with historic mine workings and the possibility of subsidence. The report states that in order to confirm the above preliminary geotechnical risk assessment, it is recommended that an Intrusive Site Investigation is undertaken in order to determine the ground conditions and confirm relevant geotechnical aspects.

4.14.1.6 The preliminary human health and environmental risk assessment has revealed that due to the site's and surrounding areas' current and past land uses that a Low risk from contamination is present beneath the site, with particular risk possible to be mitigated during the construction phase. Long term site use does not present additional risks to the wider environment than the current site configuration. In addition, a Low risk is present from the migration of radon gas, a Low risk from the migration of landfill gas and a Low risk from the migration of ground gas that would adversely impact the development. The report recommends additional contamination testing is undertaken as part of the ground investigation to determine the ground conditions, soil chemistry and any risk to the future built environment.

4.14.1.7 Recommendations include undertaking a ground investigation for geoenvironmental contamination with chemical testing comprised heavy metals, inorganics, organics and asbestos screening and quantification. There also remains the risk of mine related ground gas thus any intrusive works and

design considerations should be evaluated by a suitably qualified ground gas professional. It is recommended that a Geotechnical Ground Investigation is undertaken to determine the type, strength and bearing characteristics of the shallow superficial and underlying bedrock geology, provide recommendations for a suitable and economic foundation solutions for the proposed development requirements, ensure sufficient information on coal mining or surface open cast quarrying is evaluated to confirm that the development proposals are viable, provide recommendations with regard to any other geo-technical aspects pertaining to the development, such as concrete class specification, soakaway and/or highway design.

4.15 Remediation Method Statement, Hawthorn Pit Substation, SLR, November 2025

4.15.1.1 A search on the Durham County Council planning portal identified that SLR Consulting Limited (SLR) was commissioned by Baker Hicks Limited to undertake a Remediation Method Statement (RMS) (SLR Consulting Limited, 2025) to discharge planning conditions for a proposed electrical substation and associated infrastructure (SLR, 2025) (Application ref. DM/25/02767/RM). The substation is described as located within the 'wider Hawthorn Pit scheme of development as part of the Eastern Green Link 1 project (EGL1)', on a parcel of land to the southeast of the existing Hawthorn Pit Substation. Figure 1-1 in the RMS shows the proposed substation location entirely within the MHPGC Project PEIR Red Line Boundary: Onshore and located immediately west of the Green Onshore LSS Option Area.

4.15.1.2 The RMS records that potential pollutant linkages (PPLs) requiring remedial and/ or further mitigation comprised:

- PPL - Potential Short-Term Harm to Human Health from Asbestos Fibres in Soils During Construction;
- PPL – Potential Risks to Human Health from Hazardous Ground Gases and Volatile Organic Compounds (VOCs) due to gas regime calculated as Characteristic Situation 3 (CS3);
- PPL – Potential risks from Combustible Materials;
- PPL – Potential risks to Piling from Contaminated Soil and Leachate;
- PPL - Potential harm to Landscape Plants from Phytotoxic Elements and Compounds in soils;
- PPL – Potential risks to water supply pipework;
- PPL – Potential risks from unexpected sources of contamination.

4.15.1.3 In regard to asbestos, previous testing results reproduced in the RMS indicate the presence of asbestos in 8 of a total of 200 soil samples. The positive asbestos identifications occurred in samples obtained from depths of between 0.4m bgl and 3.5m bgl. Asbestos types were confirmed as chrysotile, amosite and crocidolite, the maximum concentration was 0.0068% crocidolite in a sample from 1m bgl. It was concluded from the results that 'Made ground Colliery Spoil type soils' potentially contained asbestos fibres. The positive detections were noted to occur within Made Ground soils of colliery spoil type material with a very low proportion of anthropogenic material recorded (i.e. brick/concrete/cemented materials).

4.15.1.4 In relation to ground gas risks, gas protection measures are detailed for the proposed GIS building comprising cast in-situ monolithic reinforced suspended floor slab, gas resistant membrane and incorporation of a pressure relief pathway in the form of a single size (no fines) granular aggregate blanket with permitter building termination points venting to air.

4.15.1.5 Risks to property posed by combustible materials recorded within Made Ground soils within the MHPGC Project PEIR Red Line Boundary: Onshore were noted in the RMS, in particular colliery spoil type material, in relation to its prolonged exposure to heat generated from proposed HV cables. It was recommended in the RMS that for proposed cable corridors and cable transition pits, suitable backfill material should be placed around the HV cables in the form of a thermally designed filler. Site-won material was not considered appropriate as backfill material for immediate surround within cable corridors or transition pits.

4.15.1.6 In regard to other contamination, 'moderate to low mobility' hydrocarbons were recorded in soils, including Made Ground, and shallow groundwater and proposed piling design and specifications,

including specifications for concrete, were therefore recommended by SLR to account for the presence of concentrations of petroleum hydrocarbons.

4.15.1.7 In regard to phytotoxic compounds (not specified but expected to include heavy metals), it is noted in the RMS that 'Colliery Spoil type soils' should not be in direct contact with plants in landscaping schemes.

4.15.1.8 The contaminants identified in the RMS are consistent with those identified in this report in **Table 7.1** for sources S1, S2 and S8.

4.16 Desk study for potential UXO, Tetra Tech, December 2025

4.16.1.1 Tetra Tech RPS Energy (Tetra Tech) was commissioned by Morven Offshore Wind Limited to undertake a desktop study and risk assessment for potential UXO for the onshore section of the development (Tetra Tech RPS Energy, 2025). The boundary covered by the Tetra Tech report is noted to be slightly different from the MHPGC Project PEIR Red Line Boundary: Onshore due to design evolution of the MHPGC Project since the report was completed. The Tetra Tech boundary includes the whole of the MHPGC Project PEIR Red Line Boundary: Onshore with the exception of the access road around the north of Hawthorne Quarry located in the southeast.

4.16.1.2 Based on the conclusions of the research and the risk assessment undertaken the report identified a Moderate UXO Risk within the MHPGC Project PEIR Red Line Boundary: Onshore. The report identified two zones of risk, a moderate risk zone and low to moderate zone. The Moderate risk zone (Zone A in the Tetra Tech report) covers landfall and extends approximately 600m southwest of the Durham Coast Line railway (which runs northwest/southeast). The Low to Moderate risk zone (Zone B) continues from Zone A to the western extent of the MHPGC Project PEIR Red Line Boundary: Onshore. The report states that the risk level for Zone B is due to the probability of encountering aerial bombs in this area being lower than that of Zone A but the potential for encountering these and small arms ammunition and land service ammunition in this area cannot be ruled out.

4.16.1.3 The report recommends an intrusive magnetometer survey prior to any borehole and Cone penetration testing (CPT) locations across the MHPGC Project PEIR Red Line Boundary: Onshore to reduce the risk of encountering deep buried UXBs. In addition, an explosives engineer should be present during relevant excavations taking place within the MHPGC Project PEIR Red Line Boundary: Onshore.

4.16.1.4 The report suggests that for shallow excavations / works within the MHPGC Project PEIR Red Line Boundary: Onshore, it may be feasible for a non-intrusive magnetometer to be undertaken as an alternative to an explosives engineer.

4.17 Morven Offshore Wind Farm GC1 Onshore Convertor Station at Jade Business Park, Geotechnical and Geoenvironmental Review, Arup, April 2026

4.17.1.1 Arup was commissioned by Morven Offshore Wind Limited to undertake a geotechnical and geoenvironmental review of the area surrounding Jade Business Park (Arup, 2026). Arup's review of available historical and geoenvironmental information indicated that the Jade Business Park site occupies land formerly associated with the Hawthorn Colliery (Hawthorn Combined Mine) and Coking works, which operated between the 1950s and early 1990s. Following closure, the site underwent extensive investigation, remediation and earthworks between 1999 and 2003, including treatment of contaminated soils, large-scale cut-and-fill operations, and creation of a Central Development Zone (CDZ) intended for future industrial development. The remediation works identified two areas of principal contamination located in Northern Remediation Zone (NRZ) which align with the former coking works by-products area. The remediation works were completed in accordance with the regulatory requirements in place at that time; however, the available information indicates that some residual uncertainties remain regarding the spatial extent and nature of fill materials, particularly within areas potentially associated with backfilled borrow pits containing coal-rich material.

4.17.1.2 Ground investigations undertaken in 2018 generally identified made ground overlying glacial till deposits and limestone bedrock immediately surrounding Jade Business Park.

4.17.1.3 The Arup report summarises groundwater strikes encountered during the 2018 ground investigation. Strikes were recorded between 1.2m bgl and 11.5m bgl during drilling/excavation both in made ground and natural superficial deposits. Groundwater monitoring undertaken post ground investigation, identified many of the installations to be dry. Where groundwater was present, it was typically recorded at around 5m to 8m below ground level.

4.17.1.4 Laboratory testing reported generally low levels of contamination, with metals, petroleum hydrocarbons and asbestos below the assessment criteria applied at the time. Localised exceedances of certain polycyclic aromatic hydrocarbon (PAHs), cyanide and arsenic were identified within made ground in some areas, and isolated elevated mercury concentrations were recorded in soil leachability testing. Historical remediation activities also identified asbestos-containing materials within parts of the former Northern Remediation Zone and Western Landscape Zone, although no asbestos was detected in the areas investigated during 2018.

4.17.1.5 Ground gas monitoring undertaken during the 2018 investigation recorded generally low gas flow rates, although four locations recorded flow rates between -71.9litres/hour to +35.7litres/hour. Localised methane concentrations of up to 5.1% v/v and carbon dioxide concentrations of up to 5.7% v/v were measured. Based on the monitoring results, the site was initially classified as Characteristic Situation 3 (CS3), but this was reduced to CS2 on the basis of generally low flow rates in the majority of installations. This indicates that gas protection measures may be required for permanent structures. The review notes that further ground gas assessment, potentially including continuous monitoring, would be required to better define the ground gas regime and confirm any protection requirements for future development.

4.17.1.6 From a geotechnical perspective, made ground thickness was found to vary across the site, with natural superficial deposits comprising predominantly firm to stiff glacial till overlying limestone bedrock. The review concludes that site-specific geotechnical and geoenvironmental investigations are required to confirm existing ground conditions, assess contamination and ground gas risks, characterise fill materials, and inform foundation and earthworks design for the MHPGC Project including for the green onshore LSS option.

4.17.1.7 The report recommends that further gas monitoring is required to confirm risks and required protection measures for the proposed substation and a Ground Investigation is required to understand the hydrogeological regime across the site. It was also recommended that a ground investigation was also required to obtain geotechnical information to support the proposed development.

4.18 Morven Offshore Wind Farm – onshore pre-FEED: stage 2 coal mining review, Arup, June 2026

4.18.1.1 Arup was commissioned by Morven Offshore Wind Limited to undertake a stage two coal mining review for the onshore section of the development (Arup, 2026a). The study area that this document covers is shown on **Figure 1.8** The report provides a review of BGS and Mining Remediation Authority (MRA) datasets, existing reports and historic mapping. Further details are provided within **Section 5.11** and on **Figure 1.9** of this report.

4.18.1.2 Mining Risk Summary:

- Hawthorn Combined Mine including Hawthorn Pit shaft in west of the MHPGC Project PEIR Red Line Boundary: Onshore – Potential for collapse and mine gases;
- Dawdon colliery shaft and adits – Limited impact as they are at a great enough distance to the north of the landfall;
- Mining related settlement;
- Karst - dissolution features, collapsible ground, sinkholes and voids.

5 Environmental Setting

5.1.1.1 Information on the MHPGC Project PEIR Red Line Boundary: Onshore environmental setting has been obtained from the following sources:

- BGS, 1965. Geological Survey of England and Wales, New Series 1:63,360/1:50,000 geological map series. Sheet Number 27. Durham. Drift;
- BGS, 2008. Geological Survey of England and Wales, New Series 1:63,360/1:50,000 geological map series. Sheet Number 27. Durham. Solid;
- BGS, 2026, Onshore GeoIndex Map Viewer;
- Previous site reports as detailed in Section 4;
- Groundsure GIS and historical mapping data, 2026;
- Department for Environment, Food & Rural Affairs (Defra), 2026, Magic Maps Interactive Mapping.

5.1.1.2 The groundwater and surface water sensitivity has been based on The Environment Agency, National House Building Council (NHBC)/ Chartered Institute of Environmental Health (CIEH)/Guidance for the Safe Development of Housing on Land Affected by Contamination R&D66: 2008.

5.2 Published Geology

5.2.1 Anthropogenic Ground (generally referred to as made ground)

5.2.1.1 Anthropogenic ground consists of made ground, worked ground, infilled ground and landscaped ground used to fill or raise land. However, in general, made ground is the preferred or most often used general term in the majority of information sources and previous reports and more widely in the geo-environmental industry.

5.2.1.2 Anthropogenic ground has been identified on BGS mapping and in the Groundsure report in a few locations across and just outside the MHPGC Project PEIR Red Line Boundary: Onshore.

- Across the northern half of the west of the MHPGC Project PEIR Red Line Boundary: Onshore associated with the former Hawthorn Combined Mine and railway land;
- To the south of the former Hawthorn Combined Mine associated with the former scrap yard;
- In the northeast corner of the Blue LSS Option Area at the junction of the A19 and A182 and along the A19 to the south associated with the construction of these roads;
- In the south and north of the far east of the MHPGC Project PEIR Red Line Boundary: Onshore associated with Hawthorn Quarry and Dawdon Colliery respectively;
- Across the east of the MHPGC Project PEIR Red Line Boundary: Onshore associated with historic ground workings and modifications in this area.

5.2.1.3 Mapping of the artificial deposits across the MHPGC Project PEIR Red Line Boundary: Onshore are displayed on **Figure 1.2.**

5.2.2 Superficial deposits

5.2.2.1 BGS mapping records show the MHPGC Project PEIR Red Line Boundary: Onshore to be underlain predominantly by clays, silts sands and gravels of Glacial Till, with small sections of Glaciofluvial Deposits, Alluvium and Beach Deposits of sand and gravel.

5.2.2.2 More detail on the locations of these sections and preliminary ground models for each section of the MHPGC Project PEIR Red Line Boundary: Onshore, are summarised in **Section 5.3.** Mapping of the superficial deposits reported are displayed on **Figure 1.3.**

5.2.3 Bedrock

5.2.3.1 Bedrock beneath the MHPGC Project PEIR Red Line Boundary: Onshore is recorded by BGS mapping to comprise Limestone of the Ford Formation, Limestone and Dolomite of the Shelf-Edge Reef Ford Formation and Dolostone of the Roker Formation.

5.2.3.2 More detail on the locations of these sections and preliminary ground models for each section of the MHPGC Project PEIR Red Line Boundary: Onshore, are summarised in **Section 5.3.**

5.2.3.3 Several faults are identified across the MHPGC Project PEIR Red Line Boundary: Onshore:

- One in the east of the MHPGC Project PEIR Red Line Boundary: Onshore in a N-S direction;
- One to the east of the A19 in a N-S direction;
- Five in the centre of the MHPGC Project PEIR Red Line Boundary: Onshore . Two in a NE-SW direction, two in a NW-SE direction and one in a N-S direction;
- One in the west of the MHPGC Project PEIR Red Line Boundary: Onshore in a NW-SE direction.

5.2.3.4 Mapping of the bedrock and faults across the MHPGC Project PEIR Red Line Boundary: Onshore are displayed on **Figure 1.4.** The Seaham Formation is also present within the figure but is located offsite to the northeast.

5.2.4 BGS Logs

5.2.4.1 The findings from the available BGS boreholes across the MHPGC Project PEIR Red Line Boundary: Onshore are presented in **Table 5.1** below and the borehole locations shown on **Figure 1.5.** Scans of the BGS borehole logs can be found in **Appendix B**. Some BGS log records within the MHPGC Project PEIR Red Line Boundary: Onshore are confidential, cannot be obtained and therefore have not been reviewed for this report.

Table 5.1: Summary of BGS borehole logs across the MHPGC Project PEIR Red Line Boundary: Onshore

Summary of borehole logs	BGS Borehole reference
Within the east of the MHPGC Project PEIR Red Line Boundary: Onshore (including the landfall) Superficial deposits or residual weathered rock present from GL – 3m bgl (except in NZ44NW74 which recorded no superficial deposits and NZ44NW62 which shows superficial deposits to 26m bgl); Within borehole NZ44NW370, limestone underlying superficial deposits was proven to a maximum depth of 107.5m bgl in under which 'no returns' were recorded to 188.30m bgl within which suspected sands were encountered at 177.3m bgl. Limestone was proven to a depth of 30.5m bgl (the maximum drill depth) in borehole NZ44NW62 (correlating with the BGS mapped areas of the Ford Formation); Dolomite underlying superficial deposits, within NZ44NW57/J, NZ44NW57/E and NZ44NW27 (locations mapped by the BGS as underlain by the Roker Formation) and proven to a maximum depth of 60m bgl; Interbedded sandstone, siltstone, mudstone and coal in NZ44NW74; Groundwater not recorded in any boreholes in this section of the MHPGC Project PEIR Red Line Boundary: Onshore.	NZ44NW74 NZ44NW57/J NZ44NW370 NZ44NW62 NZ44NW57/E NZ44NW27
Within the centre of the MHPGC Project PEIR Red Line Boundary: Onshore (including Blue LSS Option Area) Topsoil GL – 0.4m bgl (NZ44NW395); Made Ground GL – 4m bgl in A19 location (average) (NZ44NW396, NZ44NW397, NZ44NW398, NZ44NW399); Soft to firm sandy clay (Glacial Till) 0.4 – 9m bgl; Firm to stiff clay (Glacial Till) 4 – 15.5m bgl; Mudstone 11.03 – 17m bgl, Limestone 17 – 138m bgl (NZ44NW368); Limestone 11-15m bgl (NZ44NW396, NZ44NW397, NZ44NW398 and NZ44NW399); Weathered Limestone 13.3 – 14.5m bgl (base) (NZ44NW395);	NZ44NW49 NZ44NW368 NZ44NW395 NZ44NW396 NZ44NW397 NZ44NW398 NZ44NW399

Summary of borehole logs	BGS Borehole reference
Interbedded mudstone, siltstone and coal (NZ44NW49); NZ44NW395 records moist ground 2.9 to 3.7m bgl NZ44NW368, dated 2012, records no water strikes but records 'rest water level on completion' as 95m bgl.	
Within the west of the MHPGC Project PEIR Red Line Boundary: Onshore (including Green LSS Option Area) Topsoil GL – 0.4m bgl; Firm sandy silty clay (Glacial Till) 0.4m bgl – 8.7m bgl (base); NZ34NE79 records the borehole to be wet at surface to 0.3m bgl.	NZ34NE79 NZ34NE81

5.3 Preliminary Ground Models

5.3.1.1 A summary of the anticipated ground conditions across the MHPGC Project PEIR Red Line Boundary: Onshore are presented below.

Table 5.2: Summary of anticipated ground conditions across the MHPGC Project PEIR Red Line Boundary: Onshore.

Section of site	Anticipated superficial geology	Anticipated bedrock geology
Within the east of the MHPGC Project PEIR Red Line Boundary: Onshore	Predominantly Glacial Till. Areas of absent/unmapped superficial deposits in the western half of this area. Glaciofluvial deposits in the southeastern corner and directly to the northeast. Beach deposits along the eastern boundary.	Predominantly Roker Formation. Two narrow sections of the Ford Formation Shelf-Edge Reef in the north and south of this area.
Within the centre of the MHPGC Project PEIR Red Line Boundary: Onshore	Predominantly Glacial Till. Glaciofluvial deposits in the centre of this area Areas of absent/unmapped superficial deposits to the north of this area by the B1432, to the east of the A19.	Predominantly Roker Formation. Ford Formation in the south and northeast.
Within the west of the MHPGC Project PEIR Red Line Boundary: Onshore	Predominantly Glacial Till. Patches of Glaciofluvial deposits across the entire area. Bands of Alluvium across the centre of the area and in the far west.	Ford Formation

5.4 Hydrogeology

5.4.1 Aquifer Status

5.4.1.1 The Groundsure data shows that the superficial deposits prominently underlying the MHPGC Project PEIR Red Line Boundary: Onshore (Glacial Till) are classified by the Environment Agency (EA) as Secondary Undifferentiated aquifer (Defra, 2026). These are aquifers where it is not possible to apply either a Secondary A or B definition because of the variable nature of the deposits. Localised areas of Secondary A aquifers are also present comprising the Glaciofluvial deposits, alluvium and beach deposits (BGS, 2026). These are bedrocks that contain permeable strata that can support local water

supplies and may form an important source of base flow to rivers. Large, localised areas in the landfall have no classification (Defra, 2026).

5.4.1.2 The bedrock geology comprising the Limestone of the Ford Formation, Limestone and Dolomite of the Shelf-Edge Reef Ford Formation and Dolostone of the Roker Formation is classified by the Environment Agency as a Principal aquifer (Defra, 2026) which underlies the entire MHPGC Project PEIR Red Line Boundary: Onshore. These are aquifers described by the Environment Agency as rock layers of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale.

5.4.1.3 The MHPGC Project PEIR Red Line Boundary: Onshore is underlain by the Wear Magnesian Limestone Water Framework Directive (WFD) waterbody. The waterbody is classified by the Environment Agency (Environment Agency, 2019) as having an overall status of Poor and chemical status of Poor in 2019.

5.4.1.4 The groundwater vulnerability (Defra, 2026) for the MHPGC Project PEIR Red Line Boundary: Onshore is generally low in the west, beyond the A19. In the eastern part of the MHPGC Project PEIR Red Line Boundary: Onshore groundwater vulnerability is generally medium within the north and south and high through the centre.

5.4.1.5 There is limited groundwater monitoring data available for the MHPGC Project PEIR Red Line Boundary: Onshore. Groundwater depth observations recorded in BGS borehole records are provided in **Section 5.2.4** and groundwater depth information provided in previous reports reviewed to inform this PRA is included **in Section 4**.

5.4.2 Groundwater Abstractions

5.4.2.1 Groundsure information records no onsite abstractions. There are two offsite groundwater abstractions (Groundsure, 2026) located within 500m of the MHPGC Project PEIR Red Line Boundary: Onshore, as described below and shown on **Figure 1.6**: Information from the Environment Agency identified a third abstraction within 2km which is also shown on **Figure 1.6.**

- Located approximately 370m north of the northwest corner of the Blue LSS Option Area- Northumbrian Water – Potable Water Supply – Active and Historical (effective from 1966);
- Located approximately 240m north of the northeastern corner of the MHPGC Project PEIR Red Line Boundary: Onshore – Dawson Colliery Mineral Water Treatment Scheme – The Coal Authority – Pollution Remediation (Active), Transfer Between Sources and Heat Pump (Historical) (effective from 2010).
- Located approximately 1.1km to the north of the A19/A182 junction – Northumbrian Water.

5.4.2.2 The Groundsure data shows that the MHPGC Project PEIR Red Line Boundary: Onshore is located within Source Protection Zones (SPZs) (Defra, 2026). The east and west of the MHPGC Project PEIR Red Line Boundary: Onshore are located within a SPZ3 which also includes the western part of the Green LSS Option Area. The rest of the MHPGC Project PEIR Red Line Boundary: Onshore is located within a SPZ2, excluding the northern part of the A19 and the Blue LSS Option Area, which are in SPZ1. The abstractions and SPZs are shown on **Figure 1.6** in **Appendix A.**

5.4.2.3 Information on private water supplies (PWS) has been sought from DCC to inform the PEIR for the MHPGC Project as detailed in **Volume 3, Chapter 2: Water Resources and Flood Risk, of the PEIR**. This has identified two private water supplies within 5km of the *MHPGC PEIR Red Line Boundary: Onshore*.

5.4.2.4 DCC records no PWS within the MHPGC Project PEIR Red Line Boundary: Onshore and one PWS is located within the land contamination and hydrogeology study areas at Hesledon Farm to the north, at grid coordinates 439774, 546404 (this is over 500m from the nearest proposed LSS which is the Green LSS Option Area). The abstraction is from the Magnesian Limestone Group Principal Aquifer at approximately 70m bgl. The PWS is located within an area designated as SPZ2. DCC note that their records do not preclude the presence of other PWSs, springs or other water abstraction points within the area.

5.4.2.5 The identified PWS is for a rural property. This PWS and other similar PWS if present, utilise smaller yields of groundwater (less than 20,000 litres a day) and do not require a licence.

5.4.2.6

5.4.3 Groundwater Sensitivity

5.4.3.1 Based on the information above and the method of assessing the sensitivity of water environment receptor in NHBC guidance document R&D 66 Annex 2 (NHBC/EA/CIEH, 2008) the sensitivity of the underlying groundwater has been assessed as Very High due to the presence of the Principal Aquifer across the whole of the MHPGC Project PEIR Red Line Boundary: Onshore and the proximity to SPZ1 and potable water supply abstraction.

5.5 Hydrology

5.5.1 Surface Water Features

5.5.1.1 There are numerous streams, drains and ponds crossing the MHPGC Project PEIR Red Line Boundary: Onshore, these surface water features along the route are shown in **Figure 1.6** in **Appendix A.**

5.5.1.2 These features are classified under the WFD scheme (Groundsure, 2026). It is noted that the majority of surface water features within the MHPGC Project PEIR Red Line Boundary: Onshore or within the corridor are not classified. The WFD features are classified below:

- The Dalton Beck to North Sea river is located in the crossing from the south and running north along the east boundary of the Western Area. This has been given an overall rating of Moderate by the Environment Agency in 2019 (Environment Agency, 2019);
- Hawthorn Burn, located off-site immediately south of the central area of the MHPGC Project PEIR Red Line Boundary: Onshore has been given an overall rating of Poor and a chemical rating of Fail by the Environment Agency in 2019 (Environment Agency, 2019).

5.5.2 Surface Water Abstractions

5.5.2.1 The Groundsure data indicates that there are no surface water abstractions within or near the MHPGC Project PEIR Red Line Boundary: Onshore.

5.5.3 Licenced Discharges to Controlled Waters & Pollution Incidents

5.5.3.1 The Groundsure data shows five licenced discharges to controlled waters and two pollution incidents to be recorded on-site. These are summarised below and shown on **Figure 1.6** in **Appendix A**.

Licenced Discharges

- Located east of the former Hawthorn Combined Mine, relating to the 'Former Hawthorn Reclamation Site' and dated February 2001. Effluent type is reported as trade discharges – site drainage (surface water) and the receiving water is an unnamed tributary of Dalton Beck. Status is shown as revoked;
- Located in the northwestern area of the former Hawthorn Combined Mine, relating to the 'Former Hawthorn Reclamation Site' and dated February 2002. The effluent type is reported as trade discharges – site drainage (contaminated surface water) and the receiving water is an unnamed tributary of Dalton Beck. Status is shown as revoked;
- Located in the southwest of Coop House Wood in the southwest of the MHPGC Project PEIR Red Line Boundary: Onshore and dated February 1965. The effluent type is reported as sewage discharges – sewer storm overflow – water company and the receiving water is Coldwell Burn/Murton Dene. Status is shown as 'Transferred from R(PP)A 1951-1956';
- There are two licenced discharges located in the south of Coop House Wood in the southwest of the MHPGC Project PEIR Red Line Boundary: Onshore and dated January 1996 and February 2019. The effluent type is reported as sewage discharges – sewer storm overflow – water company and the receiving water is Coop House Dene Burn for both licences. The status of both licences is shown as 'varied under EPR 2010'.

Pollution Incidents

- Located in the south of Coop House Wood in the southwest of the MHPGC Project PEIR Red Line Boundary: Onshore and dated April 2007. The pollutant type is reported as sewage materials. Land and air are reported as Category 4 (No Impact) and water is reported as Category 2 (Significant);
- Located in the south of Coop House Wood in the southwest of the MHPGC Project PEIR Red Line Boundary: Onshore and dated March 2003. The pollutant type is reported as sewage materials (crude sewage). Land and air are reported as Category 4 (No Impact) and water is reported as Category 3 (Minor).

5.5.3.2 There are a number of licence discharges and pollution incidents located off-site, primarily located in the areas of Murton, Dalton Park and along North Dene Burn.

5.5.4 Surface Water Sensitivity

5.5.4.1 Based on the information above and the method for assessing the sensitivity of water environment receptors in NHBC guidance document R&D 66 Annex A the sensitivity of the surface water receptors has been assessed as Moderately High due to the presence of a Moderate rated surface water present across the MHPGC Project PEIR Red Line Boundary: Onshore.

5.6 Ecology and nature conservation

5.6.1 Sites of Special Scientific Interest (SSSI)

5.6.1.1 The Groundsure data indicates the following SSSIs are present on and within 550m of the MHPGC Project PEIR Red Line Boundary: Onshore. These are shown on **Figure 1.7** in **Appendix A.**

5.6.1.2 Onsite:

- In the far east of the MHPGC Project PEIR Red Line Boundary: Onshore – SSSI name: Durham Coast, Seaham-Easington Colliery: Foreshore & Intertidal, Littoral Sediment. Last condition reported as unfavourable – recovering. Features include aggregations of non-breeding birds;
- In the far east of the MHPGC Project PEIR Red Line Boundary: Onshore - SSSI name: Durham Coast, Seaham-Easington: Cliff Top Grassland, Calcareous Grassland – Lowland. Last condition reported as unfavourable – recovering. Features include spring/flush fen (lowland) and vegetated sea cliffs;
- In the west of the MHPGC Project PEIR Red Line Boundary: Onshore – SSSI name: Hesledon Moor East, Neutral Grassland – Lowland. Last condition reported as unfavourable – declining. Features include Basin fen (lowland).

5.6.1.3 Off-site (within 500m)

- On the southeastern boundary of the MHPGC Project PEIR Red Line Boundary: Onshore – SSSI name: Hawthorn Quarry, Earth Heritage. Last condition reported as favourable. Features include marine Permian;
- To the southeast of the MHPGC Project PEIR Red Line Boundary: Onshore – SSSI name: Hawthorn Dene, Mixed Habitat. Last condition reported as unfavourable – recovering. Features include lowland mixed deciduous woodland;
- North of west of the MHPGC Project PEIR Red Line Boundary: Onshore – SSSI name Hesledon Moor East, Neutral Grassland – Lowland. Last condition reported as unfavourable – declining. Features include Basin fen (lowland);
- Southwest of the west of the MHPGC Project PEIR Red Line Boundary: Onshore – SSSI name Hesledon Moor West, Dwarf Shrub Heath – Lowland. Last condition reported as unfavourable – declining. Features include lowland dry heath;
- Southwest of the west of the MHPGC Project PEIR Red Line Boundary: Onshore – SSSI name: Hesledon Moor West, Standing Open Water and Canals. Last condition reported as unfavourable – declining. Features include lowland dry heath and valley fen;

- Southwest of the west of the MHPGC Project PEIR Red Line Boundary: Onshore –SSSI name: Hesledon Moor West, Broadleaved, Mixed and Yew Woodland – Lowland. Last condition reported as destroyed. Features include lowland dry heath.

5.6.2 Special Areas of Conservation

5.6.2.1 The Groundsure data indicates that there is one Special Area of Conservation (SAC) located in the east of the MHPGC Project PEIR Red Line Boundary: Onshore, along the coastline. The area is named Durham Coast Special Area of Conservation and is related to vegetated sea cliffs. This is shown on **Figure 1.7** in **Appendix A.**

5.6.3 Other

5.6.3.1 The Groundsure data indicates that there is a Local Nature Reserve (LNR) located in the northeast of the MHPGC Project PEIR Red Line Boundary: Onshore, named Noses Point. Ancient woodland is indicated to be located off-site south of the eastern part of the MHPGC Project PEIR Red Line Boundary: Onshore, named Hawthorn Dene. Coop House Wood in the southwest of the site, Hesledon Moor East and Hawthorn Quarry in the southwest of the site are Local Wildlife Sites (LWS) located within the MHPGC Project PEIR Red Line Boundary: Onshore. Hesledon Moor West, Cowtons Pond, Cold Hesledon Meadow and two other parcels of Hesledon More East are present within 500m MHPGC Project PEIR Red Line Boundary: Onshore. These are shown on **Figure 1.7** in **Appendix A.**

5.6.3.2 These are shown on **Figure 1.7**.

5.7 Flooding

5.7.1.1 The Groundsure data and Environment Agency flood risk map indicates that the coastline along the boundary of the far east of the MHPGC Project PEIR Red Line Boundary: Onshore is within areas classified as Flood Zone 3 and 2. These are areas with a medium and high probability of flooding that have an annual chance of flooding by rivers >1% and a >0.5% chance of flooding by the sea. The Flood Zone 3 areas are surrounded by a small area of Flood Zone 2. These are areas with a medium probability of flooding that have an annual chance of flooding by rivers of 1% and a 0.5% chance of flooding by the sea. At this point the export cable to landfall will be wholly underground and will not be subject to or affected by coastal flooding.

5.7.1.2 Other than along the coastline and a small area in Hesledon Moor East, there are no other flood risk zones identified within the MHPGC Project PEIR Red Line Boundary: Onshore.

5.8 Unexploded Ordnance

5.8.1.1 An Unexploded Bomb Risk report has been obtained for the MHPGC Project from Tetra Tech (Tetra Tech, 2026) which indicates that the MHPGC Project PEIR Red Line Boundary: Onshore is located within an area of Moderate bomb risk in the east and the remainder of the MHPGC Project PEIR Red Line Boundary: Onshore is within a Low-Moderate bomb risk. Moderate bomb risk indicates that the area was subject to a bombing density of 15.5 bombs per 1000 acres or more. The Tetra Tech report also indicates that enemy targets were present within the vicinity of the project along the coastline.

5.8.1.2 The findings of the UXO Desk Study are summarised as follows:

- A number of records of military activity within the Project have been identified comprising defensive positions, anti-aircraft artillery, military presence/training and historic bombing;
- Two Royal Air Force Air Defence radar sites have been identified within the vicinity of the Project;
- Bombing records indicate that during World War II, 427 high explosive bombs fell within the rural district of Easington. A further 121 items were recorded within Easington including parachute mines, phosphorous bombs and fire pots.

5.8.1.3 On the basis of the available information Tetra Tech have indicated that the risk of encountering UXO is considered to be Moderate. The risk assessment recommends an intrusive magnetometer survey prior to any borehole and Cone penetration testing (CPT) locations across the MHPGC Project PEIR

Red Line Boundary: Onshore to reduce the risk of encountering deep buried UXBs. In addition, an explosives engineer should be present during relevant excavations taking place within the MHPGC Project PEIR Red Line Boundary: Onshore. The report also suggests that for shallow excavations / works within the MHPGC Project PEIR Red Line Boundary: Onshore, it may be feasible for a non-intrusive magnetometer to be undertaken as an alternative to an explosives engineer.

5.9 Radon

5.9.1.1 The Indicative Atlas of Radon in Great Britain (UK Radon, 2025) indicates that the far east of the MHPGC Project PEIR Red Line Boundary: Onshore and small parts of the north and southwest are within a Radon Affected Area where between 1% and 3% of properties are above the Action Level. In these areas existing properties should have radon measurements taken and where measurements reveal concentrations above the Action Level (200 Bq/m3) measures should be taken to reduce the concentration to as low as reasonably practicable.

5.9.1.2 The remainder of the MHPGC Project PEIR Red Line Boundary: Onshore is shown to be within an area where less than 1% of properties are above the Action Level.

5.10 Mineral Extraction

5.10.1.1 The following information has been sourced from the MRA interactive map viewer (Mining Remediation Authority, 2026) a MRA coal mining report (appended to the Arup 2026 report) (Arup, 2026a) and the Groundsure report.

5.10.2 Historic Coal Mining

Coal seams

5.10.2.1 According to BGS and MRA records, no coal seams subcrop[1] the MHPGC Project PEIR Red Line Boundary: Onshore.

Development high risk areas

5.10.2.2 The MRA (Mining Remediation Authority, 2026) identifies two small areas of development high risk within the MHPGC Project PEIR Red Line Boundary: Onshore. One encompassing the zone of influence of the mine entry in the west, and one smaller area directly to the west of the railway line, approximately 175m south of the A182.

Surface workings

5.10.2.3 The MRA (Mining Remediation Authority, 2026) identifies no areas of opencast coal mining within the MHPGC Project PEIR Red Line Boundary: Onshore.

Known shallow workings

5.10.2.4 The MRA (Mining Remediation Authority, 2026) identifies no areas of known shallow (<30m bgl) coal mining with the MHPGC Project PEIR Red Line Boundary: Onshore.

Probable shallow workings

5.10.2.5 The MRA (Mining Remediation Authority, 2026) identifies no areas of probable shallow (<30m bgl) coal mining within the MHPGC Project PEIR Red Line Boundary: Onshore.

Known deep workings

5.10.2.6 The MRA (Mining Remediation Authority, 2026) identifies deep (>30m bgl) coal mining within the Ryhope Five Quarters, High Main, Yard, Main, Maudlin, Low Main and Hutton seams beneath the site(the MHPGC Project PEIR Red Line Boundary: Onshore), The seams have been worked at depths of between 209 and 491m bgl, at thicknesses of between 70 and 230cm with the most recent

[1] Note: The term 'subcrop' is sometimes used interchangeably with 'outcrop' in some reports/sources. Both denote shallow coal but outcrop is used to refer to coal that is present at surface. Subcrops refer to shallow coal that has an overburden of sediments or sedimentary rocks that are not visible at surface and would be the subject to surface mining as opposed to deep mining.

working date of 1990. These seams relate to several former mines and collieries and mine entries to the west, north and northeast of the MHPGC Project PEIR Red Line Boundary: Onshore. Three former mines encroach onto the MHPGC Project PEIR Red Line Boundary: Onshore); these are the South Hetton Colliery to the west, Hawthorn Mine within Green LLS Option Area and, to the southwest, north and northeast of the Green LLS Option Area, and the Dawdon Colliery to the northeast of landfall. Merton Colliery, to the north of the Blue LSS Option Area is within the Land Contamination Study Area buffer but is not within the MHPGC Project PEIR Red Line Boundary: Onshore.

Mine entries

5.10.2.7 One recorded mine shaft (Ref 438545-003) is located within the MHPGC Project PEIR Red Line Boundary: Onshore (in the west, directly north of the Green LSS Option Area), see **Figure 1.8** in **Appendix A.** This mine shaft is referred to as Murton Hawthorn shaft (NGR 438897, 545850), extends to 455m bgl and has been located by the MRA (Sirius, 2024). The MRA records the shaft diameter to be 6.71m and the drift thickness at the shaft location to be 20.1m.

5.10.2.8 The risks associated with mine shafts are assessed by considering the potential zone of influence (ZOI), the zone where ground subsidence may reasonably be expected to occur in the event of a shaft failure, collapse or settlement of any infill. This zone has a radius defined as:

$$R = \frac{shaft\ diameter}{2} + departure\ distance + depth\ to\ rockhead$$

438545-003 ZOI radius = (6.71/2 + 0 + 20.1) = 23.455m.

5.10.2.9 The mine entry shall either be appropriately remediated following consultation with the Mining Remediation Authority, or the mine entry zone of influence shall be avoided for the location of structures during detailed design as per the Mining Remediation Authority 'guidance for building over or within the influencing distance of a mine entry'. The zone of influence is indicated on **Figure 1.8**.

5.10.2.10 The Murton Hawthorn Shaft is currently being monitored for mine gas by the MRA. It has been located and is vented through a large diameter vent with a flame arrester and a dip tube. The mine entry zone of influence is also fenced off around the mine entry.

5.10.2.11 One adit is located within 100m of the northern boundary of the landfall, however it is dipping to the northeast, away from the site therefore should not pose a risk of shallow ground collapse within the MHPGC Project PEIR Red Line Boundary: Onshore.

5.10.2.12 Additional mine shafts and adits are also located to the west of the MHPGC Project PEIR Red Line Boundary: Onshore, and to the north of the landfall. These mine entries are in excess of 100m from the MHPGC Project PEIR Red Line Boundary: Onshore, with the adits descending away from the site so they are not considered to pose a risk of shallow ground collapse on-site.

Mining and groundwater constraints

5.10.2.13 The majority of the site is classified by the MRA as a category B for mining and groundwater constraints which is described as being on the coalfield.

5.10.2.14 The eastern half of the eastern section of the site is classified as a category C1, described as on the coalfield area with one, or both of: shallow mine workings, and nearby controlling outflow. This requires any major development including drainage borehole equivalent to or in excess of 30m to have a site specific flood and drainage assessment undertaken considering current and future mine water and groundwater, a consultation with the lead local flood authority and a pre-application discussion with the EA. 30m+ drainage boreholes are not likely to be proposed on the site.

5.10.2.15 The coastal area of the site, along the beach is classified as a category D, described as on the coalfield area with shallow mine water and one, or both of: shallow mine workings, and nearby controlling flow. This determines that "infiltration SuDS may not work now, or in the future, as any SuDS could be impacted by minewater. The developer should suggest alternative methodologies and must undertake pre-application consultation with the MRA and pre-consultation with the lead local flood authority for drainage proposals other than drainage to the network". SuDS are not likely to be proposed in this coastal area of the site.

5.10.3 Non-Coal Mineral Extraction

5.10.3.1 Surface mining and quarrying of Limestone and Glacial sand and gravel are identified by the BGS (1:50,000 sheet map 57, 1965), mostly at the landfall and in the west of the MHPGC Project PEIR Red Line Boundary: Onshore. For further information on the potential impacts on mineral resources, reference should be made to **Volume 3, Chapter 1: Geology, Hydrogeology and Ground Conditions**.

5.10.3.2 Additionally, there is the potential for unrecorded sand pits and quarries across the MHPGC Project PEIR Red Line Boundary: Onshore.

5.10.3.3 Review of historical OS mapping and aerial imagery does not indicate any evidence of unrecorded mining or quarrying.

5.10.3.4 These areas of surface mining may have been backfilled with spoil or other unknown materials.

5.11 Ground Stability

5.11.1.1 The risk of deposits prone to stability issues across the MHPGC Project PEIR Red Line Boundary: Onshore are categorised as follows and shown on **Figure 1.9** in **Appendix A.**

- Compressible deposits – Predominantly very low risk with bands of high risk in the western section, correlating with the areas of Alluvium beneath the MHPGC Project PEIR Red Line Boundary: Onshore.

5.11.1.2 Collapsible deposits - Predominantly very low risk with bands of low risk in the western section, correlating with the areas of Alluvium beneath the MHPGC Project PEIR Red Line Boundary: Onshore.

Shrink swell clays – Low risk across the western part of the MHPGC Project PEIR Red Line Boundary: Onshore, moderate risk across the central and eastern parts of the site. Pockets of very low-risk coinciding with the areas of mapped Glaciofluvial and Beach deposits beneath the MHPGC Project PEIR Red Line Boundary: Onshore.

- Running sands – Predominantly low risk. Bands of moderate risk correlating to the areas mapped to be underlain by Alluvium. High risk correlating to the areas mapped to be underlain by Beach deposits. Pockets of very low risk across the east of the MHPGC Project PEIR Red Line Boundary: Onshore.
- Landslides – Predominantly low risk with pockets of moderate to high risk across the west and east of the MHPGC Project PEIR Red Line Boundary: Onshore.
- Ground dissolution – Low risk across the MHPGC Project PEIR Red Line Boundary: Onshore.

5.12 Mine Gas

5.12.1.1 Figure 13.1 of the CL:AIRE guidance 'Good Practice for the Risk Assessment for Mine Gas Emissions' (CL:AIRE, 2021) presents a decision support tool to classify sites in accordance with five risk categories from no risk to high risk. In general, the decision support tool sorts the sites into their relative risk categories based on the geological / historical mining features.

5.12.1.2 **Table 5.3** overleaf provides a summary of the preliminary screening with respect to mine gas risks within the MHPGC Project PEIR Red Line Boundary: Onshore.

Table 5.3: Qualitative Mine Gas Risk Designation

Stage	Item for Consideration	Yes/No	Comments
Initial	Is the site within a Coal (now MRA) defined Coal Mining Reporting Area (CMRA)	Yes	Potential mine gas risk – proceed with further assessment.
Are all of these statements true? (If 'Yes' – Negligible Risk)	Mine entries present >50m from site boundary	No	The Consultants Coal Mining Report (The Mining Remediation Authority report appended to Arup, 2026) indicate the presence of a mine shaft (ref. 438545-003-Murton Hawthorn Shaft) at grid reference 438896 545850 which is located within the development boundary of the MHPGC Project PEIR Red Line Boundary: Onshore. Proceed with further assessment.
	Workings present >150m depth	Yes	The MRA report indicates the presence of shallowest working at 209m bgl beneath the MHPGC Project PEIR Red Line Boundary: Onshore, related to the High Main coal seam with an extraction thickness of 100cm, dipping northeast at 3 degrees and last worked in 1952.
	No faults or other potential pathways connecting surface to deeper unflooded workings	No	Multiple faults trending north-south northeast- southwest and northwest-southeast are noted intersecting the MHPGC Project PEIR Red Line Boundary: Onshore that could connect the surface to deeper workings. Proceed with further assessment.
	Outside area of past or probable shallow workings on Mining Remediation Authority map viewer	Yes	The MHPGC Project PEIR Red Line Boundary: Onshore is not located within an area of probable shallow workings based on Mining Remediation Authority information. No probable workings are recorded to depths of 150m bgl based on data included on the MRA Map Viewer (MRA, 2026). No further assessment of probable shallow workings required.
Are all of these statements true? (If 'Yes' – Low Risk)	Workings (only) between 30m and 150m but permanently flooded or covered by 10m+ of low permeability superficial deposits	Yes	Workings at 209m bgl are considered to be flooded. The area is noted to have experienced a significant increase in mine water levels since workings ceased in the area in 1992. The MRA have confirmed that water levels within the Murton Hawthorn Shaft are to be close to ground level. No groundwater information was available on the BGS borehole logs available both with MHPGC Project PEIR Red Line Boundary: Onshore or within close proximity.

Stage	Item for Consideration	Yes/No	Comments
			No further assessment of mine workings required.
	Mine entries present >50m from site boundary	No	See above text on mine entries. Proceed with further assessment.
Are any of these statements true? If 'No' – Moderate Risk) If 'Yes' – High Risk)	Mine entries on-site or <20m from site boundary	Yes	See above text on mine entries. Given shallow water levels are anticipated within the MHPGC Project PEIR Red Line Boundary: Onshore and the mine entry is capped and vented this is unlikely to act as a potential migration pathway. No further assessment of mine entries required.
	Workings below site at <30m depth and unflooded or variable water level (not permanently flooded)	No	See above text on mine workings. No further assessment of mine workings required.
	Faults or other pathways connecting surface to deeper unflooded workings	No	See above text on faults. No further assessment of faults required.
	Within area of past or probable shallow workings on Mining Remediation Authority map viewer	No	See above text on mine entries. No further assessment of probable shallow workings required.

5.12.1.3 Based on the above, the MHPGC Project PEIR Red Line Boundary: Onshore is considered to represent a High Risk in accordance with CL:AIRE guidance (CL:AIRE, 2021), principally based on the presence of a mine entry on-site. However, given the presence of shallow groundwater associated with mine water rebound beneath the MHPGC Project PEIR Red Line Boundary: Onshore and workings in excess of 150m bgl, the likelihood of gas migration could be reduced as migration pathways are not present. The mineshaft is effectively 'permanently flooded' following CL:AIRE guidance (CL:AIRE, 2021).

5.12.1.4 The following information was also included in the Arup report (Arup, 2026a), obtained from the MRA on mine gases:

- Dawdon Theresa Shaft (E4435820 N547810) (offsite, to the north of the far east of the MHPGC Project PEIR Red Line Boundary: Onshore) – "*Dawdon was originally vented through two vents fitted with flame arrestors. Initially methane was vented and some gas leaked around the shaft. As water has recovered the gas disappeared and in 2006 the last of the vents was removed. Gas readings continue to be taken at the shaft although the vent has been removed*."
- L86 Hawthorne (E438895 N545850) (in the west of the MHPGC Project PEIR Red Line Boundary: Onshore, north of the Green LSS Option Area) – "*Hawthorne Shaft is connected to Murton Colliery. The shaft is vented through a large diameter vent fitted with a flame arrester, there is also a dip tube. Water levels are now close to OD and all workings are believed to be isolated from the vent.*"
- "*The monitoring points are monitored and maintained periodically by contractors on behalf on the Coal Authority* (now MRA). *During these periodic visits spot readings of gas are taken at the monitoring points, these readings include for oxygen, carbon dioxide, methane and latterly atmospheric pressure*."

- Graphs showing the measured gas levels at the two shafts from 2016 to 2024 for Theresa shaft, and 2008 to 2024 for Hawthorn shaft show generally stable oxygen levels (20-21%) with the occasional elevated levels of Carbon dioxide (CO_2) recorded (up to 1%. brief spike to 3% in 2016). Very limited or no methane levels are recorded (<0.5%). No gas flow rate measurements were undertaking during the monitoring.

6 Regulatory Information and Consultation

6.1 Regulatory Database

6.1.1.1 The Groundsure data includes information and data collected from several organisations including the Environment Agency, the Local Authority, the British Geological Survey, DEFRA and Health and Safety Executives (HSE). **Table 6.1** summarises this information.

Table 6.1: Regulatory database

Description	On site*	0 – 50m	50 - 250	Details
Recorded historical waste sites	1	0	0	Located onsite in the southwest of the east of the MHPGC Project PEIR Red Line Boundary: Onshore and is recorded as a scrap yard (S4.01). Shown on the historical maps from 1992. Aerial images show the area to be a caravan site from 2006. Shown on Figure 1.11.
Recorded historical landfill sites	0	0	3	Three are located within 250m of the MHPGC Project PEIR Red Line Boundary: Onshore as shown on Figure 1.11. Further details are provided within Section 6.2 below.
Waste exemptions	9	1	4	Waste exemptions have been registered within the MHPGC Project PEIR Red Line Boundary: Onshore for a variety of activities, reflecting the storage, treatment, recovery and reuse of waste materials as well as for agricultural purposes.
Licenced discharges to controlled waters	5	6	12	All on-site discharge consents are located in the western part of the MHPGC Project PEIR Red Line Boundary: Onshore. One is located to the east of the former Hawthorne mine (S8.01) and relates to trade discharge (site drainage) into an unnamed tributary of Dalton Beck. One is located in the west of the of the former Hawthorne mine (S8.01) and relates to trade discharges (site drainage) into an unnamed tributary of Dalton Beck. Three are located within Coop House Wood in the southwest of the MHPGC Project PEIR Red Line Boundary: Onshore relating to sewage discharge, of these two discharge into Coop House Dene Burn and one into Coldwell Burn/Murton Dene.
Part A (1) industrial activities	0	0	1	One activity is located north of the far east of the MHPGC Project PEIR Red Line Boundary: Onshore relating to South Seaham Garden Village Energy Centre.
Licenced pollutant release (Part A(2)/b)	0	0	3	Two are located south of the centre of the MHPGC Project PEIR Red Line Boundary: Onshore relating to the unloading of petrol into storage service stations. One is located southwest of the west of the MHPGC Project PEIR Red Line Boundary: Onshore. relating to the use of bulk cement.

Description	On site*	0 – 50m	50 - 250	Details
List 1 dangerous substances	2	0	0	Two are located in the north and northeast of the west of the MHPGC Project PEIR Red Line Boundary: Onshore with substances reported as mercury (other) and cadmium, the receiving water is the Dalton Burn and Dalton Beck. Both relate to the former Hawthorne Reclamation Site (mine).
List 2 dangerous substances	2	0	0	Two are located in the north and northeast of the west of the MHPGC Project PEIR Red Line Boundary: Onshore (as above), with substances reported as chromium, copper, iron, lead, nickel and zinc. Both relate to the former Hawthorne Reclamation Site (mine).
Pollution incidents (EA)	2	0	1	Two are located onsite within Coop House Wood in the southwest one relating to sewage material (final effluent) and a category 2 (significant impact) to water. The other relating to sewage material (crude sewage) and a category 3 (minor impact) to water.
*within the MHPGC Project PEIR Red Line Boundary: Onshore				

6.2 Landfill Sites

6.2.1.1 The Groundsure data report states that no active or historic landfill sites are located within the MHPGC Project PEIR Red Line Boundary: Onshore.

6.2.1.2 The Groundsure GIS data shows that there are three historical landfills located within 250m of the MHPGC Project PEIR Red Line Boundary: Onshore. One of these is located approximately 160m south of the west of the MHPGC Project PEIR Red Line Boundary: Onshore and named Area Y South of Hetton Miner (S10.1). The extent of infilling and the nature of the material is unknown. The historical maps show the area as a plantation until 1957 after which time the area had been developed into a Miners' Welfare ground comprising a cricket ground, football pitch, bowling green and tennis court and it is likely that material was imported onto the site as part of these construction works. There is no further information regarding this landfill.

6.2.1.3 The other two historic landfills are located north of the west of the MHPGC Project PEIR Red Line Boundary: Onshore, named Area K West of Wheatley Hill (150m) (S10.2) and Area K Murton Miners Welfare (250m) (S10.3). The historical maps show these areas to have been occupied by the Miner's Welfare Recreation Ground from the late 1922 and are currently still used as open space/recreation ground. There is no further information regarding these landfills.

6.2.1.4 There are a number of old pits/quarries (S1.01-S1.13) within the MHPGC Project PEIR Red Line Boundary: Onshore that have potentially been infilled. The majority of these, including the Dawdon Quarry (S9.02) and areas of infilling of railway cuttings (S1.15-S1.20) are located to the east of A19.

6.2.1.5 Areas associated with the infilling of the A19 (S1.12-S1.13) are located immediately to the east of the Blue LSS Option Area.

6.2.1.6 The former South Hetton Colliery (S8.02) is located approximately 450m to the southwest of the Green LSS Option Area and areas of infilling, associated with the former Hawthorn Mine Railway (S2.01), are located within and immediately to the east and west of the Green LSS Option Area.

6.2.1.7 From a review of the available aerial photographs and Light Detection and Ranging Data (LiDAR) there are no current depressions shown in the ground and are therefore all considered to have been infilled. From the historical maps sources S1.04-S1.08 and S1.10 appear to have been infilled prior to the 1900s and sources S1.01-S1.03 and S1.11 infilled prior to the 1970s. Degradation of any putrescible material is likely to have occurred over this time reducing the potential for gas generation.

6.3 Planning History

6.3.1.1 A review of the DCC planning portal has been undertaken to identify additional information related to the site. The identified applications are summarised below and any relevant reports and information obtained from the planning portal has been summarised in Section 4 of this report.

Table 6.2: Summary of planning applications related to the site

Application Number and Date Registered	Description	Comments
DM/19/01316/FPA 23 Apr 2019	Erection of 7 units (5 buildings) for B2/B8 industrial use with integrated offices and associated service yards, car parking and landscaping	A preliminary geoenvironmental assessment, gas risk assessment and geoenvironmental appraisal for land at Hawthorn Business Park is included within the portal which have been reviewed, and portent information is presented in section 4 of this report.
DRC/19/00312 22 Jul 2019	Discharge of conditions 3 (Construction Traffic Management Plan), 4 (contaminated land) and 6 (tree protection) pursuant to DM/19/01316/FPA for the erection of 7 units (5 buildings) for B2/B8 industrial use with integrated offices and associated service yards, car parking and landscaping	No additional relevant information
DM/19/02444/WAS 26 Jul 2019	Landraise with arisings and topsoil	No additional relevant information
DRC/19/00340 13 Aug 2019	Discharge of condition 7 (landscape scheme) pursuant to DM/19/01316/FPA for the erection of 7 units (5 buildings) for B2/B8 industrial use with integrated offices and associated service yards, car parking and landscaping	No additional relevant information
DM/20/00232/NMA 24 Jan 2020	Non material amendment to DM/19/01316/FPA (condition 2 - approved plans) comprising of alterations to enclosures and additional area of hard surface adjacent to/east of unit 4000	No additional relevant information
DRC/20/00078 19 Feb 2020	Discharge of condition 10 (landscape maintenance) pursuant to DM/19/01316/FPA for the erection of 7 units (5 buildings) for B2/B8 industrial use with integrated offices and associated service yards, car parking and landscaping	No additional relevant information
DRC/20/00147 20 Apr 2020	Discharge of conditions 8 (road signage strategy), 9 (travel plan) and 11 (secondary (emergency) access management strategy) pursuant to DM/19/01316/FPA for the erection of 7 units (5 buildings) for B2/B8 industrial use with integrated offices and associated service yards, car parking and landscaping	No additional relevant information

Application Number and Date Registered	Description	Comments
DRC/20/00148 20 Apr 2020	Discharge of Conditions 4 (Land Remediation) and 6 (Dust Management) of DM/19/02444/WAS	No additional relevant information
DM/20/01325/AD 27 May 2020	Freestanding sign with Jade Business Park logo, sign boards for tenant logos and management company contact information	No additional relevant information
DRC/20/00205 19 Jun 2020	Discharge of Condition 5 (contaminated land) of Planning Permission DM/19/02444/WAS	No additional relevant information
DRC/20/00204 19 Jun 2020	Discharge of condition 5 (land contamination verification report) pursuant to DM/19/01316/FPA for the erection of 7 units (5 buildings) for B2/B8 industrial use with integrated offices and associated service yards, car parking and landscaping	No additional relevant information
DM/20/02093/AD 03 Aug 2020	2no. fascia signs	No additional relevant information
DM/20/03108/NMA 23 Oct 2020	Non-material amendment to DM/19/01316/FPA to permit extension of unit fence line positions	No additional relevant information
DM/21/02901/OUT 12th Aug 2021	Outline application for a mixed-use development comprising of B2 and B8 units (amended description)	An updated preliminary geoenvironmental assessment and detailed remediation and verification strategy relating to the development of the Jade Business Park and surrounding areas known as Hawthorn Business Park. Relevant information has been summarised in Section 4.
DM/22/01663/OUT 7th June 2022	Outline planning application for the erection of a new 400 kilovolt electricity substation, a converter station, and the laying out of replacement public open space on land to the west and south of Jade Business Park, with all matters reserved	A Geo-Environmental and Geotechnical Desk Study report 2022. An Environmental Appraisal Report (EAR) relating to the Scotland and England Green Link (SEGL) 1 onshore scheme 2022. A Phase 1 geo-environmental assessment desk study for land at Hawthorn Pit 2024. Relevant information has been summarised in section 4.
DM/22/03133/WAS 21 Oct 2022	Land raise works and planting of a new woodland area.	No additional relevant information
DM/24/02696/FPA 30 Sep 2024	Demolition of existing farm buildings and dwellings and erection of 149 dwellings (use class C3) with vehicle access, open space, landscaping, SUDS, and associated infrastructure works	A phase one (desk study) geoenvironmental appraisal report for land adjacent to Seaham Garden Village 2024.

Application Number and Date Registered	Description	Comments
		Relevant information has been summarised in section 4.
DM/25/00128/RM 16th Jan 2025	Reserved Matters application (all matters, being details of the permanent access, appearance, landscaping, layout and scale) for the erection of a converter station, and the laying out of replacement public open space on land to the west and south of Jade Business Park pursuant to DM/22/01663/OUT	Phase III – Remediation Strategy for Eastern Green Link 1 (EGL 1) – Murton Convertor Station (2025). Relevant information has been summarised in section 4.
DM/25/00425/FPA 13 Feb 2025	Retention a temporary site compound area with associated works for a period not exceeding 2 years with restoration thereafter	No additional relevant information
SCR/25/00013 02 May 2025	EIA Screening Opinion in relation to the proposed development of a 49.9MW solar farm and associated battery storage	No further additional information
DM/25/01881/FPA 11 Jul 2025	Solar Farm comprising the installation of solar photovoltaic panels and associated infrastructure including combined customer & DNO substation, inverter and transformer stations, spare parts container, associated battery energy storage system, maintenance tracks, fencing, security cameras, landscape planting, swales and associated works.	A ground hazard desk study report (2025) relating to the proposed renewable energy development for Hazel Solar Farm Relevant information has been summarised in section 4.
DM/25/02528/VOC 9th Sep 2025	Variation of condition 2 of planning permission DM/21/02901/OUT (mixed use development comprising of B2 and B8 units).	No additional relevant information
DM/25/02692/RM 26 Sep 2025	Application for reserved matters comprising the construction of 3 industrial units with associated access, parking, landscaping and drainage (Phase 2) pursuant to outline planning permission DM/21/002901/OUT (B2/B8 industrial development).	No additional relevant information
DM/25/02767/RM 3rd Oct 2025	Reserved Matters application (all matters, being details of the permanent access, appearance, landscaping, layout and scale) for the erection of a substation on land to the west of Jade Business Park pursuant to DM/22/01663/OUT	No additional relevant information
DM/26/01109/FPA 1st May 2026	Full planning application for a temporary visitor centre at the EGL1 site compound for a period of up to 5 years	Application withdrawn 13th August 2026 resubmission DM/26/02162/FPA No additional relevant information
DM/26/01289/DRC 21st May 2026	Discharge of Condition 31 (Construction Management Plan) pursuant to Planning Permission DM/22/01663/OUT	Mentions a Construction Environmental Management Plan received 21st May 2026 (Doc Ref EGL1-JMSHAWP4ZZ-XXZZ-PL-EN-0001 Revision C04) however this is not present on the planning portal.

Application Number and Date Registered	Description	Comments
		No additional relevant information
DM/26/02162/FPA 18th August 2026	Temporary visitor centre at the EGL1 site compound for a period of up to 5 years (Resubmission)	No additional relevant information

7 Preliminary Conceptual Site Model

7.1 Introduction

7.1.1.1 The Conceptual Site Model (CSM) is based upon the environmental conditions of the site as described in the previous sections. The methods used in this assessment followed a risk-based approach with the potential environmental risk assessed qualitatively using the 'source-pathway-receptor' contaminant linkages concept introduced in the guidance document (principally the Environment Agencies LCRM Guidance) on the practical implementation of the Environmental Protection Act 1990. The definitions for the qualitative risk assessment have been taken from "Guidance for the Safe Development of Housing on Land Affected by Contamination" Annex 4 R&D Publication 66: 2008 Volume 2 (NHBC/EA/CIEH, 2008) presented in **Appendix C.**

7.1.1.2 Environmental risk can be defined as the combination of the consequence of a harmful effect and the probability of its occurrence. The existence of a contaminant linkage is primarily dependant on site usage and environmental conditions.

7.1.1.3 The environmental risk assessment has been carried out identifying and evaluating the significance of the following:

- Potential Sources of Contamination: these include any actual pollution incidents, releases to the environment or historical activities of concern, located either on or in the vicinity of the MHPGC Project PEIR Red Line Boundary: Onshore;
- Potential Pathways: these are the routes or mechanisms by which Contaminants of Concern (CoC) may migrate from the source to the receptor;
- Potential Receptors: these include current or future land users, activities or persons within the MHPGC Project PEIR Red Line Boundary: Onshore that could be harmed by CoC.

7.1.1.4 The risk assessment considers potential risks to receptors in the context of the future use of the MHPGC Project PEIR Red Line Boundary: Onshore following construction of the MHPGC Project. The MHPGC Project will involve some change of land use for the new LSS, TJBs, and also joint boxes, link boxes, and monitoring boxes that are needed along the onshore export cable routes to enable their operation and maintenance, and also resumption of the main existing land use within the MHPGC Project PEIR Red Line Boundary: Onshore, which is agricultural, as it will be possible to resume this land use over the buried onshore export cables once constructed.

7.2 Exclusions From the Risk Assessment

7.2.1.1 The assessment has not considered risks to trespassers as during its construction or operational phase, during operation the LSS for the MHPGC Project will include a high security fence and security monitoring which would prevent access, during construction there will be security fencing and suitable measures to prevent unauthorised entry to construction sites, as defined in the Construction Design and Management Regulations 2015.

7.2.1.2 The assessment does not consider risks to receptors during construction as these would fall under other legislation which could include (but would not be limited to) the Control of Pollution Act 1974, the Environmental Protection Act 1990, the Health and Safety at Work Act (1974) and regulations made under the act, the Construction Design and Management Regulations 2015), the Environmental Permitting (England and Wales) Regulations 2016, and The Control of Asbestos Regulations 2012.

7.3 Potential Sources of Contamination

7.3.1.1 **Table 7.1** below and **Figure 1.11** in **Appendix A** provides a summary of the potential sources of contamination that may be present at the Project, as well as the likely distribution of such sources. Note: On-site sources are those within the MHPGC Project PEIR Red Line Boundary: Onshore. Off-site sources are those outside the MHPGC Project PEIR Red Line Boundary: Onshore but within the 500m Land Contamination Study Area of the PEIR Chapter.

Table 7.1: Potential sources of contamination

Source ID	Potential Source	Potential Contaminants of Concern	Location	Source to be considered further?
S1	Potential infilling Historical quarries, pits and ground workings	Asbestos, heavy metals, inorganics, PAH, total petroleum hydrocarbons (TPH), Benzene Toluene Ethylbenzene Xylene (BTEX), VOCs. Ground gases (methane and CO2).	On-site**: (S1.01 – S1.13* & S1.14, 1.21) infilling associated with construction of A19 (S1.14) and infilling of railway cuttings (S1.15-S1.20). Off-site: S1.13* *Note S1.13 is predominantly off site but does encroach on the western extent of the Red Line Boundary.	Yes – Numerous quarries, pits and railway cuttings were historically present across the MHPGC Project PEIR Red Line Boundary: Onshore. The historical maps and LiDAR data indicate that all areas have been infilled. Sources S1.04-S1.08 and S1.10 appear to have been infilled prior to the 1900s and sources S1.01-S1.03 and S1.11 infilled prior to the 1970s. Degradation of any putrescible material and organic contaminants is likely to have occurred over this time, reducing the potential for gas generation. These sources have therefore not been considered further with respect to ground gas due to low potential for gas generation.
S2	Railway land Embankments and cuttings	Asbestos, heavy metals, inorganics, PAH, TPH, BTEX, VOCs, poly-chlorinated bi-phenyls (PCBs).	On-site: Historical railway (S2.01) associated with the former Hawthorn Mine located within the west of the MHPGC Project PEIR Red Line Boundary: Onshore within the Green LSS Option Area. Former railway, Blastfurnace Branch (S2.02) located in the east of the MHPGC Project PEIR Red Line Boundary: Onshore approximately 200m from the eastern MHPGC Project PEIR Red Line Boundary: Onshore Former Long Run Railway Line (S2.03) located within the western in the west of the MHPGC	Yes – Potential for contamination associated with the historical railway. Current operational railway (S2.04) not considered further[2]. Infilled railway cuttings assessed under potential infilling (S1.15-S1.20).

[2] A current railway line cannot be disturbed by development and as such has limited potential for mobilisation and migration of contamination. Moreover, they cannot be investigated and as such remediated.

Source ID	Potential Source	Potential Contaminants of Concern	Location	Source to be considered further?
			Project PEIR Red Line Boundary: Onshore approximately 430m from the Blue LSS Option Area Current operational railway (S2.04) located adjacent to Blastfurnace Branch (S2.02). Off-site: None Note: linear features such as railways extend off site beyond the MHPGC Project PEIR Red Line Boundary: Onshore but are not considered as significant off-site sources.	
S3	Refuse/spoil heap All refuse/spoil heaps appear to be associated with former quarries, mines and collieries and is therefore likely to comprise spoil from quarry activity rather than refuse material.	Asbestos, heavy metals, inorganics, PAH, TPH, BTEX, VOCs, ground gases (methane and CO2).	On-site: Source S3.01, approximately 220m east of the Green LSS Option Area. Source S3.03 located in the southeast of the MHPGC Project PEIR Red Line Boundary: Onshore. Off-site: Source S3.02, approximately 120m north of the Blue LSS Option Area. S3.03 extends off-site across the Red Line Boundary.	Yes –Unclear from available information if material remains in-situ. Potential for contaminants to be present in this and the wider area if material used for historical infilling.

Source ID	Potential Source	Potential Contaminants of Concern	Location	Source to be considered further?
S4	Scrap Yard	Asbestos, heavy metals, inorganics, PAH, TPH, BTEX, VOCs, PCBs, dioxins and furans.	On-site S4.01, located approximately 220m south of the Green LSS Option Area. Off-site: None	Yes – the source is located centrally west and may be encountered during construction.
S5	Tanks Sources associated with the former Hawthorn mine.	Heavy metals, inorganics, phenol, cyanide, PAH, TPH, BTEX, VOCs, SVOCs ammonium sulphate and ammonium cyanides. vapours.	On-site: S5.01-S5.21located within and immediately to the north of the Green LSS Option Area. Tanks removed by 1993 based on historical mapping. Off-site: None	Yes – Potential for contaminants to be present in the vicinity of the historical tanks.
S6	Sludge Beds	Heavy metals, inorganics, phenol, cyanide, PAH, TPH, BTEX, VOCs, SVOCs ammonium sulphate and ammonium cyanides. vapours.	On-site: Located approximately 50m to the north (S6.01) and 60m to the west (S6.02) of the Green LSS Option Area. Off-site: None	Yes – Historical use of the sludge beds unknown. Potential for wide range of contaminants to be present.
S7	Electrical substations (including transformer buildings)	Transformer oils, PCBs	On-site Located approximately 60m to the north (S7.01) and approximately 220m to the northwest (S7.02-S7-04) of the Green LSS Option Area. Off-site None	Yes – Potential for historical use of PCBs within substations.

Source ID	Potential Source	Potential Contaminants of Concern	Location	Source to be considered further?
S8	Mine Workings - Hawthorn Combined Mine S8.02 - South Hetton Colliery Mine	Asbestos, heavy metals, inorganics, PAH, TPH, BTEX. Mine gas	On-site The former Hawthorn Combined Mine (S8.01) was located with the Green LSS Option Area. South Hetton Colliery (S8.02*) located approximately 450m west of the Green LSS Option Area. Off-site *S8.02 is predominantly off site but does encroach on the western extent of the Red Line Boundary.	Yes – Hawthorn Combined Mine and associated buildings are no longer present, and the area is now grassland but potential for residual contamination to remain. South Hetton Colliery has been redeveloped and has therefore been assessed under source S1 – Potential infilling
S9	Quarry's	Asbestos, heavy metals, inorganics, PAH, TPH, BTEX, VOCs, PCBs.	On-site: Hawthorne Quarry and (S9.01*) Dawdon Quarry (S9.02*) in the east of the MHPGC Project PEIR Red Line Boundary: Onshore. Off-site: S9.01 is predominantly off-site but the proposed access route which forms part of the MHPGC Project PEIR Red Line Boundary: Onshore crosses the quarry. S9.02 is predominantly off-site but encroaches onto the far north-eastern Red Line Boundary at landfall.	No – From the available information Hawthorne Quarry does not appear to have been infilled. Refuse/spoil heap associated with the quarry is assessed under source S3.03 Dawdon Quarry has been redeveloped and has therefore been assessed under source S1.12 – Potential infilling
S10	Historical Landfill S10.01-S10.03	Ground gases (methane and CO2).	On-site: None	Yes – Nature of any infill material unknown. Potential for migration onto the MHPGC Project PEIR Red Line Boundary: Onshore.

Source ID	Potential Source	Potential Contaminants of Concern	Location	Source to be considered further?
			Off-site: Located between 160m and 250m from the MHPGC Project PEIR Red Line Boundary: Onshore and between 480m and 600m from the Green LSS Option Area.	
S11	Coking works S11.01	Asbestos, heavy metals, inorganics, phenol, cyanides, PAH, TPH, BTEX, VOCs, SVOCs ammonium sulphate and ammonium cyanide. vapours.	On-site: in the west, in and immediately to the north of, the Green LSS Option Area. Off-site: None	Yes – Remedial works have previously been undertaken in this area, ground investigation in 2018 reported localised exceedances of contaminants including heavy metals and PAHs.
** Within the MHPGC Project PEIR Red Line Boundary: Onshore.				

7.4 Potential Pathways

7.4.1.1 In the context of the MHPGC Project within the Project boundary the potential exposure or migration pathways associated with the identified potential sources have been identified as follows:

- Pathways to Human Health receptors:
  - Direct contact, ingestion or inhalation of contaminated soils and soil dust and vapours;
  - Migration of gas and vapours and accumulation in buildings and structures (explosive/ asphyxiation risk);
- Pathways to Controlled Water receptors:
  - Leaching / migration of contaminants through the unsaturated zone and subsequent impact on groundwater within the underlying aquifers;
  - Lateral migration of contaminants within groundwater and impact on groundwater within the underlying aquifers;
  - Lateral migration of contaminants within groundwater and subsequent impact on surface water receptors;
  - Migration of contaminants through drainage networks (e.g. breaks in culverts) and subsequent impact on surface water receptors;
- Pathways applicable to site infrastructure:
  - Accumulation of hazardous ground gases within enclosed spaces/structures associated the future development (explosive risk).
- Pathways applicable to Ecological Receptors
  - Ingestion and uptake by flora and fauna

7.5 Potential Receptors

7.5.1.1 In the context of the Project, the following potential receptors were identified:

- Human Health
  - Future site users;
  - Off-site neighbouring residential and commercial occupants.
- Controlled Waters
  - Superficial Aquifers (Secondary Undifferentiated and localised Secondary A);
  - Bedrock Aquifers (Principal Aquifer);
  - Potable and groundwater abstractions;
  - The Dalton Beck.
- Services and Building Fabric
  - Future development;
  - Future underground services.
- Ecological Receptors
  - SSSI, SAC, LNR, Ancient Woodland and LWS (based on the locations of these receptors, SPRLs have only been identified for sources S1, S2, S3 and S4 and therefore assessment of risks from other sources is not required).

7.6 Preliminary Risk Assessment

7.6.1.1 A preliminary risk assessment has been undertaken for these potential source-pathway-receptor linkages to identify potentially unacceptable risks on a qualitative basis. This approach is based on Department for the Environment Food and Rural Affairs (DEFRA) Statutory Guidance on Contaminated Land ("Circular 01/2012, Contaminated Land.," April 2012.), Construction Industry

Research and Information Association (CIRIA) guidance on risk assessment (CIRIA C552, 2001) and the Environment Agency Guidance on Land contamination risk management (LCRM 2025). The risk is therefore based on a consideration of both:

- the likelihood of an event (probability – takes into account both the presence of the hazard and receptor and the integrity of the pathway); and
- the severity of the potential consequence (takes into account both the potential severity of the hazard and the sensitivity of the receptor).

7.6.1.2 Further details on the risk assessment methodology is presented within **Appendix C** and the risk assessment is provided as **Table 7.2.** The land use for which the assessment has been undertaken for is development for industrial use as a substation with associated below ground cable routing.

Table 7.2: Preliminary Risk Assessment

SPRL	Potential Sources and contaminants	Pathway	Receptor	Probability	Severity	Preliminary risk rating	Comments
SPRL1	Potential infilling - S1.01-S1.21 Refuse/spoil heaps S3.01-S3.03 Contaminants of concern Heavy metals, inorganics, PAH, TPH, BTEX, VOCs	Direct contact, ingestion or inhalation of contaminated soils and soil dust and vapours.	Future site user	Low Likelihood	Medium	Moderate/Low	Potential sources of contamination associated with historical infilling and refuse heaps have been identified within the MHPGC Project PEIR Red Line Boundary: Onshore. These are located within and adjacent to the Green LSS Option Area and adjacent to the Blue LSS Option Area. Future site workers are expected to undertake routine inspection and general maintenance activities only; therefore, direct contact with potentially impacted soils is anticipated to be infrequent, localised and of short duration. Where present, hardstanding would prevent direct contact with soils however potential for contact in areas of landscaping.
SPRL2		Off-site neighbouring residential and commercial occupants.	Residential and commercial occupants.	Low Likelihood	Medium	Moderate/Low	Dust generated from areas of bare ground has the potential to migrate beyond the MHPGC Project PEIR Red Line Boundary: Onshore and may contain contaminants associated with the former use of the MHPGC

SPRL	Potential Sources and contaminants	Pathway	Receptor	Probability	Severity	Preliminary risk rating	Comments
							Project PEIR Red Line Boundary: Onshore. However, dust generation is anticipated to be limited and localised.
SPRL3	Potential infilling - S1.01-S1.21 Refuse/spoil heaps S3.01-S3.03 Contaminants of concern Heavy metals, inorganics, PAH, TPH, BTEX, VOCs	Leaching / migration of contaminants through the unsaturated zone and subsequent impact on groundwater within the underlying aquifers. Lateral migration of contaminants within groundwater and impact on groundwater within the underlying aquifers.	Superficial Aquifers (Secondary Undifferentiated and localised Secondary A); Bedrock Aquifers (Principal Aquifer); Potable and groundwater abstraction (SPZs).	Likely	Medium	Moderate	The MHPGC Project PEIR Red Line Boundary: Onshore is predominantly underlain by glacial till, classified as a Secondary Undifferentiated Aquifer, overlying the Roker and Ford formations of the Magnesian Limestone Group Principal Aquifer. There is one area of potentially infilled land (S1.14) located within the SPZ1 catchment in the centre of the MHPGC Project PEIR Red Line Boundary: Onshore associated with the construction of the A19 although this source is relatively small. Other areas of potential infilling and refuse/spoil heaps are present within the SPZ2 catchment. Remedial works have been undertaken in the west of the MHPGC Project PEIR Red Line Boundary: Onshore, however, subsequent ground investigation in 2018 reported localised exceedances of contaminants

SPRL	Potential Sources and contaminants	Pathway	Receptor	Probability	Severity	Preliminary risk rating	Comments
							including heavy metals and PAHs within soils no groundwater testing was undertaken. The glacial till is expected to provide a degree of protection to the underlying aquifers by restricting vertical contaminant migration; however, natural permeable horizons, alluvial deposits may facilitate contaminant transport. Consequently, there is potential for contaminants to migrate into the superficial and bedrock aquifers.
SPRL4	Potential infilling - S1.01-S1.21 Refuse/spoil heaps S3.01-S3.03 Contaminants of concern Heavy metals, inorganics, PAH, TPH, BTEX, VOCs	Lateral migration of contaminants and within groundwater and subsequent impact of surface water receptors. Migration of contaminants drainage networks (e.g. breaks in culverts) and subsequent impact on surface water receptors.	The Dalton Beck	Likely	Medium	Moderate (Sources S1.01, S1.19 and S3.01 only)	The Dalton Beck is present in the west of the MHPGC Project PEIR Red Line Boundary: Onshore and located approximately 380m south of the Green LSS Option Area. Sources S1.01, S1.19 and S3.01 are located on the route of the river. Remedial works have been undertaken in the west of the MHPGC Project PEIR Red Line Boundary: Onshore, however, subsequent ground investigation in 2018 reported localised exceedances of contaminants including heavy metals and PAHs

SPRL	Potential Sources and contaminants	Pathway	Receptor	Probability	Severity	Preliminary risk rating	Comments
							within soils, no groundwater testing was undertaken. Whilst the predominance of low permeability glacial till across much of the MHPGC Project PEIR Red Line Boundary: Onshore may reduce contaminant migration, there is the potential for migration of any contaminants present associated with these sources to impact the river.
SPRL5		Ingestion and uptake by flora and fauna	Ecological receptors SSSI, LNR, and LWS	Unlikely	Medium	Low	Potential sources of contamination associated with historical infilling and refuse heaps have been identified within the MHPGC Project PEIR Red Line Boundary: Onshore. Which could migrate to groundwater and to sensitive ecological site where suitable pathways are present. Glacial Till would inhibit migration. Degradation of hydrocarbons is likely. The ecological receptors located near these sources are considered unlikely to be significantly affected.
SPRL6	Potential infilling - S1.09, S1.12-S1.21	Inhalation and ingestion of particles and fibres.	Future site users	Low Likelihood	Medium	Moderate/Low	Potential for asbestos to be present within soils. Potential sources of contamination associated with historical

SPRL	Potential Sources and contaminants	Pathway	Receptor	Probability	Severity	Preliminary risk rating	Comments
	Refuse/spoil heaps S3.01-S3.03 Contaminants of concern Asbestos						infilling and refuse heaps have been identified within the MHPGC Project PEIR Red Line Boundary: Onshore boundary. These are located within and adjacent to the Green LSS Option Area and adjacent to the Blue LSS Option Area. Some removal of asbestos impacted soils was reportedly undertaken as part of the remedial works in the west of the MHPGC Project PEIR Red Line Boundary: Onshore, but no verification testing is available so potential for asbestos remain. Asbestos was not encountered during the 2018 investigation around the Jade Business Park; however, this analysis did not include the northern remediation zone. Future site workers are expected to undertake routine inspection and general maintenance activities only; therefore, direct contact with potentially impacted soils is anticipated to be infrequent, localised and of short duration. Where present, hardstanding would prevent direct contact with

SPRL	Potential Sources and contaminants	Pathway	Receptor	Probability	Severity	Preliminary risk rating	Comments
							soils however there would be the potential for contact in areas of landscaping.
SPRL7			Off-site neighbouring residential and commercial occupants.	Low Likelihood	Medium	Moderate/Low	Dust generated from areas of bare ground has the potential to migrate beyond the MHPGC Project PEIR Red Line Boundary: Onshore and may contain contaminants associated with the former use of the MHPGC Project PEIR Red Line Boundary: Onshore. However, dust generation is anticipated to be limited and localised.
SPRL8	Potential infilling - S1.09, S1.12-S1.21 Refuse/spoil heaps S3.01- S3.03 Contaminants of concern Soil gas (methane, carbon dioxide)	Migration of gas and vapours and accumulation in buildings and structures (explosive/ asphyxiation risk)	Future site users	Low Likelihood	Severe	Moderate	Potential sources of contamination associated with historical infilling and refuse heaps have been identified within the MHPGC Project PEIR Red Line Boundary: Onshore. These are located within and adjacent to the Green LSS Option Area and adjacent to the Blue LSS Option Area. The historical mapping indicated infilling of these areas to have occurred between 1973 and 2001 so degradation of any putrescible material and organic contaminants is likely to have occurred over this time reducing
SPRL9			Future development	Low Likelihood	Severe	Moderate	

SPRL	Potential Sources and contaminants	Pathway	Receptor	Probability	Severity	Preliminary risk rating	Comments
							the potential for gas generation and migration of contaminants Gas monitoring in 2018 in the west of the MHPGC Project PEIR Red Line Boundary: Onshore classified the area of investigation as CS2 and monitoring in 2025 classified the area to the west of the Green LSS Option Area as CS3 requiring gas protection measures within buildings.
SPRL10	Railway land S2.01 - S2.03 Contaminants of concern Heavy metals, inorganics, PAH, TPH, BTEX, VOCs, pesticides and herbicides, PCBs.	Direct contact, ingestion or inhalation of contaminated soils and soil dust and vapours.	Future site workers	Low Likelihood	Medium	Moderate/Low	Historical railway land has been identified within the MHPGC Project PEIR Red Line Boundary: Onshore and is located within and adjacent to the Green LSS Option Area. Remedial works have been undertaken in the west of the MHPGC Project PEIR Red Line Boundary: Onshore, however ground investigation in 2018 reported localised exceedances of contaminants including heavy metals and PAHs within soils in this area. Future site workers are expected to undertake routine inspection and general maintenance activities only; therefore, direct

SPRL	Potential Sources and contaminants	Pathway	Receptor	Probability	Severity	Preliminary risk rating	Comments
							contact with potentially impacted soils is anticipated to be infrequent, localised and of short duration. Where present, hardstanding would prevent direct contact with soils however potential for contact in areas of landscaping.
SPRL 11			Off-site neighbouring residential and commercial occupants.	Low Likelihood	Medium	Moderate/Low	Dust generated from areas of bare ground has the potential to migrate beyond the MHPGC Project PEIR Red Line Boundary: Onshore and may contain contaminants associated with the former use of the MHPGC Project PEIR Red Line Boundary: Onshore. However, dust generation is anticipated to be limited and localised.
SPRL 12		Leaching / migration of contaminants through the unsaturated zone and subsequent impact on groundwater within the underlying aquifers. Lateral migration of contaminants within groundwater and impact on groundwater	Superficial Aquifers (Secondary Undifferentiated and localised Secondary A); Bedrock Aquifers (Principal Aquifer); Potable and groundwater	Low Likelihood	Medium	Moderate/Low	Historical railway land associated with contaminants including metals, hydrocarbons and PAHs which could migrate to groundwater where suitable pathways are present. Remedial works have been undertaken in the west of the MHPGC Project PEIR Red Line Boundary: Onshore however ground investigation in 2018 reported localised exceedances

SPRL	Potential Sources and contaminants	Pathway	Receptor	Probability	Severity	Preliminary risk rating	Comments
		within the underlying aquifers.	abstraction (SPZs).				of contaminants including heavy metals and PAHs within soils, no groundwater testing was undertaken. The MHPGC Project PEIR Red Line Boundary: Onshore is predominantly underlain by glacial till, classified as a Secondary Undifferentiated Aquifer, overlying the Roker and Ford formations of the Magnesian Limestone Group Principal Aquifer. Historical railway land is located within SPZ2 and SPZ3 areas. Given the proximity of these sources to sensitive groundwater receptors, contaminant migration via permeable horizons or preferential pathways cannot be discounted. However, the predominance of glacial till is anticipated to provide a degree of protection to groundwater resources. Infiltration would have occurred across the MHPGC Project PEIR Red Line Boundary: Onshore for some time so contaminants likely to have migrated away from the source area.

SPRL	Potential Sources and contaminants	Pathway	Receptor	Probability	Severity	Preliminary risk rating	Comments
SPRL13		Lateral migration of contaminants and within groundwater and subsequent impact of surface water receptors. Migration of contaminants in drainage networks (e.g. breaks in culverts) and subsequent impact on surface water receptors.	The Dalton Beck	Low Likelihood	Medium	Moderate/Low	The Dalton Beck is present in the west of the MHPGC Project PEIR Red Line Boundary: Onshore and located approximately 380m south of the Green LSS Option Area. Source S2.03 is located on the route of the river. Remedial works have been undertaken in the west of the MHPGC Project PEIR Red Line Boundary: Onshore however ground investigation in 2018 reported localised exceedances of contaminants including heavy metals and PAHs within soils, no groundwater testing was undertaken. Whilst the predominance of low permeability glacial till across much of the MHPGC Project PEIR Red Line Boundary: Onshore may reduce contaminant migration, there is the potential for migration of any contaminants present associated with this source to impact the river.
SPRL14		Ingestion and uptake by flora and fauna	Ecological receptors SSSI, LNR, and LWS	Unlikely	Medium	Low	Historical railway land associated with contaminants including metals, hydrocarbons and PAHs which could migrate to groundwater and to sensitive

SPRL	Potential Sources and contaminants	Pathway	Receptor	Probability	Severity	Preliminary risk rating	Comments
							ecological site where suitable pathways are present. Glacial Till would inhibit migration. Degradation of hydrocarbons is likely. The ecological receptors located near these sources are considered unlikely to be significantly affected.
SPRL15	Railway land S2.01 - S2.02 Contaminants of concern Asbestos	Ingestion and inhalation of soils and soil dusts/particles	Future site workers	Low Likelihood	Medium	Moderate/Low	Historical railway land has been identified within the MHPGC Project PEIR Red Line Boundary: Onshore and is located within and adjacent to the Green LSS Option Area. Some removal of asbestos impacted soils was reportedly undertaken as part of the remedial works in the west of the MHPGC Project PEIR Red Line Boundary: Onshore, but no verification testing is available so potential for asbestos remain. Asbestos was not encountered during the 2018 investigation around the Jade Business Park; however, this analysis did not include the northern remediation zone. Future site workers are expected to undertake routine inspection and general maintenance

SPRL	Potential Sources and contaminants	Pathway	Receptor	Probability	Severity	Preliminary risk rating	Comments
							activities only; therefore, direct contact with potentially impacted soils is anticipated to be infrequent, localised and of short duration. Where present, hardstanding would prevent direct contact with soils however potential for contact in areas of landscaping.
SPRL16			Off-site residential occupants.	Low Likelihood	Medium	Moderate/Low	Dust generated from areas of bare ground has the potential to migrate beyond the MHPGC Project PEIR Red Line Boundary: Onshore and may contain contaminants associated with the former use of the MHPGC Project PEIR Red Line Boundary: Onshore. However, dust generation is anticipated to be limited and localised.
SPRL17	Scrap Yard S4.01 Contaminants of concern Heavy metals, inorganics, PAH, TPH, BTEX, VOCs,	Direct contact, ingestion or inhalation of contaminated soils and soil dust and vapours.	Future site workers	Low likelihood	Medium	Moderate/Low	Located approximately 220m from the proposed Green LSS Option Area. Future site workers are expected to undertake routine inspection and maintenance activities only; therefore, direct contact with potentially impacted soils is anticipated to be infrequent, localised and of short duration.

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SPRL	Potential Sources and contaminants	Pathway	Receptor	Probability	Severity	Preliminary risk rating	Comments
	PCBs, dioxins and furans						Future site workers are expected to undertake routine inspection and general maintenance activities only; therefore, direct contact with potentially impacted soils is anticipated to be infrequent, localised and of short duration. Where present, hardstanding would prevent direct contact with soils however potential for contact in areas of landscaping.
SPRL18			Off-site neighbouring residential and commercial occupants.	Low Likelihood	Medium	Moderate/Low	Dust generated from areas of bare ground has the potential to migrate beyond the MHPGC Project PEIR Red Line Boundary: Onshore and may contain contaminants associated with the former use of the MHPGC Project PEIR Red Line Boundary: Onshore. However, dust generation is anticipated to be limited and localised.
SPRL19		Leaching/migration of contaminants through the unsaturated zone and subsequent impact on groundwater within the underlying aquifers.	Superficial Aquifers (Secondary Undifferentiated and localised Secondary A); Bedrock Aquifers	Low Likelihood	Medium	Moderate/Low	The scrap yard is located within SPZ3 and approximately 4.7 km from the nearest SPZ1. The source is underlain by predominantly low permeability glacial till, although localised alluvial deposits associated with nearby watercourses may

SPRL	Potential Sources and contaminants	Pathway	Receptor	Probability	Severity	Preliminary risk rating	Comments
		Lateral migration of contaminants within groundwater and impact on groundwater within the underlying aquifers.	(Principal Aquifer); Potable and groundwater abstraction and SPZ.				provide preferential groundwater pathways. Therefore, there is potential for contaminant migration to controlled waters, albeit with some attenuation provided by the surrounding glacial till.
SPRL20		Lateral migration of contaminants and within groundwater and subsequent impact of surface water receptors. Migration of contaminants in drainage networks (e.g. breaks in culverts) and subsequent impact on surface water receptors	The Dalton Beck	Low Likelihood	Medium	Moderate/Low	Dalton Beck runs approximately 90m to the south of source S4.01. Whilst the predominance of low permeability glacial till across much of the MHPGC Project PEIR Red Line Boundary: Onshore may reduce contaminant migration, there is the potential for migration of any contaminants present associated with this source to impact the river.
SPRL21		Ingestion and uptake by flora and fauna	Ecological receptors SSSI, SAC, LNR, Ancient Woodland and LWS	Unlikely	Medium	Low	Former scrap yard located adjacent to LWS (Coop House Wood). The adjacent LWS is considered unlikely to be significantly affected. Glacial Till would inhibit migration.
SPRL22	Scrap Yard S4.01 Contaminants of concern	Ingestion and inhalation of soils and soil dusts/particles	Future site workers	Low Likelihood	Medium	Moderate/Low	Future site workers are expected to undertake routine inspection and general maintenance activities only; therefore, direct

SPRL	Potential Sources and contaminants	Pathway	Receptor	Probability	Severity	Preliminary risk rating	Comments
	Asbestos						contact with potentially impacted soils is anticipated to be infrequent, localised and of short duration.. Where present, hardstanding would prevent direct contact with soils however potential for contact in areas of landscaping.
SPRL23			Off-site residential occupants.	Low Likelihood	Medium	Moderate/Low	Dust generated from areas of bare ground has the potential to migrate beyond the MHPGC Project PEIR Red Line Boundary: Onshore and may contain contaminants associated with the former use of the MHPGC Project PEIR Red Line Boundary: Onshore. However, dust generation is anticipated to be limited and localised.
SPRL24	Historical tanks S5.01-S5.21 Contaminants of concern Heavy metals, inorganics, phenol, cyanide, PAH, TPH, BTEX, VOCs, SVOCs	Direct contact, ingestion or inhalation of contaminated soils and soil dust and vapours.	Future site workers	Low likelihood	Medium	Moderate/Low	Historical tanks associated with the former mine and coking works are shown to have been present within and immediately to the north of the Green LSS Option Area. The tanks identified from the historical maps are all assumed to be above ground tanks (AST). The presence of any underground storage tanks within the MHPGC Project PEIR

SPRL	Potential Sources and contaminants	Pathway	Receptor	Probability	Severity	Preliminary risk rating	Comments
	ammonium sulphate and ammonium cyanide. vapours.						Red Line Boundary: Onshore is unknown however, due to extensive remedial works within this area they are unlikely to remain. Ground investigation in 2018 reported localised exceedances of contaminants including heavy metals and PAHs within soils in this area. Future site workers are expected to undertake routine inspection and general maintenance activities only; therefore, direct contact with potentially impacted soils is anticipated to be infrequent, localised and of short duration. Potential for vapour migration and accumulation in buildings if VOCs present within the soils/shallow groundwater. Where present, hardstanding would prevent direct contact with soils however potential for contact in areas of landscaping.
SPRL25			Off-site neighbouring residential and commercial occupants.	Low Likelihood	Medium	Moderate/Low	Dust generated from areas of bare ground has the potential to migrate beyond the MHPGC Project PEIR Red Line Boundary: Onshore and may contain contaminants associated with

SPRL	Potential Sources and contaminants	Pathway	Receptor	Probability	Severity	Preliminary risk rating	Comments
							the former use of the MHPGC Project PEIR Red Line Boundary: Onshore. However, dust generation is anticipated to be limited and localised.
SPRL26		Leaching/migration of contaminants through the unsaturated zone and subsequent impact on groundwater within the underlying aquifers. Lateral migration of contaminants within groundwater and impact on groundwater within the underlying aquifers.	Superficial Aquifers (Secondary Undifferentiated and localised Secondary A); Bedrock Aquifers (Principal Aquifer); Potable and groundwater abstractions (SPZs).	Likely	Medium	Moderate	The MHPGC Project PEIR Red Line Boundary: Onshore is predominantly underlain by glacial till, classified as a Secondary Undifferentiated Aquifer, overlying the Roker and Ford formations of the Magnesian Limestone Group Principal Aquifer. Remedial works have been undertaken in the west of the MHPGC Project PEIR Red Line Boundary: Onshore, however, subsequent ground investigation in 2018 reported localised exceedances of contaminants including heavy metals and PAHs within soils, no groundwater testing was undertaken. The historical tanks associated with the former mine and coking works were mostly located with SPZ2 with a small number within SPZ3. Based on the historical mapping, removal of the tanks was undertaken around 30 years

SPRL	Potential Sources and contaminants	Pathway	Receptor	Probability	Severity	Preliminary risk rating	Comments
							ago and remedial works have been undertaken within this area. The ground investigation in 2018 reported localised exceedances of contaminants including heavy metals and PAHs within soils, no groundwater testing was undertaken. The glacial till is expected to provide a degree of protection to the underlying aquifers by restricting vertical contaminant migration; however, natural permeable horizons, alluvial deposits may facilitate contaminant transport. Consequently, there is potential for contaminants to migrate into the superficial and bedrock aquifers.
SPRL27		Lateral migration of contaminants and within groundwater and subsequent impact of surface water receptors. Migration of contaminants in drainage networks (e.g. breaks in culverts) and subsequent	The Dalton Beck	Low Likelihood	Medium	Moderate/ Low	The historical tanks associated with the former mine and coking works are located approximately 600-800m from the Dalton Beck. Removal of the tanks was undertaken around 30 years ago and remedial works have been undertaken in the west of the MHPGC Project PEIR Red Line Boundary: Onshore. The ground investigation in 2018 reported

SPRL	Potential Sources and contaminants	Pathway	Receptor	Probability	Severity	Preliminary risk rating	Comments
		impact on surface water receptors					localised exceedances of contaminants including heavy metals and PAHs within soils, no groundwater testing was undertaken. There is the potential for migration of contaminants from these sources to the river however the predominance of low permeability glacial till across much of the MHPGC Project PEIR Red Line Boundary: Onshore will limit migration. Degradation of the source is likely.
SPRL28	Electrical substations (including transformer buildings) S7.01-S7.04 Contaminants of concern Transformer oils, PCBs	Direct contact, ingestion or inhalation of contaminated soils and soil dust and vapours.	Future site workers	Unlikely	Medium	Low	Substations are located in the west of the MHPGC Project PEIR Red Line Boundary: Onshore approximately 80m to the north of the Green LSS Option Area. There has been little change in the layout of the substations since they were initially constructed in the 1970s. Future site workers are expected to undertake routine inspection and general maintenance activities only; therefore, direct contact with potentially impacted soils is anticipated to be infrequent, localised and of short duration.

SPRL	Potential Sources and contaminants	Pathway	Receptor	Probability	Severity	Preliminary risk rating	Comments
							Where present, hardstanding would prevent direct contact with soils however potential for contact in areas of landscaping.
SPRL29			Off-site neighbouring residential and commercial occupants.	Unlikely	Medium	Low	Dust generated from areas of bare ground has the potential to migrate beyond the MHPGC Project PEIR Red Line Boundary: Onshore and may contain contaminants associated with the former use of the MHPGC Project PEIR Red Line Boundary: Onshore. However, dust generation is anticipated to be limited and localised.
SPRL30		Leaching / migration of contaminants through the unsaturated zone and subsequent impact on groundwater within the underlying aquifers. Lateral migration of contaminants within groundwater and impact on groundwater within the underlying aquifers.	Superficial Aquifers (Secondary Undifferentiated and localised Secondary A); Bedrock Aquifers (Principal Aquifer); Potable and groundwater abstractions.	Unlikely	Medium	Low	PCBs are of low mobility and are expected to strongly adsorb to soils therefore any impacts are likely to be localised to this area. Superficial deposits comprise glacial till and glaciofluvial deposits. Whilst the till is expected to limit contaminant migration, glaciofluvial deposits may provide localised groundwater pathways. The substations are located within a SPZ3, approximately 100 m from a SPZ2 and at least 1.8 km from a SPZ1 and groundwater abstraction.

SPRL	Potential Sources and contaminants	Pathway	Receptor	Probability	Severity	Preliminary risk rating	Comments
SPRL31		Lateral migration of contaminants and within groundwater and subsequent impact of surface water receptors. Migration of contaminants in drainage networks (e.g. breaks in culverts) and subsequent impact on surface water receptors.	The Dalton Beck	Unlikely	Medium	Low	Sources (S7.01-S7.04) are located approximately 300m from the Dalton Beck. PCBs are of low mobility and are expected to strongly adsorb to soils therefore any impacts are likely to be localised to this area. In addition, the predominance of low permeability glacial till across much of the MHPGC Project PEIR Red Line Boundary: Onshore will limit migration. Degradation of the source is likely.
SPRL32	Sludge beds S6.01-S6.02 Mine Workings S8.01 Coking works S11.01 Contaminants of concern Heavy metals, inorganics, phenol, cyanide, PAH, TPH, BTEX, VOCs, SVOCs ammonium	Direct contact, ingestion or inhalation of contaminated soils and soil dust and vapours.	Future site users	Low Likelihood	Medium	Moderate/Low	Potential sources of contamination associated with historical use of the west of the MHPGC Project PEIR Red Line Boundary: Onshore, including as a mine and coking works, within and surrounding the Green LSS Option Area. Some remedial works have been undertaken in the west of the MHPGC Project PEIR Red Line Boundary: Onshore however ground investigation in 2018 reported localised exceedances of contaminants including heavy metals and PAHs within soils in this area.

SPRL	Potential Sources and contaminants	Pathway	Receptor	Probability	Severity	Preliminary risk rating	Comments
	sulphate and ammonium cyanide. vapours.						Future site workers are expected to undertake routine inspection and general maintenance activities only; therefore, direct contact with potentially impacted soils is anticipated to be infrequent, localised and of short duration. Where present, hardstanding would prevent direct contact with soils however potential for contact in areas of landscaping.
SPRL33			Off-site neighbouring residential and commercial occupants.	Low Likelihood	Medium	Moderate/Low	Dust generated from areas of bare ground has the potential to migrate beyond the MHPGC Project PEIR Red Line Boundary: Onshore and may contain contaminants associated with the former use of the MHPGC Project PEIR Red Line Boundary: Onshore. However, dust generation is anticipated to be limited and localised.
SPRL34		Leaching/migration of contaminants through the unsaturated zone and subsequent impact on groundwater within the underlying aquifers.	Superficial Aquifers (Secondary Undifferentiated and localised Secondary A); Bedrock Aquifers	Low Likelihood	Medium	Moderate/Low	The MHPGC Project PEIR Red Line Boundary: Onshore is predominantly underlain by glacial till, classified as a Secondary Undifferentiated Aquifer, overlying the Roker and Ford formations of the

SPRL	Potential Sources and contaminants	Pathway	Receptor	Probability	Severity	Preliminary risk rating	Comments
		Lateral migration of contaminants within groundwater and impact on groundwater within the underlying aquifers.	(Principal Aquifer); Potable and groundwater abstractions (SPZs).				Magnesian Limestone Group Principal Aquifer. Remedial works have been undertaken in the west of the MHPGC Project PEIR Red Line Boundary: Onshore however ground investigation in 2018 reported localised exceedances of contaminants including heavy metals and PAHs within soils, no groundwater testing was undertaken. The former mine, coking works and associated infrastructure are located within a SPZ2 and SPZ3 and located approximately 1km from a SPZ1. The glacial till is expected to provide a degree of protection to the underlying aquifers by restricting vertical contaminant migration; however, natural permeable horizons, alluvial deposits may facilitate contaminant transport. Consequently, there is potential for contaminants to migrate into the superficial and bedrock aquifers.
SPRL35		Lateral migration of contaminants and within groundwater	The Dalton Beck	Low Likelihood	Medium	Moderate/Low	Dalton Beck is present immediately to the south of the former mine and coking works on

SPRL	Potential Sources and contaminants	Pathway	Receptor	Probability	Severity	Preliminary risk rating	Comments
		and subsequent impact of surface water receptors. Migration of contaminants in drainage networks (e.g. breaks in culverts) and subsequent impact on surface water receptors					the western boundary of the MHPGC Project PEIR Red Line Boundary: Onshore. Some remedial works have been undertaken in the west of the MHPGC Project PEIR Red Line Boundary: Onshore, however, subsequent ground investigation in 2018 reported localised exceedances of contaminants including heavy metals and PAHs within soils, no groundwater testing was undertaken. There is the potential for migration of contaminants from these sources to the river however the predominance of low permeability glacial till across much of the MHPGC Project PEIR Red Line Boundary: Onshore will limit migration. There remains potential for contaminants associated with the mine workings to migrate via groundwater and connected drainage features towards Dalton Beck.
SPRL36	Sludge beds S6.01-S6.02 Mine Workings	Direct contact, ingestion or inhalation of contaminated soils	Future site users	Low Likelihood	Medium	Moderate/Low	Potential for asbestos to be present within soils associated with the former mine and coking works located within and

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SPRL	Potential Sources and contaminants	Pathway	Receptor	Probability	Severity	Preliminary risk rating	Comments
	S8.01 Coking works S11.01 Contaminants of concern Asbestos	and soil dust and vapours.					surrounding the Green LSS Option Area. Some removal of asbestos impacted soils was reportedly undertaken as part of the remedial works in the west of the MHPGC Project PEIR Red Line Boundary: Onshore, but no verification testing is available so potential for asbestos remain. Asbestos was not encountered during the 2018 investigation around the Jade Business Park, however this analysis did not include the northern remediation zone. Future site workers are expected to undertake routine inspection and general maintenance activities only; therefore, direct contact with potentially impacted soils is anticipated to be infrequent, localised and of short duration. Where present, hardstanding would prevent direct contact with soils however potential for contact in areas of landscaping.
SPRL37			Off-site neighbouring residential and	Low Likelihood	Medium	Moderate/Low	Dust generated from areas of bare ground has the potential to migrate beyond the MHPGC

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SPRL	Potential Sources and contaminants	Pathway	Receptor	Probability	Severity	Preliminary risk rating	Comments
			commercial occupants.				Project PEIR Red Line Boundary: Onshore and may contain contaminants associated with the former use of the MHPGC Project PEIR Red Line Boundary: Onshore. However, dust generation is anticipated to be limited and localised.
SPRL38	Mine Workings S8.01 Contaminants of concern Mine Gas	Migration of gas and vapours and accumulation in buildings and structures (asphyxiation/explosive risk).	Future site users	Likely	Severe	High	The mine is located across the Green LSS Option Area. Preliminary screening identified a High Risk due to the presence of a mine entry within the MHPGC Project PEIR Red Line Boundary: Onshore, available information indicates the mine workings are likely to be flooded as a result of mine water rebound, which may reduce the potential for mine gas migration. Historical monitoring data also indicate low methane concentrations and stable carbon dioxide levels. Given the High risk identified by the preliminary screening a detailed mine gas assessment will be required for the MHPGC Project PEIR Red Line Boundary: Onshore.
SPRL39		Migration of gas and vapours and accumulation in buildings and structures (explosive risk).	Future development	Likely	Severe	High	

SPRL	Potential Sources and contaminants	Pathway	Receptor	Probability	Severity	Preliminary risk rating	Comments
SPRL40	Historical Landfill (offsite) S10.01-S10.03 Contaminants of concern Ground gases (methane and carbon dioxide).	Migration of gas and vapours and accumulation in buildings and structures (asphyxiation/explosive risk).	Future site users	Unlikely	Medium	Low	Landfills are located off-site. Potential for soil gas generation from waste is unknown. Landfills are thought to have been infilled over 70 years ago, so degradation of material is likely. Landfill sites are located between 160m and 250m from the MHPGC Project PEIR Red Line Boundary: Onshore boundary and between 480m and 600m from the Green LSS Option Area.

8 Preliminary Geotechnical Considerations

8.1.1.1 **This section highlights the** geotechnical considerations that pose a potential risk to the proposed development

- **Coastal erosion** – the HR Wallingford report (H R Wallingford, 2024) records coastal retreat of between 0.07 and 0.21m/yr, which may increase during and following excavations, and has the potential to affect the stability of foundations and expose proposed buried cables; The landfall will remain approximately 90m in land of predicted coastal erosion extents. Due to project design, the MHPGC Project is not considered to be at risk from the credible maximum scenario. Further assessment is detailed in **Volume 3, Chapter 2 Water Resources and Flood Risk of the PEIR.**
- **Mass movement/landslides** – areas of superficial deposits across the MHPGC Project PEIR Red Line Boundary: Onshore are identified as having a high risk of a landslide occurring. Excavations and construction have the potential to trigger a landslide, and the potential to provide unstable foundations to structures;
- **Running sands** – the areas of the MHPGC Project PEIR Red Line Boundary: Onshore with Beach deposits are identified as having a high risk of the presence of running sands and Alluvial deposits identified as having a moderate risk of the presence of running sands;
- **Shrink swell properties** – the centre and east of the MHPGC Project PEIR Red Line Boundary: Onshore are identified as having areas of moderate risk of the presence of shrink swell clays;
- **Compressible ground** – the areas of the MHPGC Project PEIR Red Line Boundary: Onshore underlain by Alluvium are identified as having a high risk of compressible ground;
- **Flood risk** – The far east of the site are areas with a medium and high probability of flooding that have an annual chance of flooding by rivers >1% and a >0.5% chance of flooding by the sea. At this location the cable to landfall will be wholly underground and not subject to or affected by coastal flooding. Surface water flood risk could increase further inland following development due to the increase of impermeable surfaces, and has the potential to affect the stability of foundations. Appropriate surface water control (e.g. SuDS) would be required;
- **Existing onshore infrastructure** – excavations for the ground investigation and construction of the new structures have the potential to undermine or disturb the foundations of existing structures within MHPGC Project PEIR Red Line Boundary: Onshore;
- **Existing utilities** – utilities strikes may occur causing services to be down, or injury or fatality.
- **UXO** – low to moderate risk from unexploded ordnance across the MHPGC Project PEIR Red Line Boundary: Onshore;
- **Made Ground** – made ground may be present in locations across the MHPGC Project PEIR Red Line Boundary: Onshore relating to previous development and historic mining;
- **Aggressive ground/groundwater conditions** – soils and rocks with high sulphate content attacks buried concrete;
- **Shallow bedrock** – may require ripping/breaking rock out for excavations increasing time and cost of construction (to be clarified by ground investigation);
- **Geological boundaries** – crossing between different bedrock or superficial strata beneath foundations, during excavations and trenchless cable sections can affect the drilling processes and foundation solutions required;
- **Bedrock dissolution** – the Ford Formation limestone has the potential to form karstic features and result in ground collapse, sinkholes and voids;
- **Mine entries** – one mine entry on-site located in the western section of the MHPGC Project PEIR Red Line Boundary: Onshore. Mine entries have the potential to collapse within a zone of influence;
- **Colliery spoil** – colliery spoil may be present in locations across the MHPGC Project PEIR Red Line Boundary: Onshore relating to historic mining;

- **Historic non-coal mining** – areas of surface mining of limestone and glacial sand and gravel occurred across the MHPGC Project PEIR Red Line Boundary: Onshore. There is no evidence suggesting these mining operations extended beneath the surface. These areas may have been backfilled with made ground or spoil.

9 Conclusions and Recommendations

9.1 Conclusions

9.1.1 Contaminated Land

9.1.1.1 Based on the preliminary conceptual site model and risk assessment, most identified pollutant linkages are assessed as Moderate/Low or Low risk.

9.1.1.2 Risks from mine gas are assessed as high to future site users and future development (i.e., buildings and other enclosed spaces) of the MHPGC Project PEIR Red Line Boundary: Onshore.

9.1.1.3 Ground gas generation associated with the presence of made ground from infilling, historical waste materials is considered to present a moderate risk to future site users, and future development of the MHPGC Project PEIR Red Line Boundary: Onshore.

9.1.1.4 The principal environmental risks relate to the potential migration of contaminants from historical contamination sources into groundwater and surface water receptors, including Secondary A/ Undifferentiated and Principal Aquifers and Dalton Beck.

9.1.1.5 A moderate risk to groundwater is identified for historical infilling sources.

9.1.1.6 A moderate risk to groundwater has also been identified from the historical tanks associated with the coking works (source S11.01).

9.1.1.7 A moderate risk has also been identified to surface waters from historical infilling and refuse/spoil heaps (sources S1.01, S1.19 and S3.01 respectively) due to being present along the route of the Dalton Beck.

9.1.2 Geotechnical

9.1.2.1 A review of the geotechnical hazards across the MHPGC Project PEIR Red Line Boundary: Onshore identified several constraints that require further investigation for the safe and economic design (detailed design) and construction of the MHPGC Project.

9.1.2.2 Notably, there is limited information on the ground and groundwater conditions across the majority of the MHPGC Project PEIR Red Line Boundary: Onshore and additional site data will be needed to confirm the ground conditions and depth to groundwater.

9.1.2.3 BGS mapping indicates the potential presence of soft alluvial/glacial deposits which are unlikely to provide a competent founding stratum for any foundations. Additionally, these superficial deposits are likely to require trench support for any excavations. The varying ground conditions may also impact the choice of underground cable, based on their thermal resistivity characteristics.

9.1.2.4 The area of the proposed works has been subjected to historic mining and legacy workings identified underlying the west and east of the MHPGC Project PEIR Red Line Boundary: Onshore that could impact the MHPGC Project.

9.1.2.5 These constraints will require further assessment as part of the detailed design process prior to construction of the MHPGC Project.

9.2 Recommendations

9.2.1.1 Ground investigations are proposed to obtain further information on the contamination status of the soils and groundwater.

9.2.1.2 Where the results of the ground investigation determine that remediation is required to ensure that the site is suitable for its proposed use, a remediation strategy would be prepared.

9.2.1.3 The strategy would comprise the following:

9.2.1.4 • implementation plan setting out the objectives and requirements of the remediation;

9.2.1.5 • validation sampling to confirm that remediation objectives have been met; and

9.2.1.6 • verification report.

9.2.1.7 The scope of the remediation strategy would be agreed with the Environment Agency/relevant local planning authority prior to its implementation.

9.2.1.8 The verification report would also be sent to the Environment Agency/relevant local planning authority for approval. Subject to the scope and results of the Remediation Strategy, the following would be undertaken where appropriate to inform construction activities and the detailed design of buildings.

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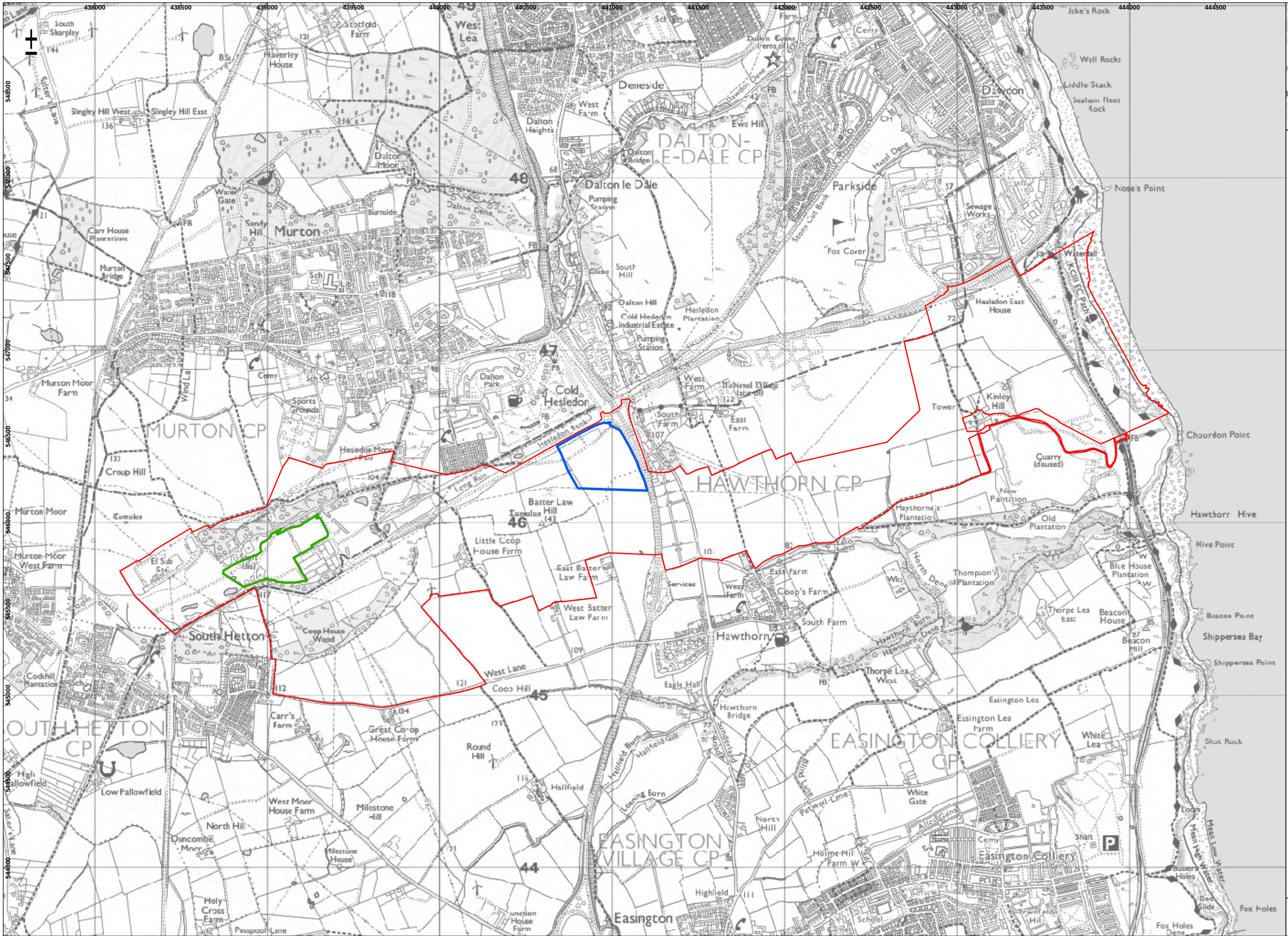
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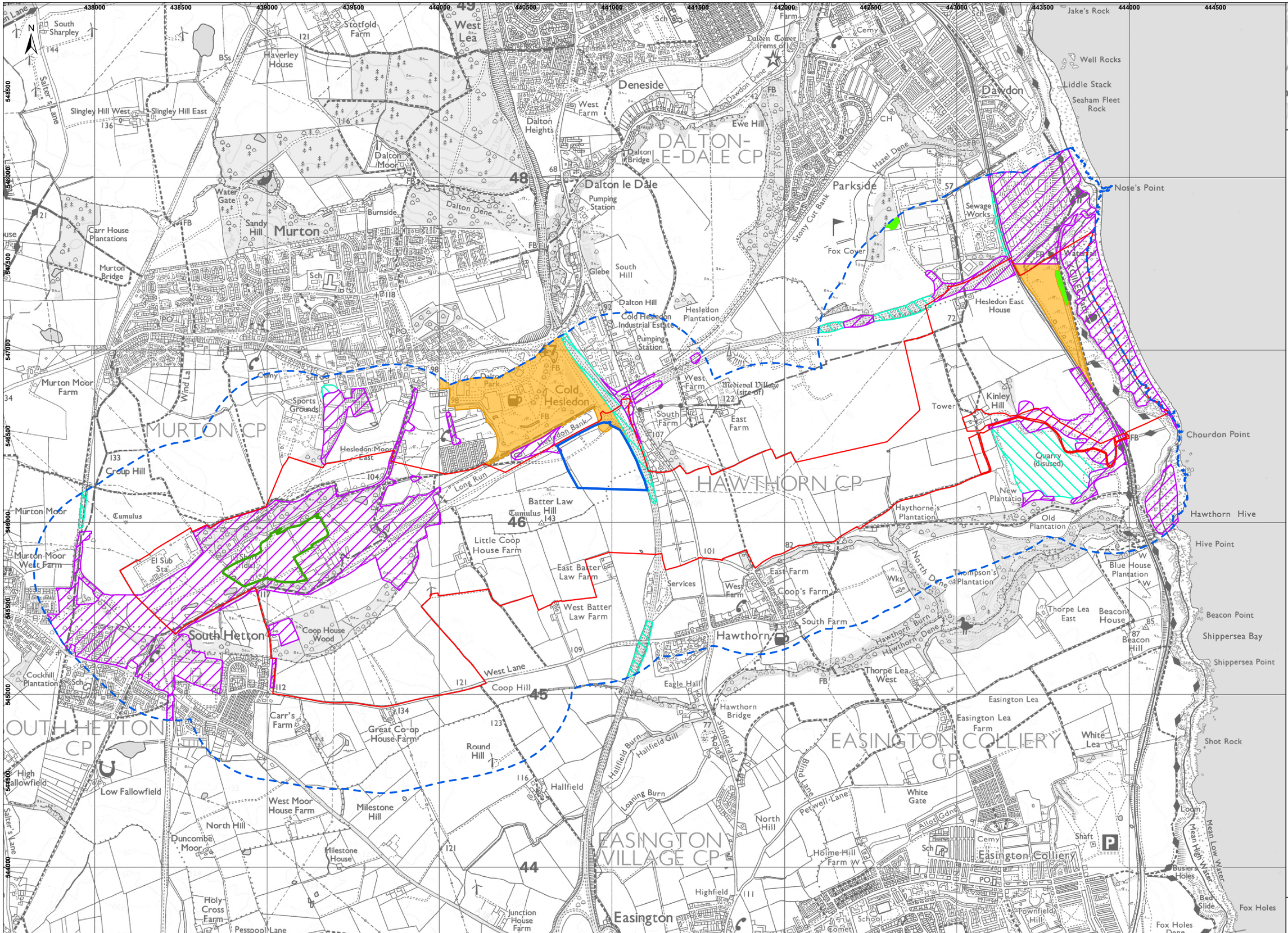
Appendix A Figures

Figure 1.1 Study Area
Figure 1.2 Anthropogenic Ground
Figure 1.3 Superficial Geology
Figure 1.4 Bedrock Geology
Figure 1.5 BGS Borehole Locations
Figure 1.6 Hydrology and Hydrogeological Features
Figure 1.7 Ecological Sensitive Areas
Figure 1.8 Mining Constraints Plan
Figure 1.9 Ground stability
Figure 1.10 Pertinent Landfill Waste Sites
Figure 1.11 Site Source Plan



Project Name: MORVEN HAWTHORN PIT GRID CONNECTION PROJECT	**Drawing Title:** FIGURE 1.1 - STUDY AREA	0 0.25 0.5 km Scale@A3: 1:20,000	**Geodetic Information:** Datum: OSGB 1936 Projection: British National Grid	**Data Sources:** BP, Ordnance Survey	**Service Layer Credits:** OS Open Greyscale: Contains OS data © Crown Copyright and database right 2019 © Crown copyright and database rights 2026 Ordnance Survey AC0000848283	**Drawing Number:** MHPGC-WSP-PRA-GRD-113

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LEGEND

- MHPGC PEIR Red Line Boundary: Onshore
- LSS Search Area (Green Option)
- LSS Search Area (Blue Option)
- 500m Buffer

Anthropogenic Ground

- Infilled Ground
- Made Ground
- Worked Ground (Undivided)
- Landscaped Ground - Artificially Modified Ground

Morven Offshore Wind Farm

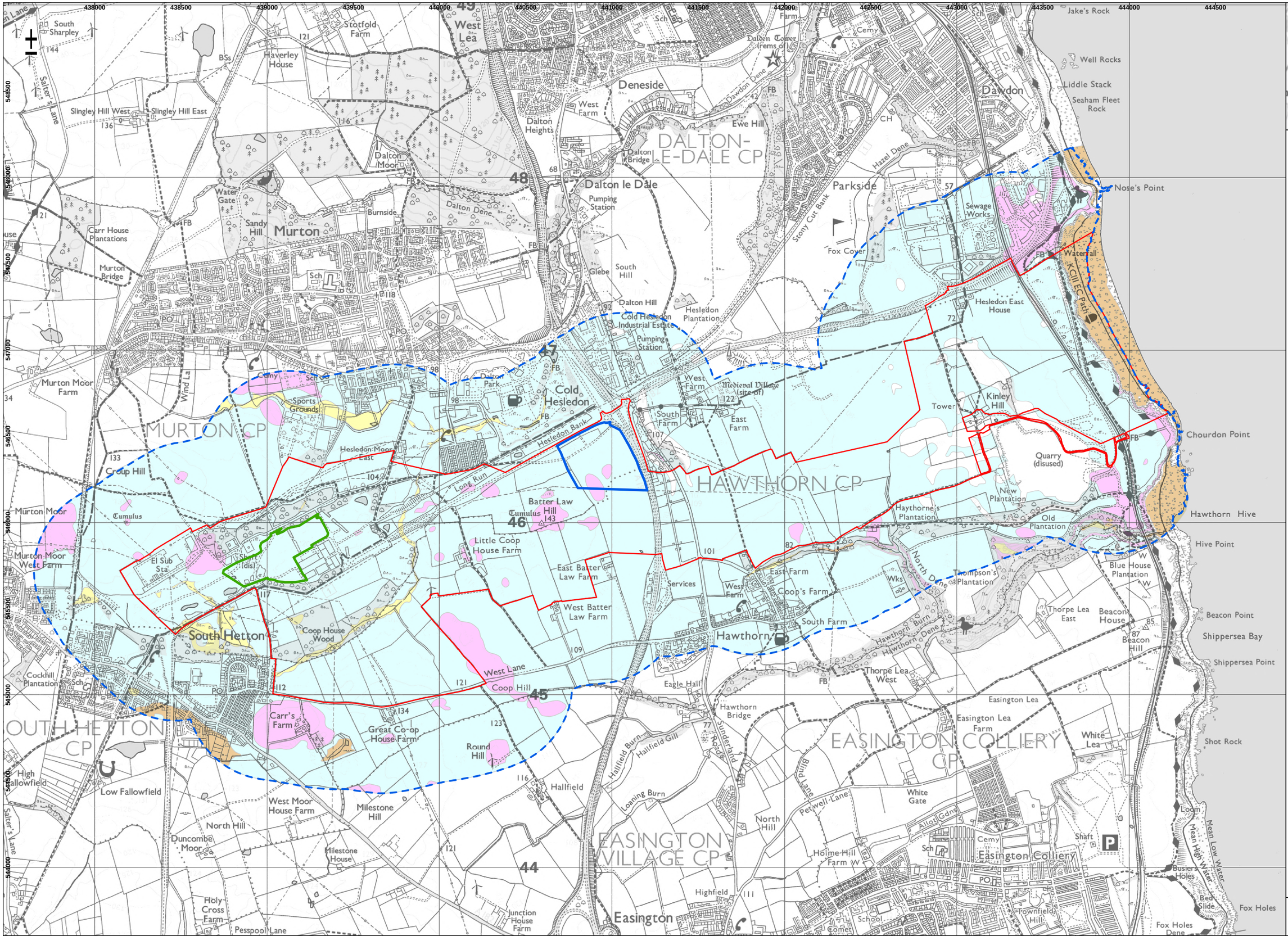
Project Name: MORVEN HAWTHORN PIT GRID CONNECTION PROJECT	**Drawing Title:** FIGURE 1.2 - ANTHROPOGENIC GROUND	0 0.25 0.5 km Scale@A3: 1:20,000	**Geodetic Information:** Datum: OSGB 1936 Projection: British National Grid	**Data Sources:** BP, Ordnance Survey

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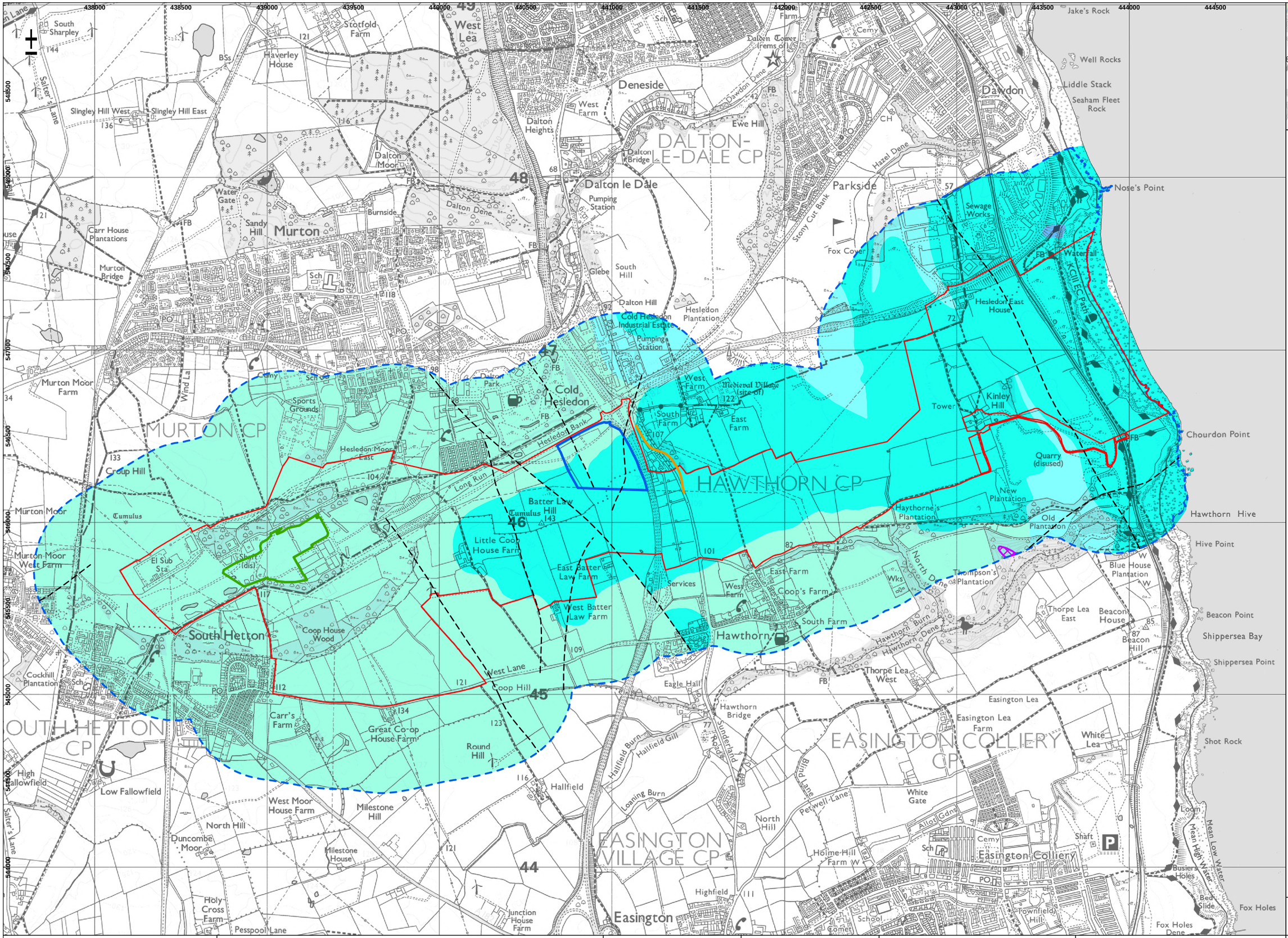


Project Name: MORVEN HAWTHORN PIT GRID CONNECTION PROJECT	**Drawing Title:** FIGURE 1.3 - SUPERFICIAL GEOLOGY	0 0.25 0.5 km Scale@A3: 1:20,000	**Geodetic Information:** Datum: OSGB 1936 Projection: British National Grid	**Data Sources:** BP, Ordnance Survey	**Service Layer Credits:** OS Open Greyscale: Contains OS data © Crown Copyright and database right 2019 © Crown copyright and database rights 2026 Ordnance Survey AC0000848283 Contains public sector information licensed under the Open government License v3.0. Derived and/or reproduced from the British Geological Survey © UKRI 2025. All rights reserved. Derived from ©Groundsure data.

Morven Offshore Wind Farm

Drawing Number:
MHPGC-WSP-PRA-GRD-115

VER	DATE	DETAILS	BY	CHECK
00	25/08/2026	Initial Issue	EH	RE
-	-	-	-	-



Project Name:
MORVEN HAWTHORN PIT GRID CONNECTION PROJECT

Drawing Title:
FIGURE 1.4 - BEDROCK GEOLOGY

0 0.25 0.5 km
Scale@A3: 1:20,000

Geodetic Information:
Datum: OSGB 1936
Projection: British National Grid

Data Sources:
BP, Ordnance Survey

Service Layer Credits:
GB Background: Contains OS data © Crown Copyright and database right 2026. Contains data from OS Zoomstack
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Morven Offshore Wind Farm

Drawing Number:
MHPGC-WSP-PRA-GRD-116

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00	25/08/2026	Initial Issue	EH	RE
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437000 438000 439000 440000 441000 442000 443000 444000 445000

549000 548000 547000 546000 545000 544000

Sheet 2

Sheet 3

Sheet 4

SEATON WITH SLINGLEY CP

MURTON CP

HAWTHORN CP

SOUTH HETTON CP

EASINGTON VILLAGE CP

EASINGTON COLLIERY CP

SEAHAM

Houghton-Le-Spring

Hetton-Le-Hole

Peterlee

LEGEND

- MHPGC PEIR Red Line Boundary: Onshore
- LSS Search Area (Green Option)
- LSS Search Area (Blue Option)
- 500m Buffer
- Sheet Extent

BGS Boreholes

- Confidential
- 0 - 10m
- 10 - 30m
- 30m+

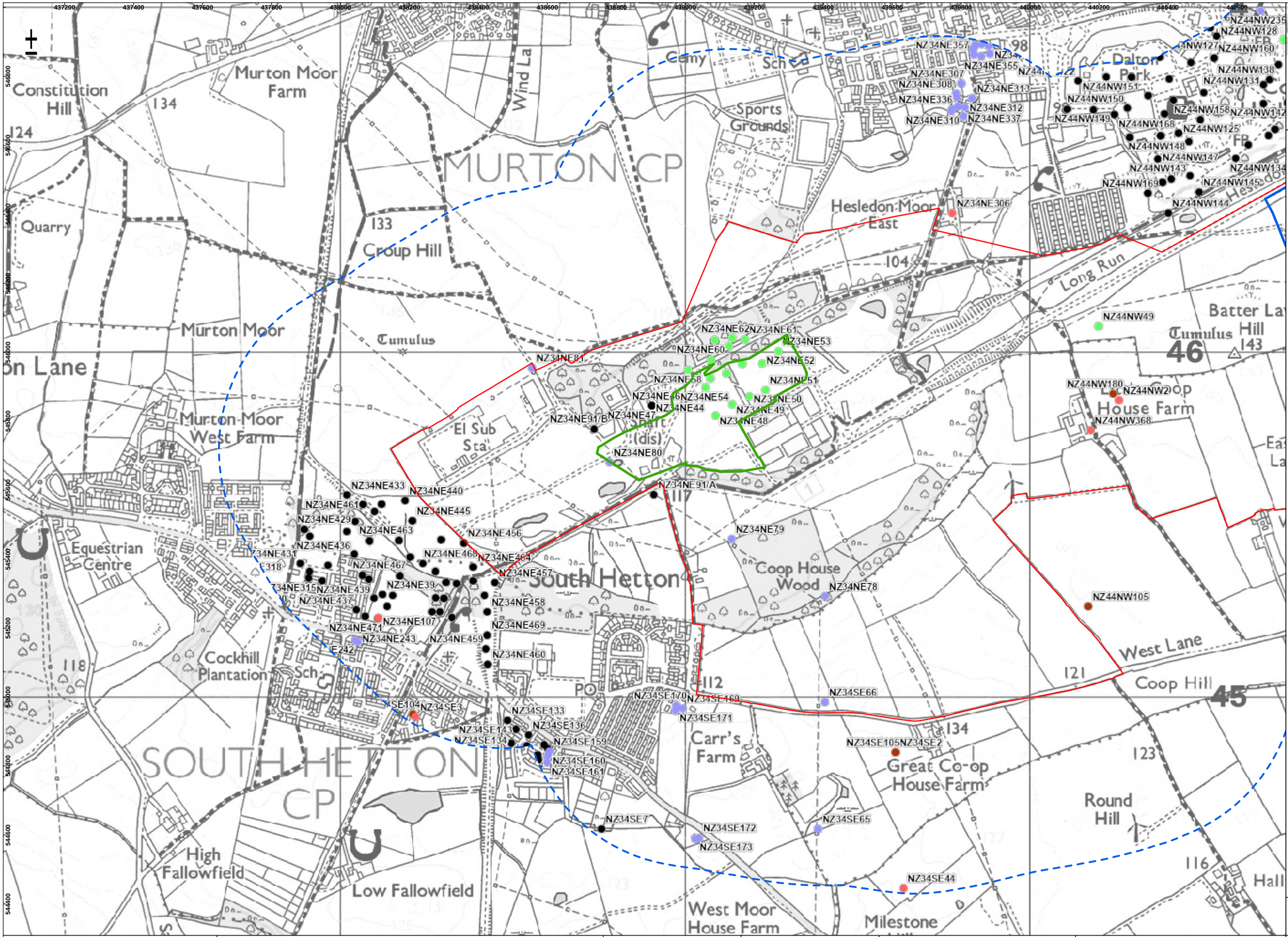
Morven Offshore Wind Farm

Project Name: MORVEN HAWTHORN PIT GRID CONNECTION PROJECT	**Drawing Title:** FIGURE 1.5 - BGS BOREHOLE LOCATIONS SHEET 1 OF 4	0 0.3 0.6 km Scale@A3: 1:25,000	**Geodetic Information:** Datum: OSGB 1936 Projection: British National Grid	**Data Sources:** BP, Ordnance Survey

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Drawing Number: MHPGC-WSP-PRA-GRD-117

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00	25/08/2026	Initial Issue	EH	RE
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LEGEND

- MHPGC PEIR Red Line Boundary: Onshore
- LSS Search Area (Green Option)
- LSS Search Area (Blue Option)
- 500m Buffer
- Sheet Extent

BGS Boreholes

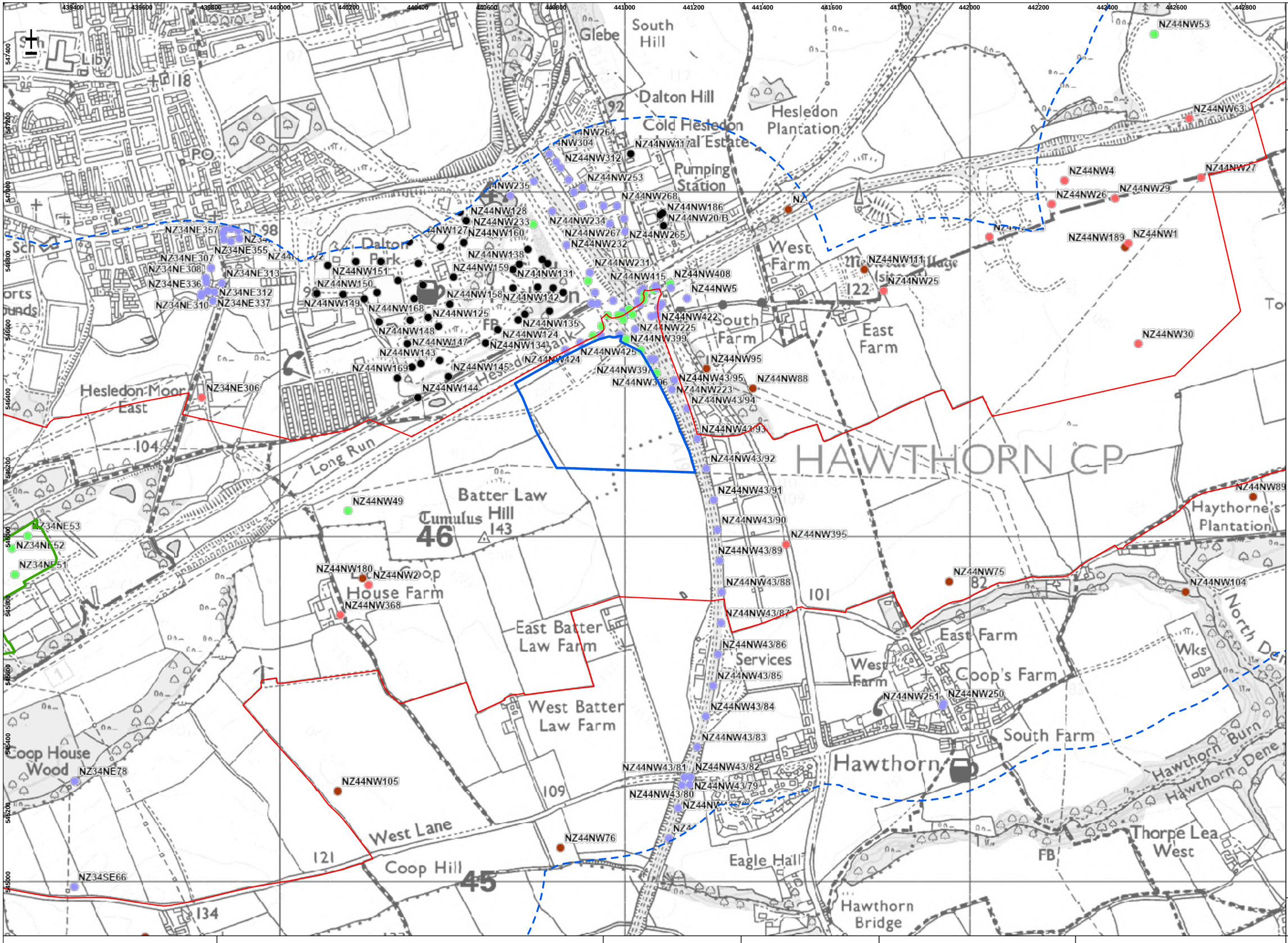
- Confidential
- 0 - 10m
- 10 - 30m
- 30m+

Morven Offshore Wind Farm

Project Name: MORVEN HAWTHORN PIT GRID CONNECTION PROJECT	**Drawing Title:** FIGURE 1.5 - BGS BOREHOLE LOCATIONS SHEET 2 OF 4	0 0.1 0.2 km Scale@A3: 1:10,000	**Geodetic Information:** Datum: OSGB 1936 Projection: British National Grid	**Data Sources:** BP, Ordnance Survey	**Service Layer Credits:** OS Open Greyscale: Contains OS data © Crown Copyright and database right 2019 British Geological Survey (BGS) GeoIndex - Boreholes data theme: © Crown copyright and database rights 2026 Ordnance Survey AC0000848283

Drawing Number: MHPGC-WSP-PRA-GRD-117

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00	25/08/2026	Initial Issue	EH	RE
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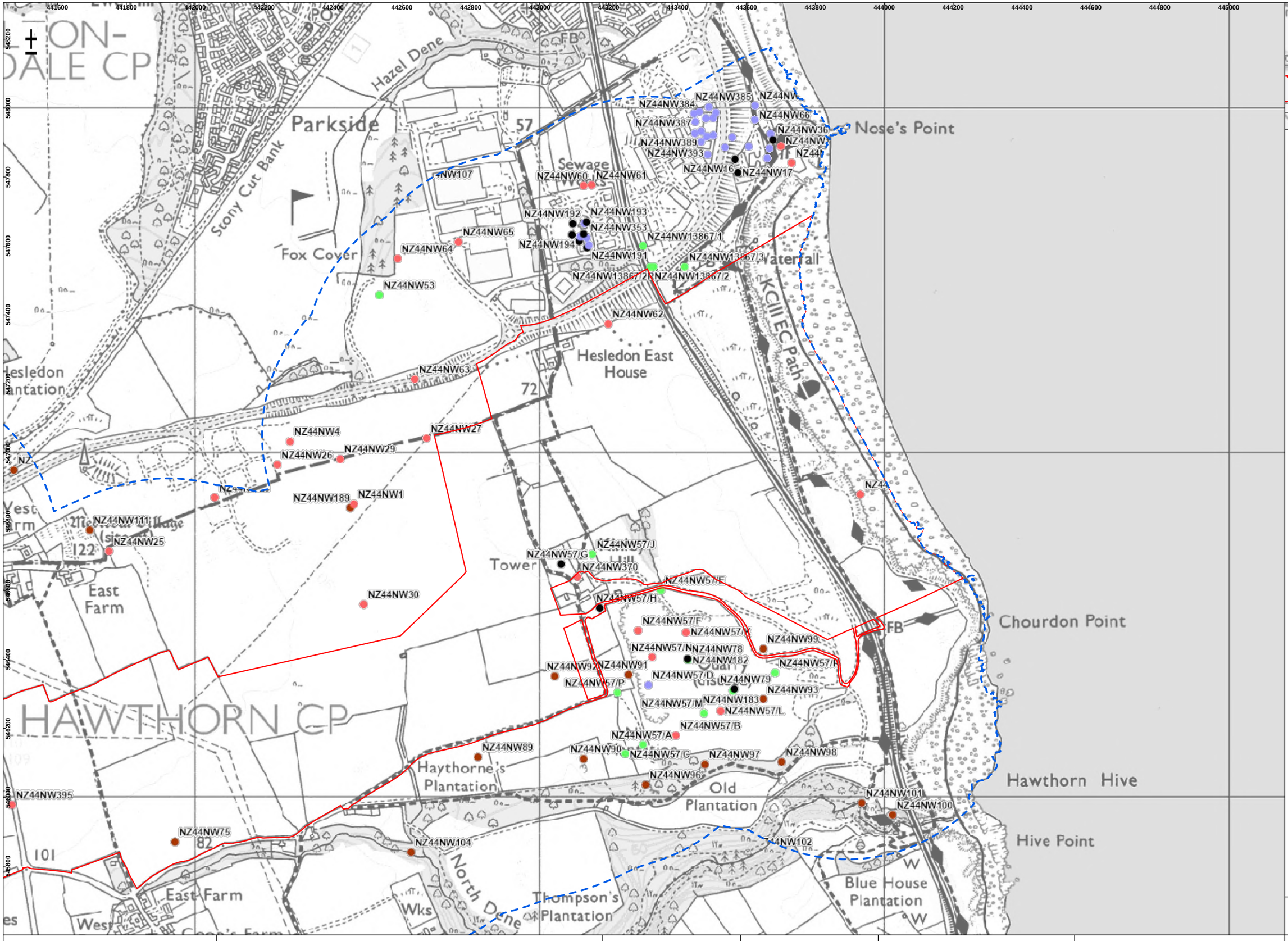


Project Name: MORVEN HAWTHORN PIT GRID CONNECTION PROJECT	**Drawing Title:** FIGURE 1.5 - BGS BOREHOLE LOCATIONS SHEET 3 OF 4	0 0.1 0.2 km Scale@A3: 1:10,000	**Geodetic Information:** Datum: OSGB 1936 Projection: British National Grid	**Data Sources:** BP, Ordnance Survey	**Service Layer Credits:** OS Open Greyscale: Contains OS data © Crown Copyright and database right 2019 British Geological Survey (BGS) GeoIndex - Boreholes data theme: © Crown copyright and database rights 2026 Ordnance Survey AC0000848283

Morven Offshore Wind Farm

Drawing Number: MHPGC-WSP-PRA-GRD-117

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00	25/08/2026	Initial Issue	EH	RE
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LEGEND

- MHPGC PEIR Red Line Boundary: Onshore
- LSS Search Area (Green Option)
- LSS Search Area (Blue Option)
- 500m Buffer
- Sheet Extent

BGS Boreholes

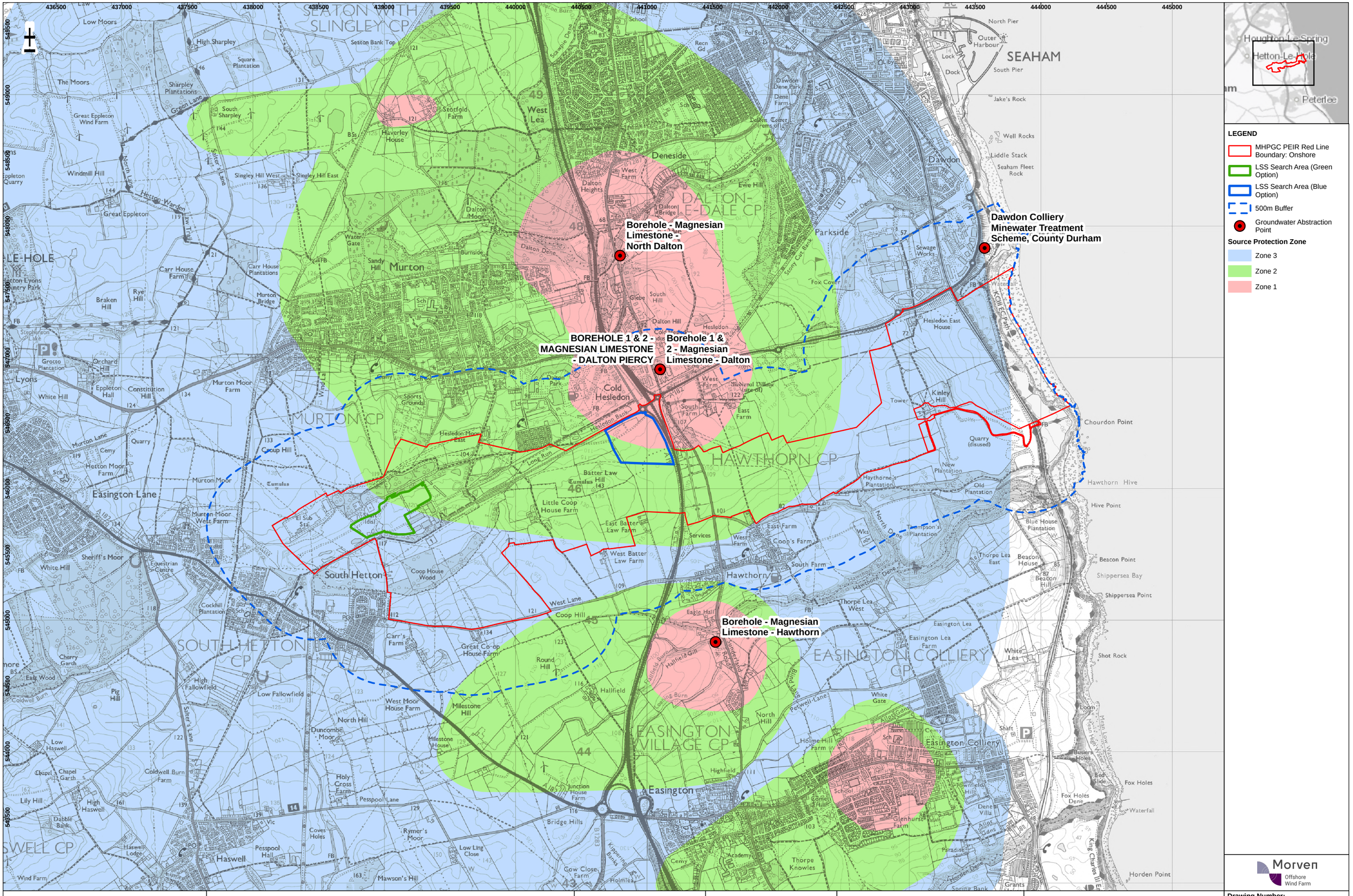
- Confidential
- 0 - 10m
- 10 - 30m
- 30m+

Morven Offshore Wind Farm

Project Name: MORVEN HAWTHORN PIT GRID CONNECTION PROJECT	**Drawing Title:** FIGURE 1.5 - BGS BOREHOLE LOCATIONS SHEET 4 OF 4	0 0.1 0.2 km Scale@A3: 1:10,000	**Geodetic Information:** Datum: OSGB 1936 Projection: British National Grid	**Data Sources:** BP, Ordnance Survey	**Service Layer Credits:** OS Open Greyscale: Contains OS data © Crown Copyright and database right 2019 British Geological Survey (BGS) GeoIndex - Boreholes data theme: © Crown copyright and database rights 2026 Ordnance Survey AC0000848283

Drawing Number: MHPGC-WSP-PRA-GRD-117

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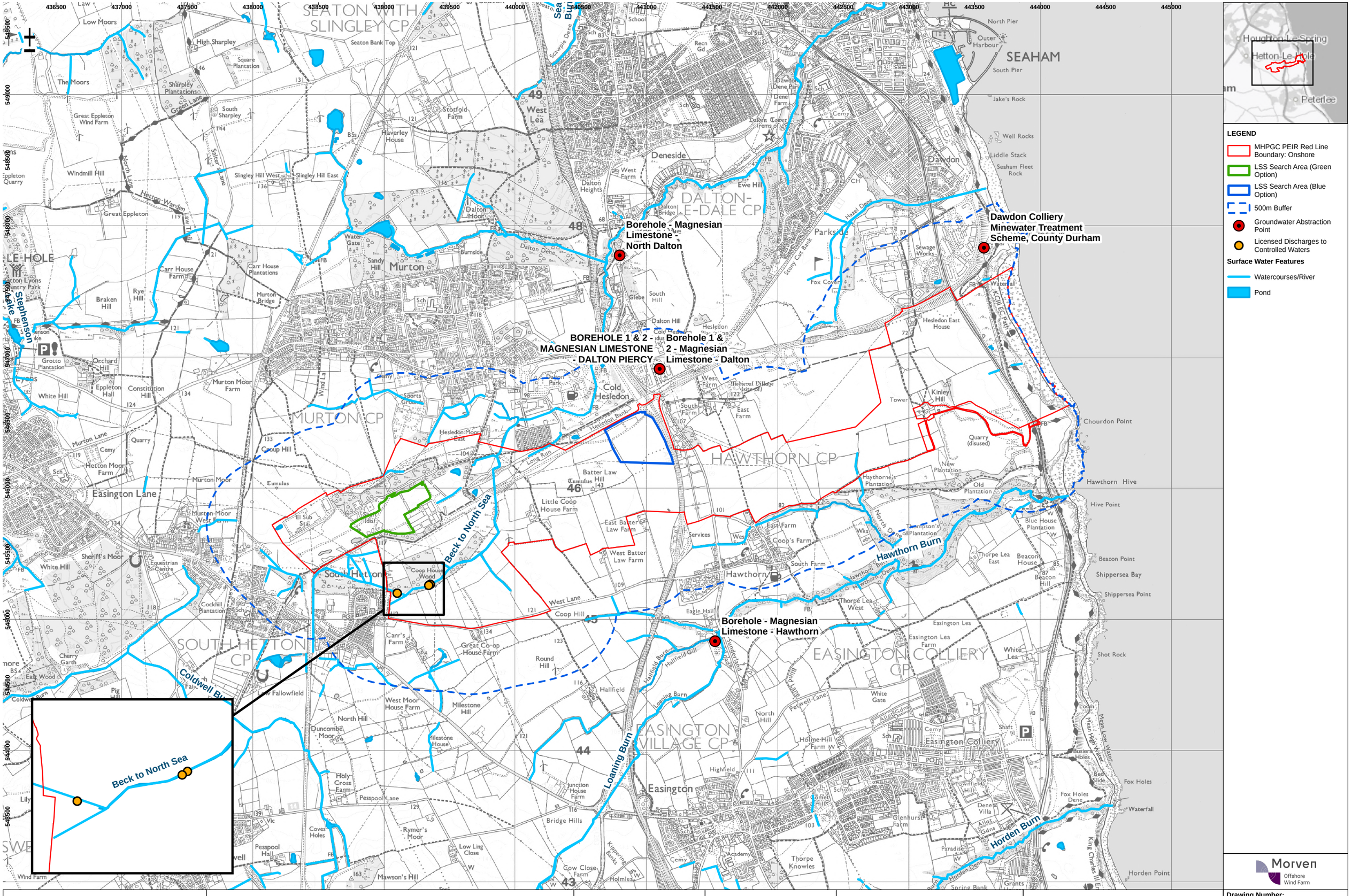


Project Name: MORVEN HAWTHORN PIT GRID CONNECTION PROJECT	**Drawing Title:** FIGURE 1.6 - HYDROLOGY AND HYDROGEOLOGICAL FEATURES SHEET 1 OF 2	0 0.3 0.6 km Scale@A3: 1:25,000	**Geodetic Information:** Datum: OSGB 1936 Projection: British National Grid	**Data Sources:** BP, Ordnance Survey	**Service Layer Credits:** OS Open Greyscale: Contains OS data © Crown Copyright and database right 2019 © Crown copyright and database rights 2026 Ordnance Survey AC0000848283 Contains public sector information licensed under the Open government License v3.0. © Environment Agency Copyright 2026. © Crown copyright and database rights 2024 Ordnance Survey 1000035207 ©Groundsure data.

Morven Offshore Wind Farm

Drawing Number: MHPGC-WSP-PRA-HYD-118

VER	DATE	DETAILS	BY	CHECK
00	25/08/2026	Initial Issue	EH	RE
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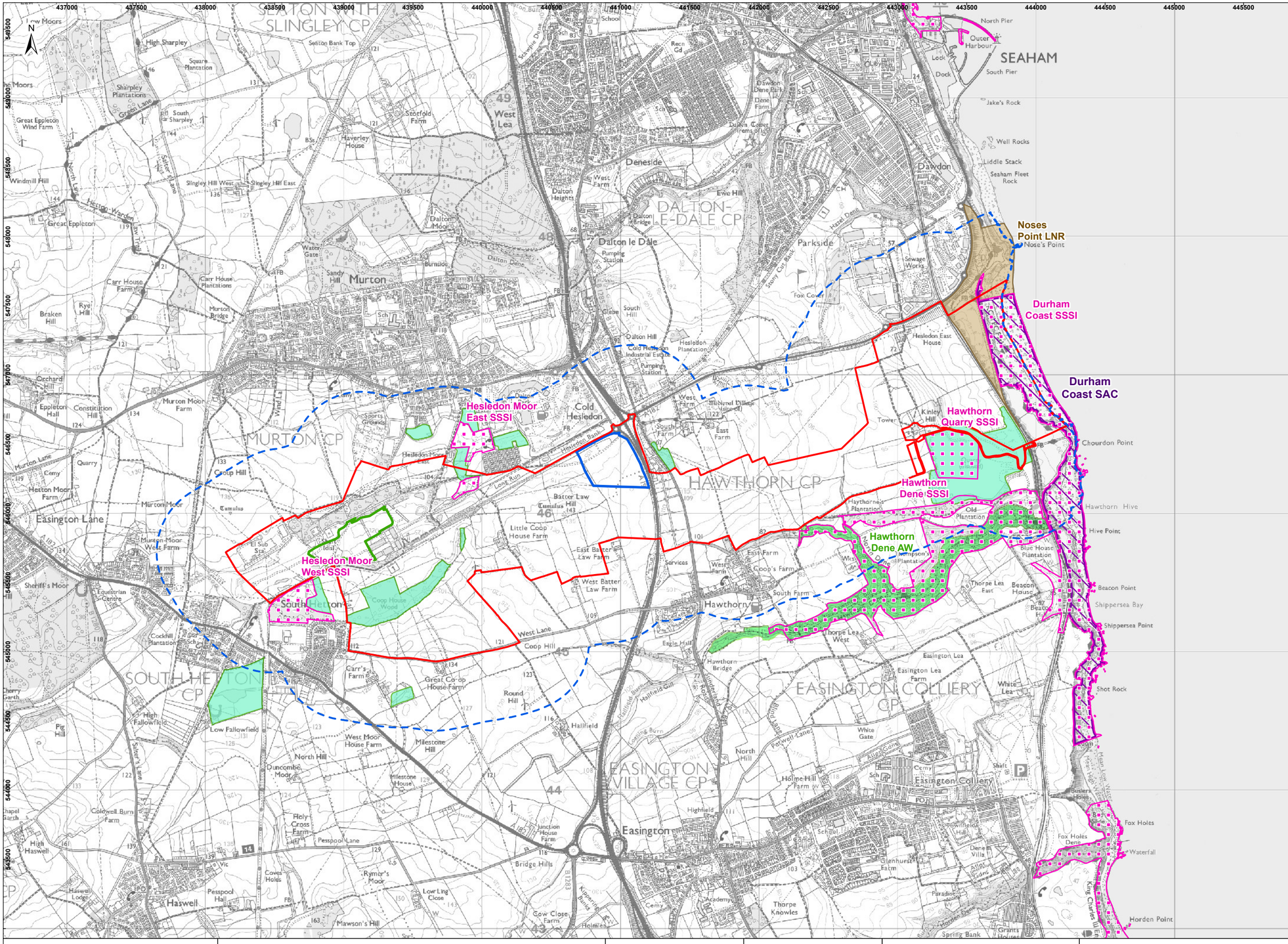


Project Name: MORVEN HAWTHORN PIT GRID CONNECTION PROJECT	**Drawing Title:** FIGURE 1.6 - HYDROLOGY AND HYDROGEOLOGICAL FEATURES SHEET 2 OF 2	0 0.3 0.6 km Scale@A3: 1:25,000	**Geodetic Information:** Datum: OSGB 1936 Projection: British National Grid	**Data Sources:** BP, Ordnance Survey	**Service Layer Credits:** OS Open Greyscale: Contains OS data © Crown Copyright and database right 2019 © Crown copyright and database rights 2026 Ordnance Survey AC0000848283 Contains public sector information licensed under the Open government License v3.0. © Environment Agency Copyright 2026. © Crown copyright and database rights 2024 Ordnance Survey 1000035207 ©Groundsure data.

Morven Offshore Wind Farm

Drawing Number: MHPGC-WSP-PRA-HYD-118

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LEGEND

- MHPGC PEIR Red Line Boundary: Onshore
- Blue LSS Option Area
- Green LSS Option Area
- 500m Buffer
- Site of Special Scientific Interest (SSSI)
- Special Area of Conservation (SAC)
- Local Nature Reserve (LNR)
- Ancient Woodland
- Local Wildlife Sites

Morven Offshore Wind Farm

Project Name:
MORVEN HAWTHORN PIT GRID CONNECTION PROJECT

Drawing Title:
FIGURE 1.7 ECOLOGICAL SENSITIVE AREAS

0 0.3 0.6 km

Scale@A3: 1:25,000

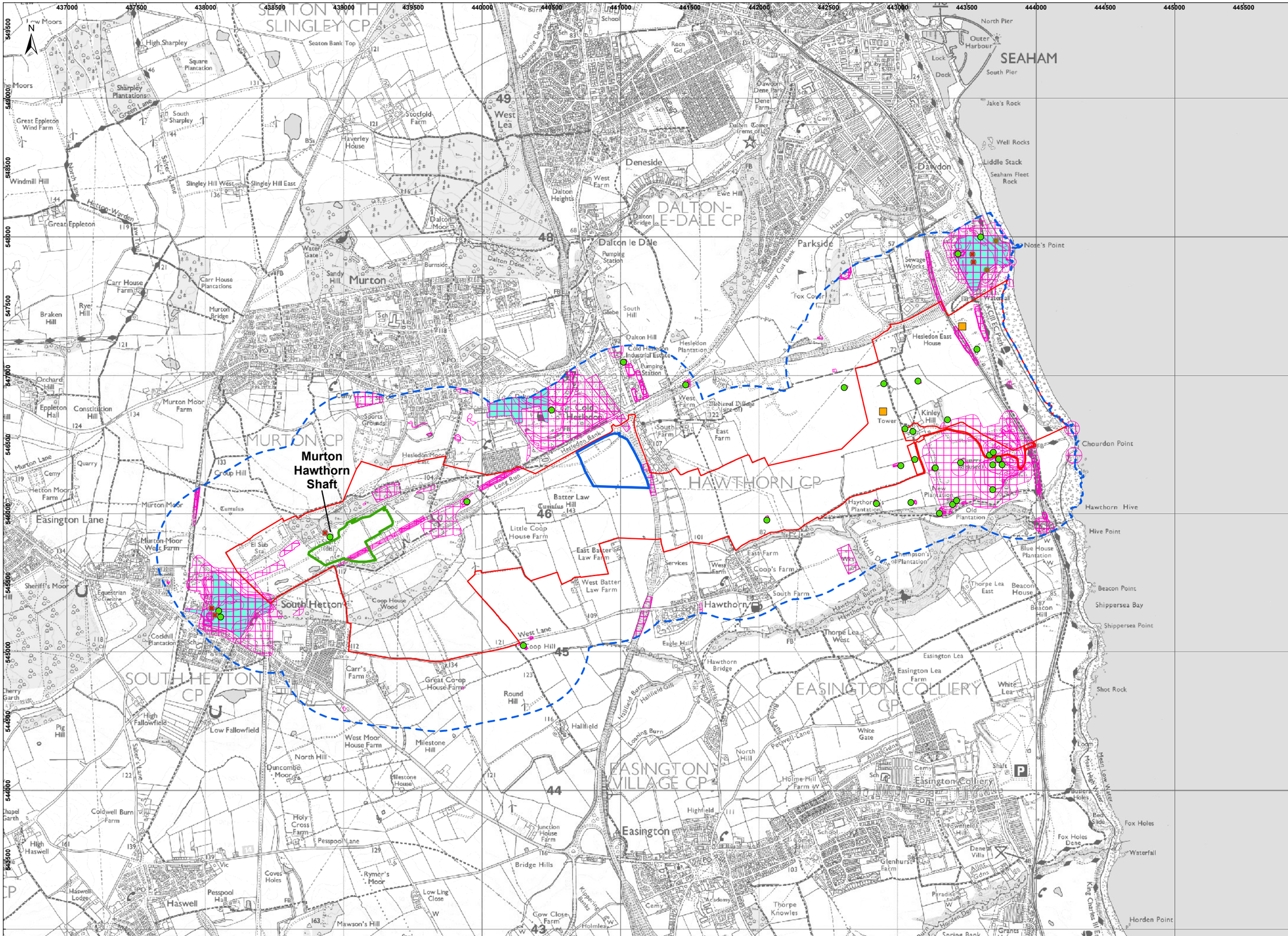
Geodetic Information:
Datum: OSGB 1936
Projection: British National Grid

Data Sources:
BP, Ordnance Survey

Service Layer Credits:
Local Wildlife Sites: Durham County Council
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Drawing Number:
MHPGC-WSP-PRA-GRD-119

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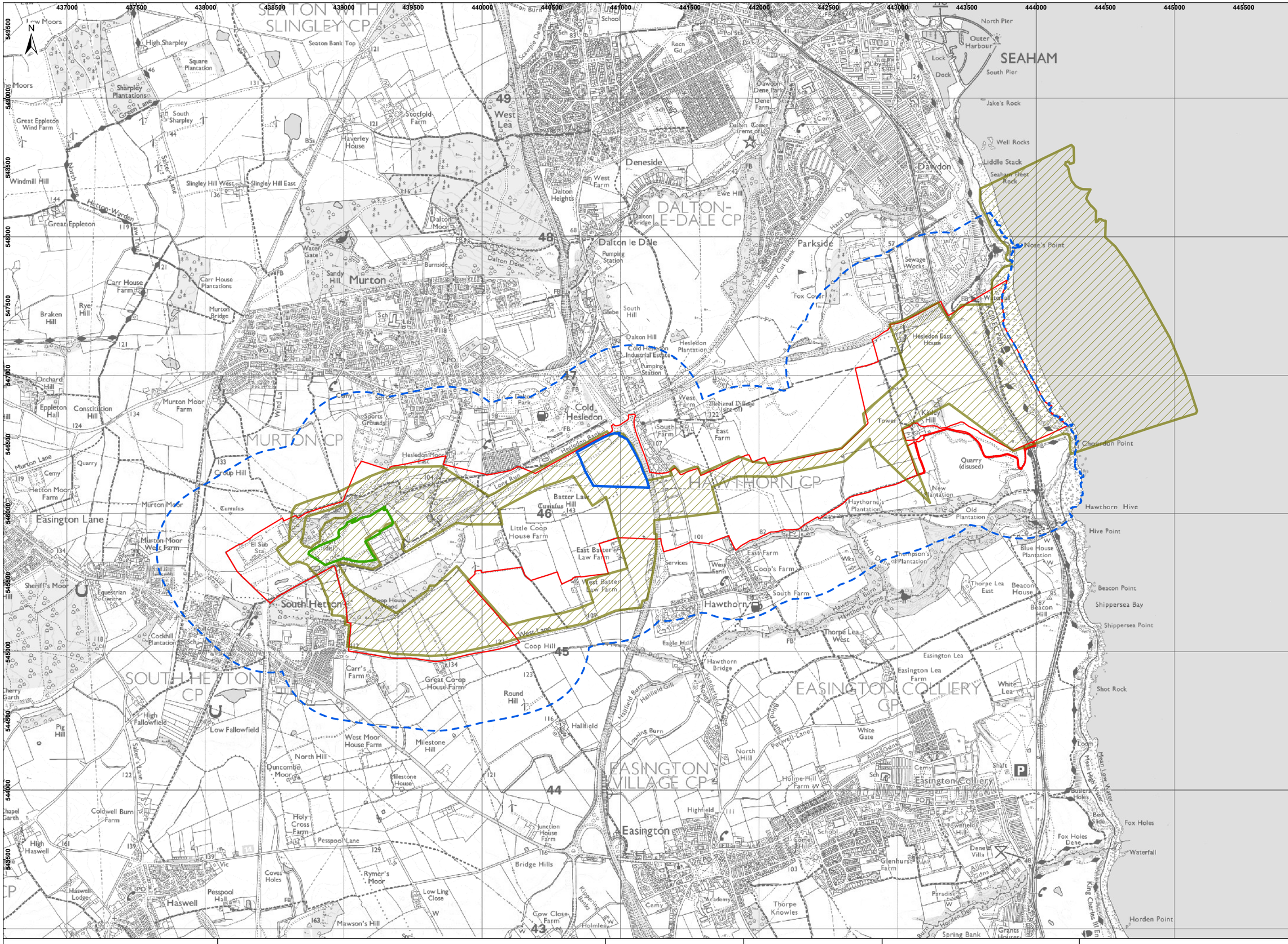


Project Name: MORVEN HAWTHORN PIT GRID CONNECTION PROJECT	**Drawing Title:** FIGURE 1.8 - MINING CONSTRAINTS PLAN SHEET 1 OF 2		**Geodetic Information:** Datum: OSGB 1936 Projection: British National Grid	**Data Sources:** BP, Ordnance Survey	**Service Layer Credits:** OS Open Greyscale: Contains OS data © Crown Copyright and database right 2019 © Crown copyright and database rights 2026 Ordnance Survey AC0000848283

Morven Offshore Wind Farm

Drawing Number: MHPGC-WSP-PRA-GRD-120

VER	DATE	DETAILS	BY	CHECK
01	28/09/2026	Initial Issue	RE	LT
-	-	-	-	-



LEGEND

- MHPGC PEIR Red Line Boundary: Onshore
- LSS Search Area (Green Option)
- LSS Search Area (Blue Option)
- 500m Buffer
- Coal mining review area

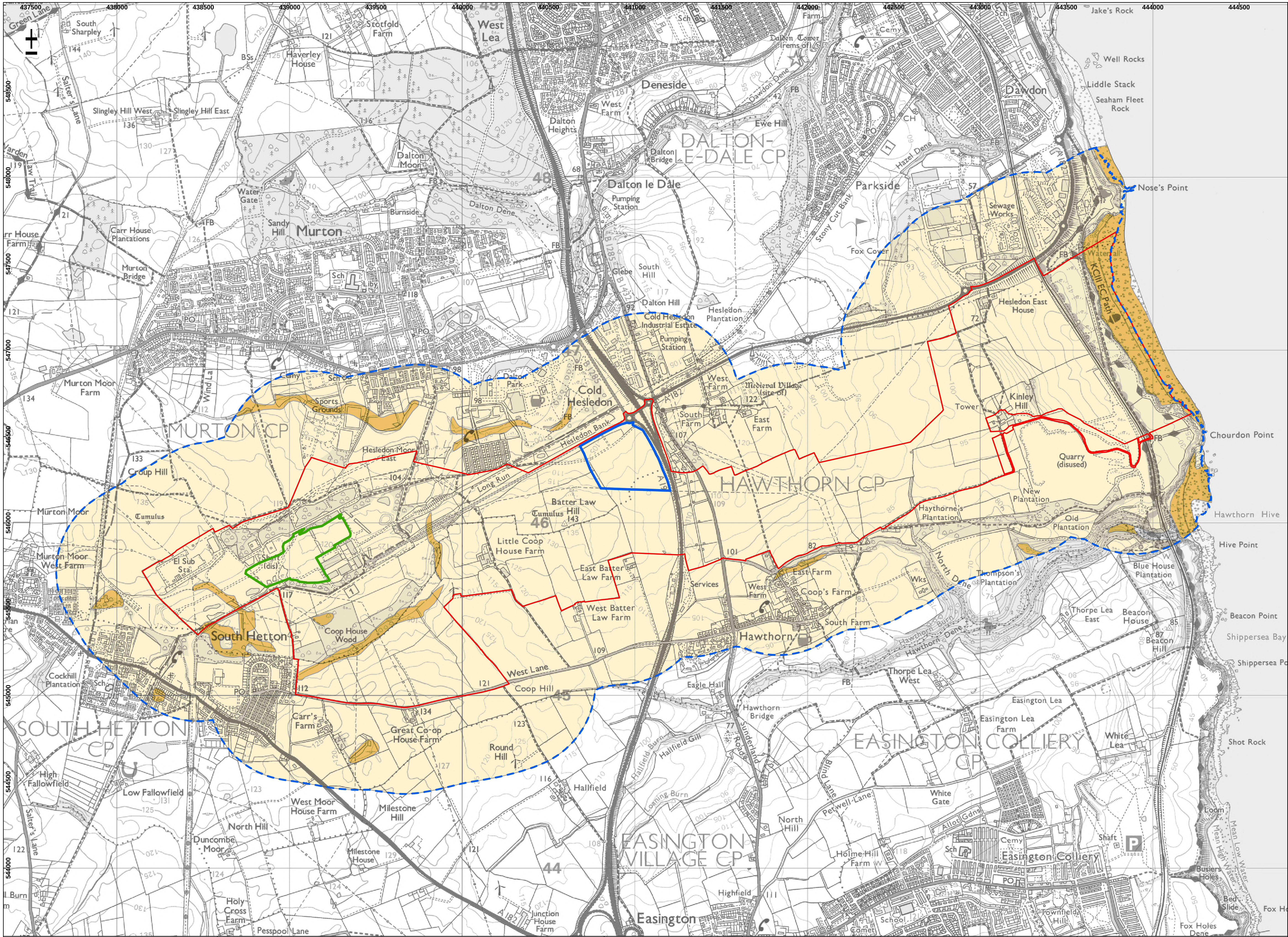
Morven Offshore Wind Farm

Project Name: MORVEN HAWTHORN PIT GRID CONNECTION PROJECT	**Drawing Title:** FIGURE 1.8 - MINING CONSTRAINTS PLAN SHEET 2 OF 2	0 0.3 0.6 km Scale@A3: 1:25,000	**Geodetic Information:** Datum: OSGB 1936 Projection: British National Grid	**Data Sources:** BP, Ordnance Survey

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Drawing Number: MHPGC-WSP-PRA-GRD-120

VER	DATE	DETAILS	BY	CHECK
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LEGEND

- MHPGC PEIR Red Line Boundary: Onshore
- LSS Search Area (Green Option)
- LSS Search Area (Blue Option)
- 500m Buffer

Collapsible Deposits

- Deposits With Potential to Collapse When Loaded and Saturated are Unlikely to be Present
- Deposits With Potential to Collapse When Loaded and Saturated are Believed Not to be Present

Morven Offshore Wind Farm

Project Name:
MORVEN HAWTHORN PIT GRID CONNECTION PROJECT

Drawing Title:
FIGURE 1.9A - GROUND STABILITY - COLLASIBLE DEPOSITS

0 0.25 0.5 km
Scale@A3: 1:20,000

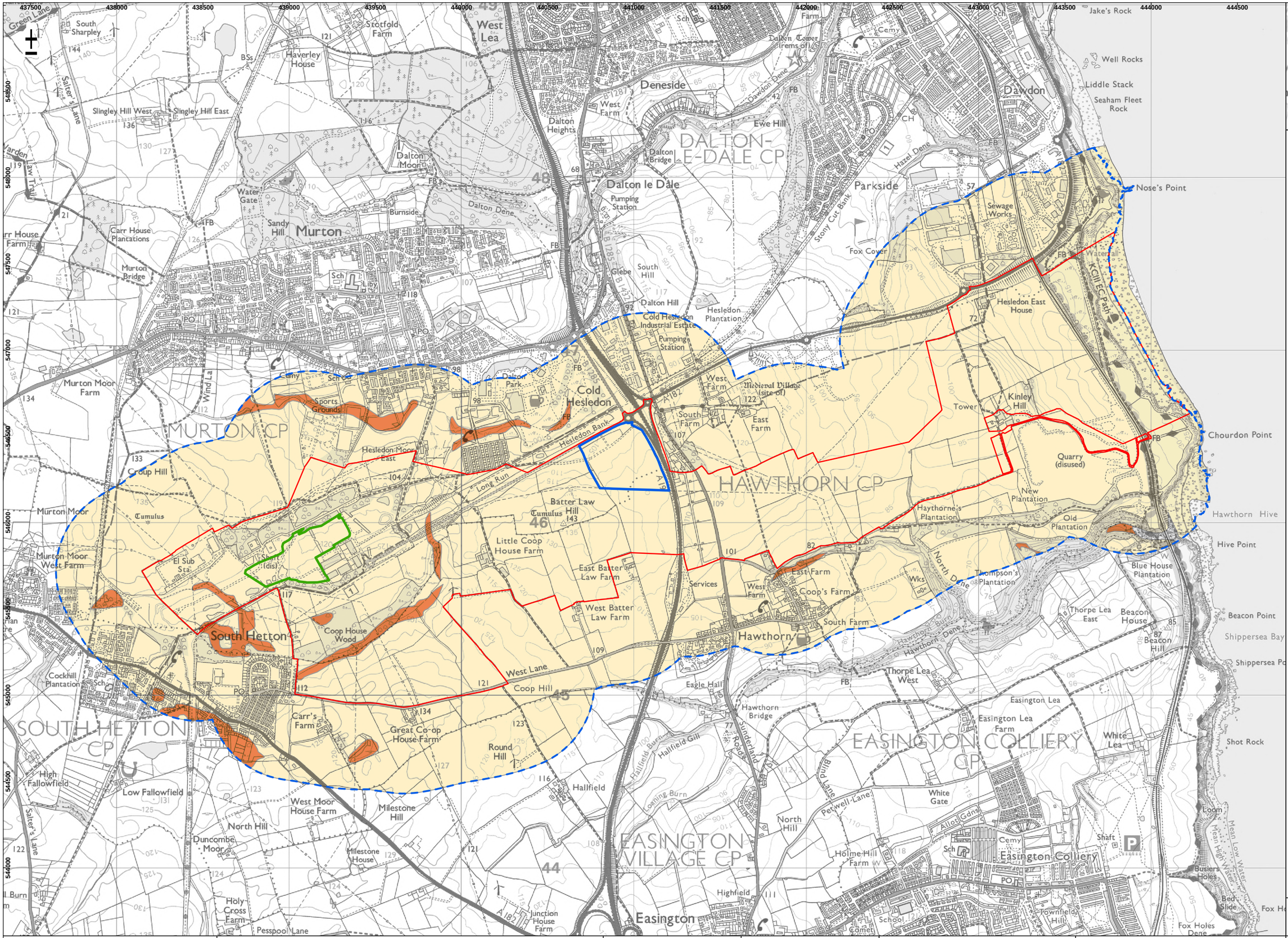
Geodetic Information:
Datum: OSGB 1936
Projection: British National Grid

Data Sources:
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Service Layer Credits:
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Drawing Number:
MHPGC-WSP-PRA-GRD-121

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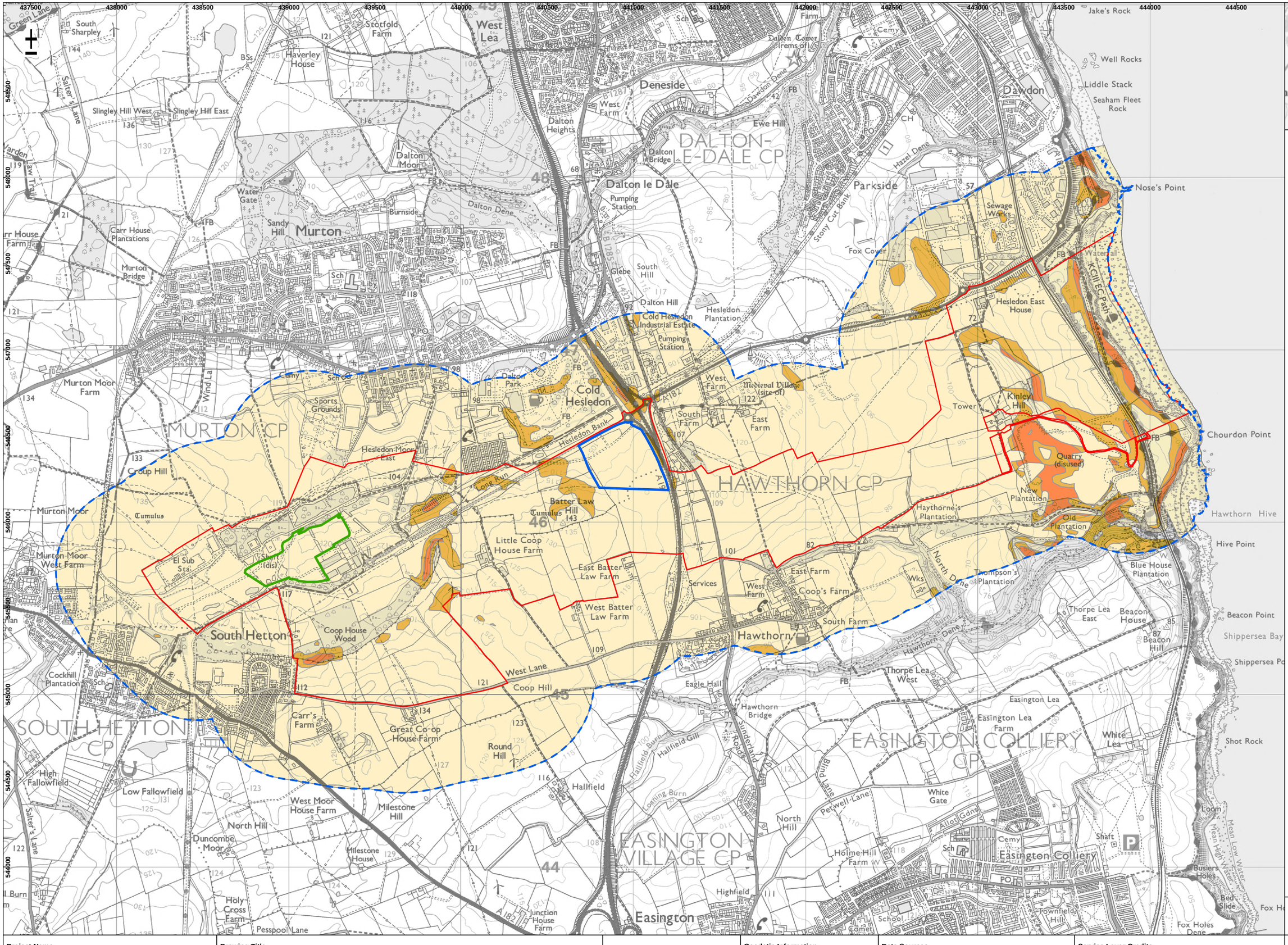


Project Name: MORVEN HAWTHORN PIT GRID CONNECTION PROJECT	**Drawing Title:** FIGURE 1.9B - GROUND STABILITY - COMPRESSIBLE DEPOSITS	0 0.25 0.5 km Scale@A3: 1:20,000	**Geodetic Information:** Datum: OSGB 1936 Projection: British National Grid	**Data Sources:** BP, Ordnance Survey, British Geological Survey	**Service Layer Credits:** OS Open Greyscale: Contains OS data © Crown Copyright and database right 2019 © Crown copyright and database rights 2026 Ordnance Survey AC0000848283

Morven Offshore Wind Farm

Drawing Number: MHPGC-WSP-PRA-GRD-121

VER	DATE	DETAILS	BY	CHECK
00	25/08/2026	Initial Issue	EH	RE
-	-	-	-	-



LEGEND

- MHPGC PEIR Red Line Boundary: Onshore
- LSS Search Area (Green Option)
- LSS Search Area (Blue Option)
- 500m Buffer

Landslides

- Low Risk
- Moderate Risk
- High Risk

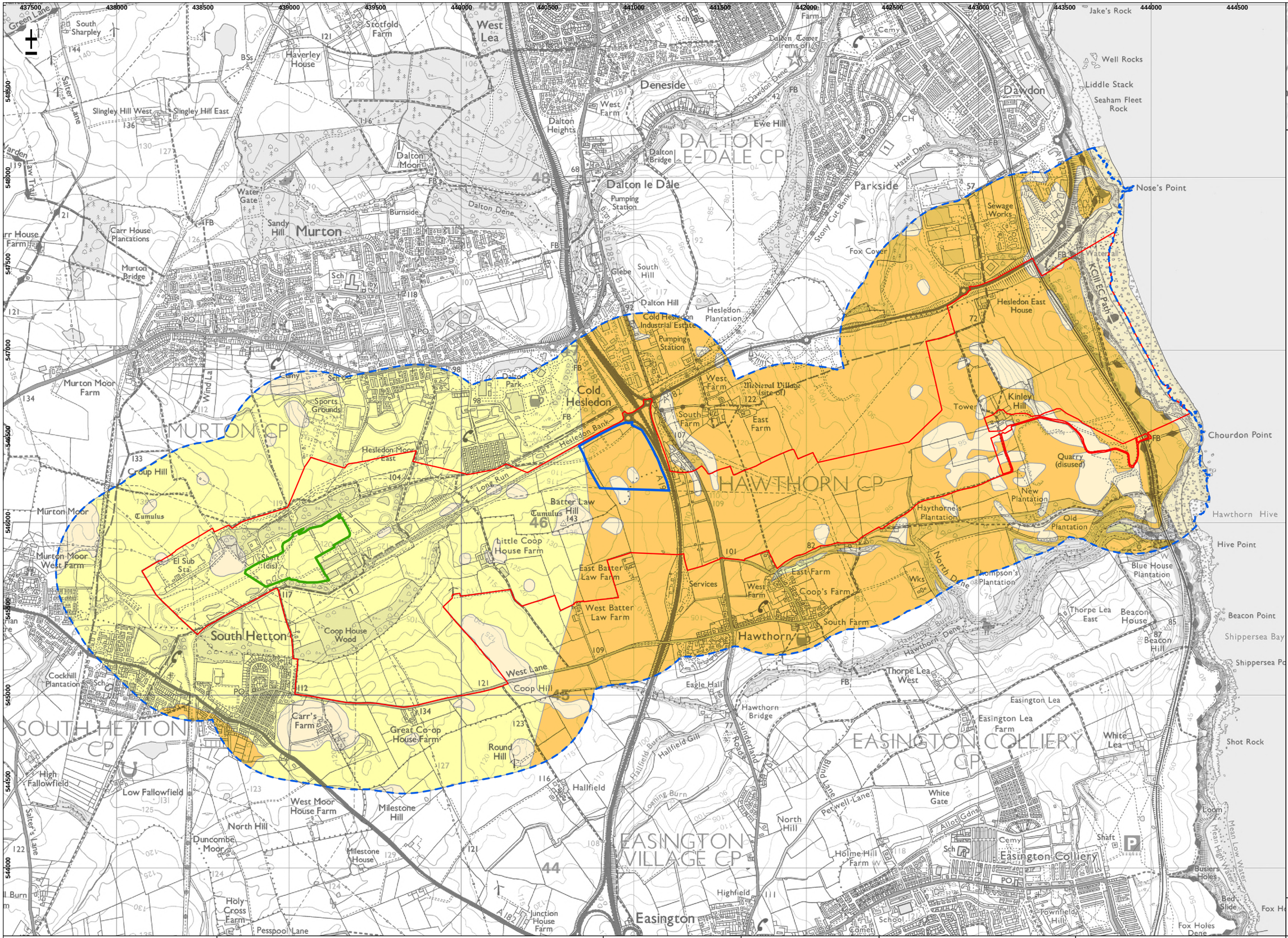
Project Name: MORVEN HAWTHORN PIT GRID CONNECTION PROJECT	**Drawing Title:** FIGURE 1.9C - GROUND STABILITY - LANDSLIDES	0 0.25 0.5 km Scale@A3: 1:20,000	**Geodetic Information:** Datum: OSGB 1936 Projection: British National Grid	**Data Sources:** BP, Ordnance Survey, British Geological Survey

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Morven Offshore Wind Farm

Drawing Number: MHPGC-WSP-PRA-GRD-121

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Project Name:
MORVEN HAWTHORN PIT GRID CONNECTION PROJECT

Drawing Title:
FIGURE 1.9D - GROUND STABILITY - SHRINK SWELL CLAYS

0 0.25 0.5 km

Scale@A3: 1:20,000

Geodetic Information:
Datum: OSGB 1936
Projection: British National Grid

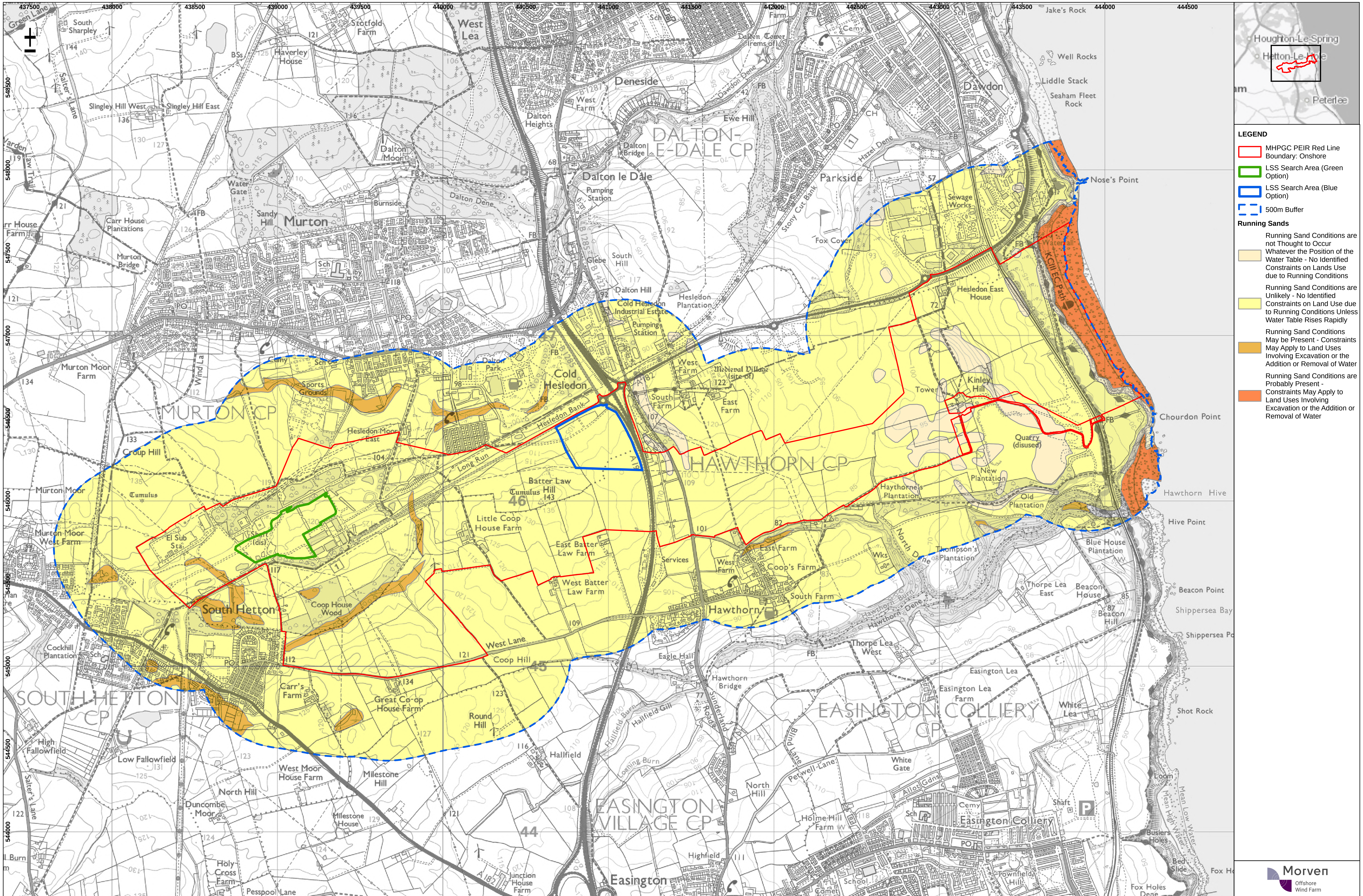
Data Sources:
BP, Ordnance Survey, British Geological Survey

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Morven Offshore Wind Farm

Drawing Number:
MHPGC-WSP-PRA-GRD-121

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Project Name:
MORVEN HAWTHORN PIT GRID CONNECTION PROJECT

Drawing Title:
FIGURE 1.9E - GROUND STABILITY - RUNNING SANDS

0 0.25 0.5 km

Scale@A3: 1:20,000

Geodetic Information:
Datum: OSGB 1936
Projection: British National Grid

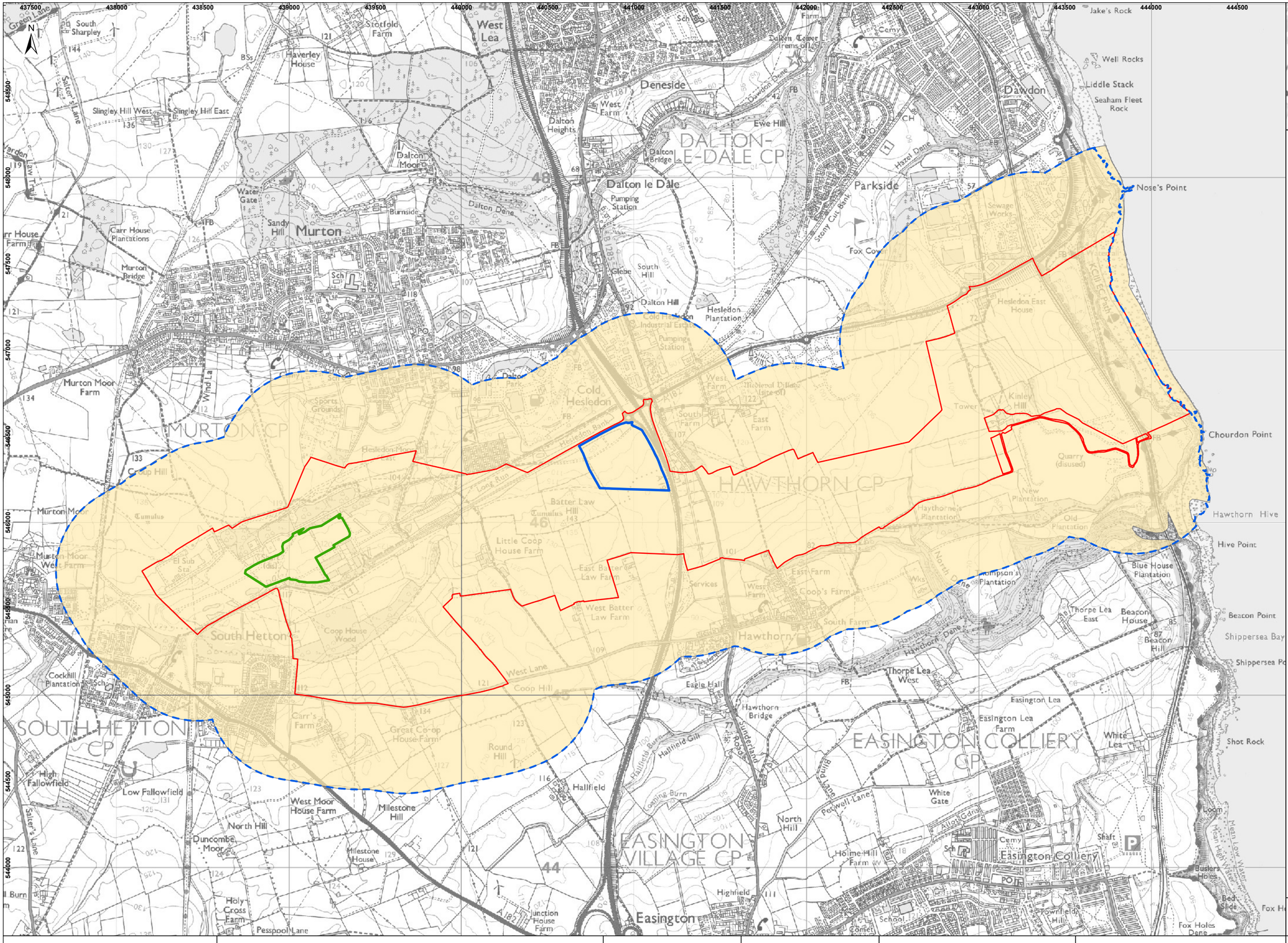
Data Sources:
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Service Layer Credits:
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Morven Offshore Wind Farm

Drawing Number:
MHPGC-WSP-PRA-GRD-121

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00	25/08/2026	Initial Issue	EH	RE
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LEGEND

- MHPGC PEIR Red Line Boundary: Onshore
- LSS Search Area (Green Option)
- LSS Search Area (Blue Option)
- 500m Buffer

Ground Dissolution of Soluble Rocks

- Hazard Rating B

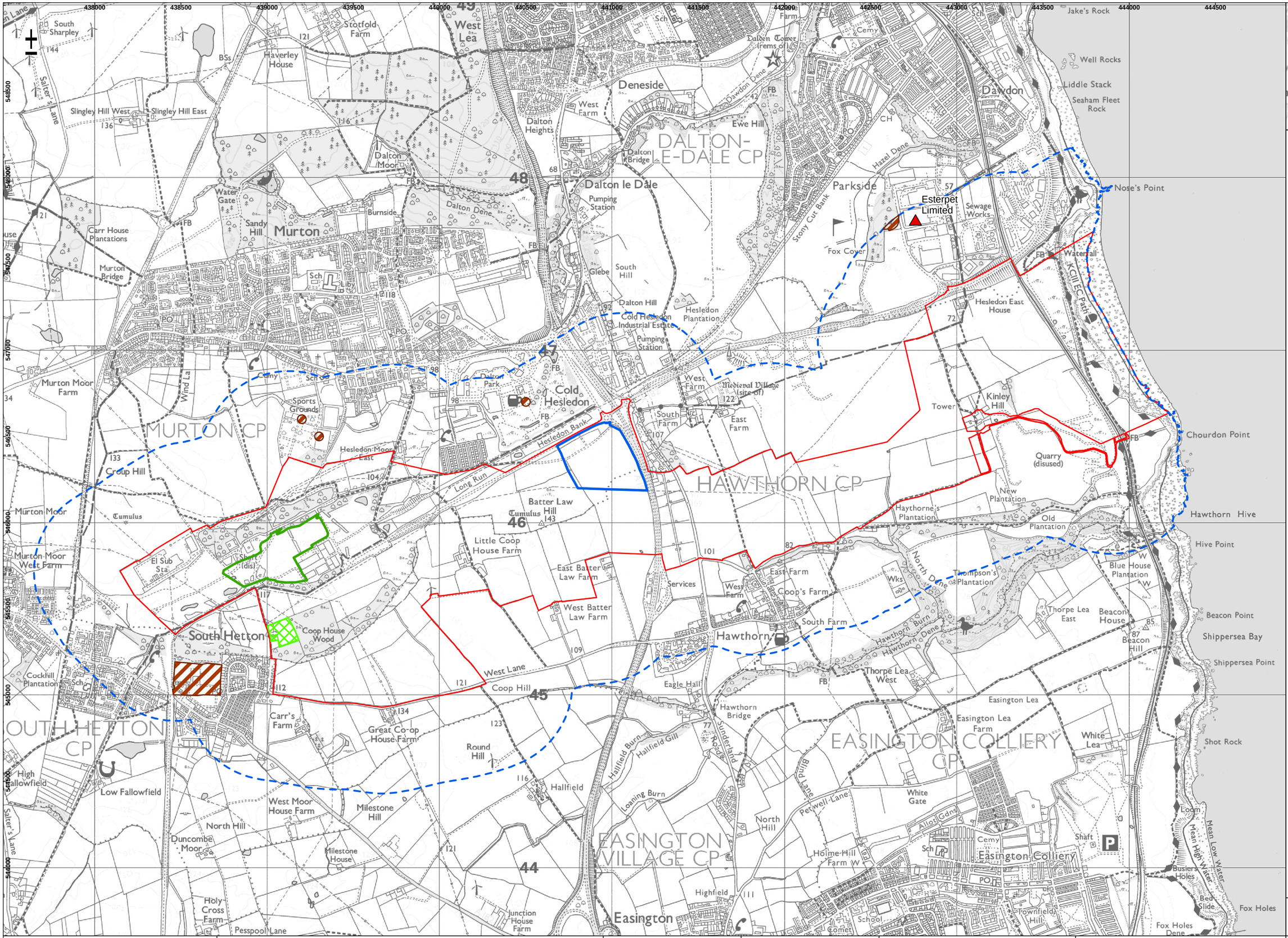
Morven Offshore Wind Farm

Project Name: MORVEN HAWTHORN PIT GRID CONNECTION PROJECT	**Drawing Title:** FIGURE 1.9F - GROUND STABILITY - GROUND DISSOLUTION OF SOLUBLE ROCKS	0 0.25 0.5 km Scale@A3: 1:20,000	**Geodetic Information:** Datum: OSGB 1936 Projection: British National Grid	**Data Sources:** BP, Ordnance Survey, British Geological Survey

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Project Name:
MORVEN HAWTHORN PIT GRID CONNECTION PROJECT

Drawing Title:
FIGURE 1.10 - PERTINENT LANDFILL/WASTE SITES

0 0.25 0.5 km

Scale@A3: 1:20,000

Geodetic Information:
Datum: OSGB 1936
Projection: British National Grid

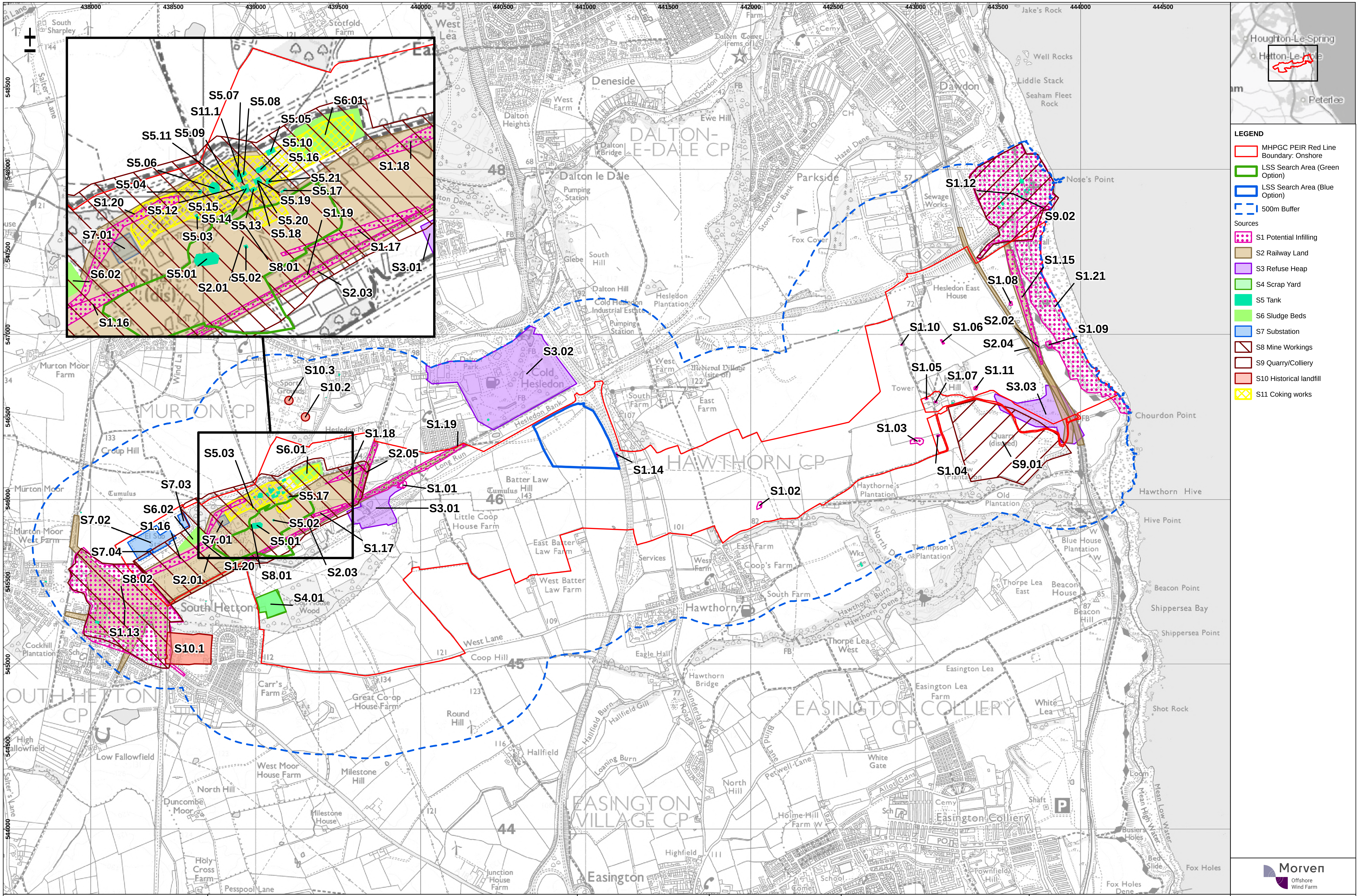
Data Sources:
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Morven Offshore Wind Farm

Drawing Number:
MHPGC-WSP-PRA-GRD-122

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Project Name:
MORVEN HAWTHORN PIT GRID CONNECTION PROJECT

Drawing Title:
FIGURE 1.11 SITE SOURCE PLAN

0 0.25 0.5 km
Scale@A3: 1:20,000

Geodetic Information:
Datum: OSGB 1936
Projection: British National Grid

Data Sources:
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Drawing Number:
MHPGC-WSP-PRA-GRD-123

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Appendix B BGS Borehole Logs

British Geological Survey

BGS ID: 726271 : BGS Reference: NZ34NE79
British National Grid (27700) : 439134,545458

NZ35SE NE79 BOREHOLE NO. 76

DIAM. 150mm

WATER for first 0.3m only.

U. 100 Sample

U. 100 No recovery

Disk sample

Bag sample

DATE	DEPTH OF BORING	DEPTH OF CASING	DEPTH TO WATER	STRATA DESCRIPTION	STRATA CHANGE (m) DEPTH	STRATA CHANGE (m) O.D.	S.P.T. BLOWS	SAMPLE DEPTH	SAMPLE TYPE
21.2.74		0.30	Wet	SANDY CLAY with STONES.		113.40			
		0.40	Dry	Firm. Orange brown and grey. Much F.M.gravel initially, with traces of organic matter and coal. Becoming almost friable towards centre of stratum.					
	1.50	1.00						1.50 to 1.95	
	2.50	2.00			2.50	110.90		2.50 to 3.00	O
	3.00	2.50			3.20	110.20		3.45	
	4.00	4.00		SILTY CLAY with STONES. Firm to stiff. Dark grey brown. Mainly F.M. gravel but some C. gravel with pockets of light brown sandy clay at 4.0m (Boulder Clay)				4.00	O
	5.00	4.00						4.50 to 4.95	NR
	6.00	4.00					90	5.15 to 5.45	X O
	6.50	4.00						6.00 to 6.45	NR
21.2.74	6.95	4.00	Dry		6.95	106.35	63	6.65 to 6.95	X O
				END OF BOREHOLE.					

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 726271 : BGS Reference: NZ34NE79
British National Grid (27700) : 439134,545458

NZ 34 NE/79

TOWER POSITION NO. 76 (new number)

LOCATION:

1.0km east north east of South Hetton (Post Office).

SITE DESCRIPTION:

Wet sloping ground just in a wood.

INFORMATION FROM INSTITUTE OF GEOLOGICAL SCIENCES:

Alluvium over boulder clay.

TOWER TYPE, TYPICAL DESIGN LOADING AND STANDARD FOUNDATION DETAILS:

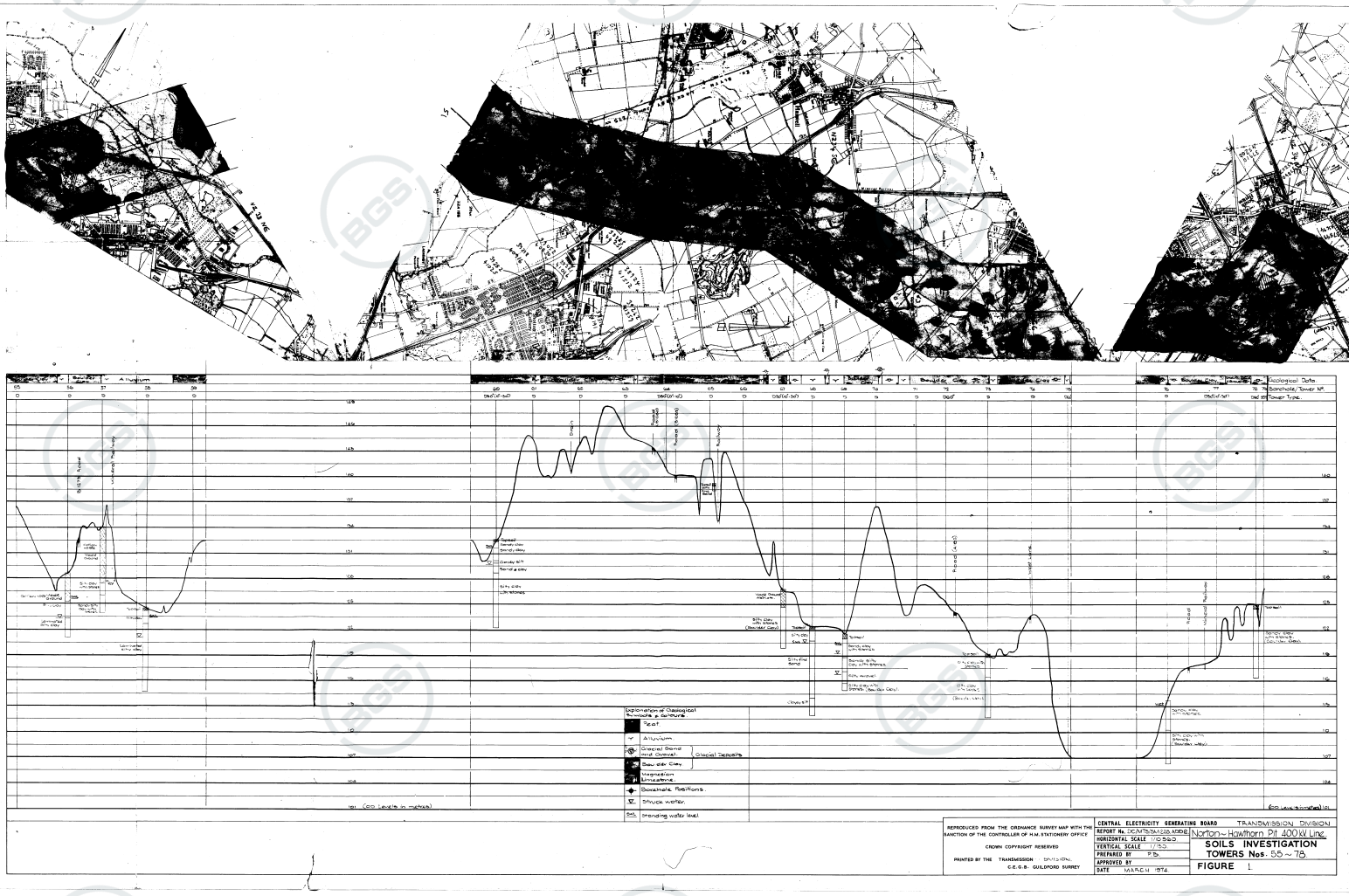
Type: D Specification: L6

		Compression	Uplift
Ultimate Design Load		1615 kN	910 kN
Dimension of Standard foundation	Base size	2.25 m.square	2.25m.square
	Depth	3.25 m	3.25m

WATER OBSERVATIONS DURING BORING:

Wet at surface - a spring adjacent - and to 0.3m. Thereafter dry.

Contact BGS: ngdc@bgs.ac.uk


Explanation of Geological Symbols & Colours
Peat
Alluvium
Glacial Deposits
Boreholes, Positions
Strunds water
Standing water level
REPRODUCED FROM THE ORDNANCE SURVEY MAP WITH THE SANCTION OF THE CONTROLLER OF H.M. STATIONERY OFFICE
CROWN COPYRIGHT RESERVED
CENTRAL ELECTRICITY GENERATING BOARD TRANSMISSION DIVISION
REPORT No. DCM/TSM/028/A0082
HORIZONTAL SCALE 1/2500
VERTICAL SCALE 1/250
PREPARED BY PB
APPROVED BY
DATE MARCH 1974
Norton-Hawthorn PH 400kV Line
SOILS INVESTIGATION
TOWERS Nos. 55-78
FIGURE 1

British Geological Survey

BGS ID: 726273 : BGS Reference: NZ34NE81
British National Grid (27700) : 438556,545955

NZ34NE/81

BOREHOLE NO. 78
DIAM. " 150mm

WATER was not encountered.

U. 100 Sample
U. 100 No recovery
Bulk sample
Bag sample

DATE	DEPTH OF BORING	DEPTH OF CASING	DEPTH TO WATER	STRATA DESCRIPTION	STRATA DEPTH	STRATA O.D.	S.P.T. BLOWS	SAMPLE DEPTH	SAMPLE TYPE
22.2.74				TOP and SUB SOIL.	0.40	125.00 124.60			
				SANDY CLAY with STONES. Firm. Orangy brown and grey initially, becoming darker grey brown. Much cobble size down gravel. The clay is very sandy in parts, much less so in others.				1.50 to 1.95	
	1.50	1.00							
	2.50	2.00		At base, possibly boulder size grey and orange sandstone broken into cobble size fragments by the chisel. (Boulder clay - possibly re-deposited initially)				2.50	O
	3.00	2.50						3.00 to 3.45	
	4.00	3.00						4.00	O
	4.50	3.50						4.50 to 4.95	
	6.00	4.95						6.00 to 6.45	
	7.50	4.95						7.50 to 7.95	
22.2.74	7.95	4.95	Dry						
23.2.74	7.95	4.95	Dry						
23.2.74	8.70	4.95	Dry	Sandstone fragments	8.70	116.30		8.50 to 8.70	↑O↓
				END OF BOREHOLE.					

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey
BGS ID: 726273 : BGS Reference: NZ34NE81
British National Grid (27700) : 438556,545955

NZ34NE/81

ANGLE TOWER POSITION No. 78 (new number)

LOCATION:

Within the Hawthorn Pit substation perimeter fence, near the north east corner of the North Eastern Electricity Board substation.

SITE DESCRIPTION:

Level grassed area raised above the substation. The ground generally falls from north to south.

INFORMATION FROM INSTITUTE OF GEOLOGICAL SCIENCES:

Gravelly boulder clay.

TYPICAL DESIGN LOADING AND STANDARD FOUNDATION DETAILS:

Angle tower type: D90

Specification: L6

		Compression footings		Uplift footings	
		Compression	Tension	Tension	Compression
Ultimate Design Load		6400 kN	250 kN	5570 kN	640 kN
Dimension of Standard foundation	Base size	4.4 m square		3.2 m square	
	Depth	2.15 m		6.5 m	

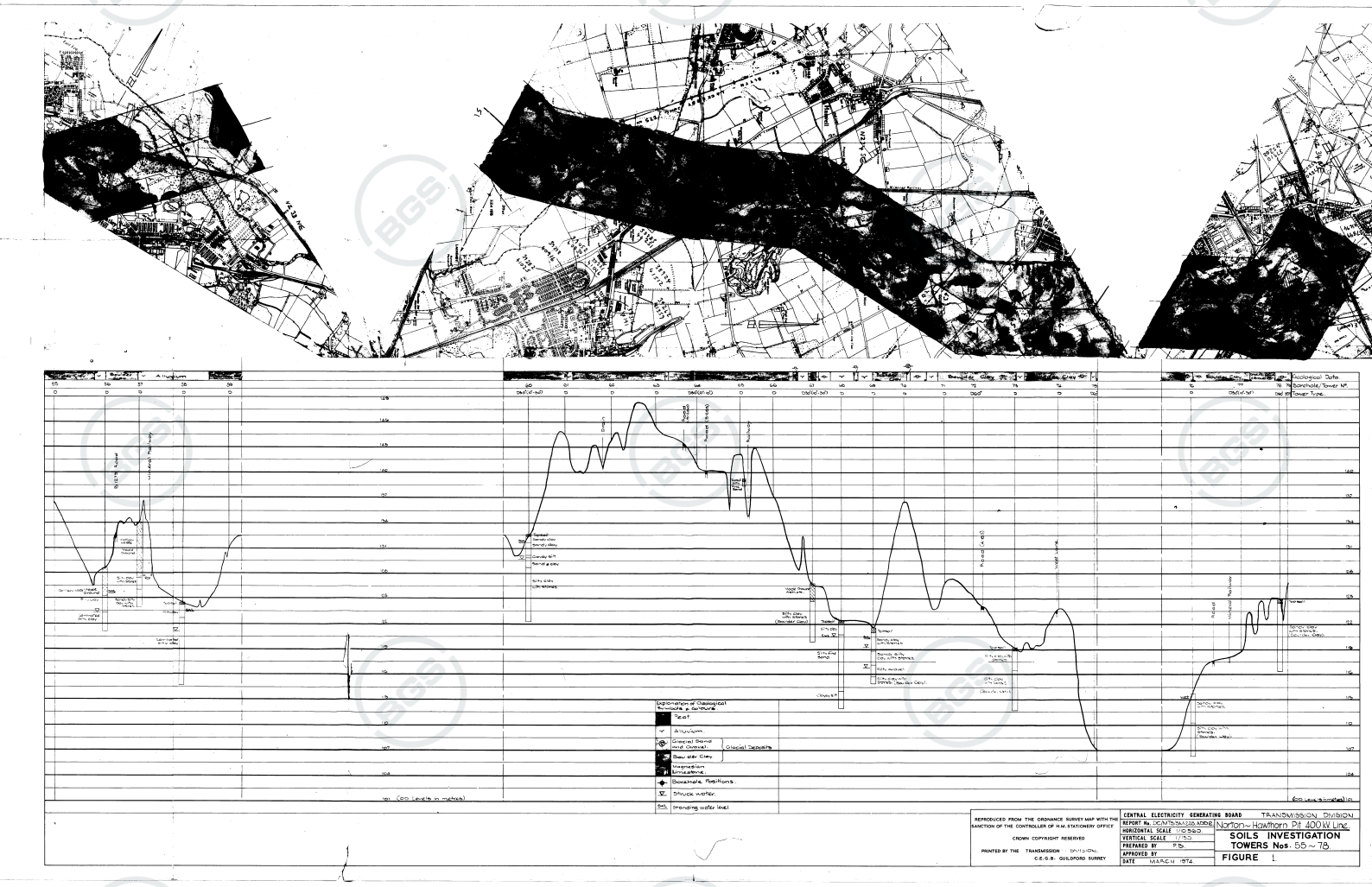
WATER OBSERVATIONS DURING BORING:

Water was not encountered.

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 726273 : BGS Reference: NZ34NE81
British National Grid (27700) : 438556,545955



Explanation of Geological Symbols & Letters

- Peat
- Alluvium
- Glacial Deposits: Glacial Gravel and Gravel; Boulder Clay; Varved Clays
- Bedrock Positions
- Struck water
- Standing water level

REPRODUCED FROM THE ORDNANCE SURVEY MAP WITH THE SANCTION OF THE CONTROLLER OF H.M. STATIONERY OFFICE
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CENTRAL ELECTRICITY GENERATING BOARD TRANSMISSION DIVISION
REPORT No. DCM/TS/SM/026 ADDE
HORIZONTAL SCALE 1/1250
VERTICAL SCALE 1/150
PREPARED BY PB
APPROVED BY
DATE MARCH 1974

Norton-Hawthorn PH 400 kV Line
SOILS INVESTIGATION
TOWERS Nos. 55-75
FIGURE 1

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 772312 : BGS Reference: NZ44NW27
British National Grid (27700) : 442671,547042

(68/4028) Wt. 74179/81 3000 2/49 M. & St., Ltd. G 68

NZ 44 NW 27

SECTION OF COLDHESLEDON No3 Borehole.

Pallister Works.

Surface Level ____ O.D.

Communicated 1950 by Pallister Works.

Date of boring or sinking 1950 Borer Kraelius

One-inch Map 21 Six-inch Map (County and Half-Quarter Sheet) DURHAM 21 NE

Cores examined 21 Aug 50.

	Thickness.			Depth from Surface.		
	Fathoms.	feet.	ins.	Fathoms.	feet.	ins.
Dipr Specimen from 18' is probably recrystallized Stelly Anhydrite.		6	10		6	10
Coarsely crystalline cream dolomite with cavities		18	2		25	0
Cream dolomite, locally with finer more homogeneous bands		9	0		34	0
Cream dolomite, honeycomb structure.		9	0		43	0
Massive brown stained dolomite with cavities.		8	10		51	10
Cream dolomite with cavities.		10	6		62	4
Soft friable cream oolitic dolomite		1	10		64	2
Cream-white dolomite		3	8		67	10
Cream buff hard dolomite			6		68	4
Soft friable cream oolitic dolomite		3	8		72	
Hard buff bedded dolomite			2		72	2
Friable dolomite		9	4		81	6
Cream white brecciated dolomite with cavities more friable in lower part.		5	10		87	4
Brecciated dolomite			6		87	10
Soft friable buff crystalline dolomite		3	11		91	9
Soft finely crystalline dolomite		10	0		101	9
Buff oolitic dolomite		8	3		110	
Fine oolitic buff dolomite		8	7		118	7
Hard crystalline dolomite, with cavities, brecciated, cream buff to yellow brown.		7	5		126	
Soft oolitic buff dolomite, with cavities, friable.		5	2		131	2
Friable oolitic dolomite		34	8		166	10
Cream - buff white amorphous dolomite		9	8		176	6
Oolitic - medium friable dolomite		13	6		190	0
Coarser oolitic dolomite		5	0		195	0
Buff bedded dolomite with cavities		3	0.		198	0

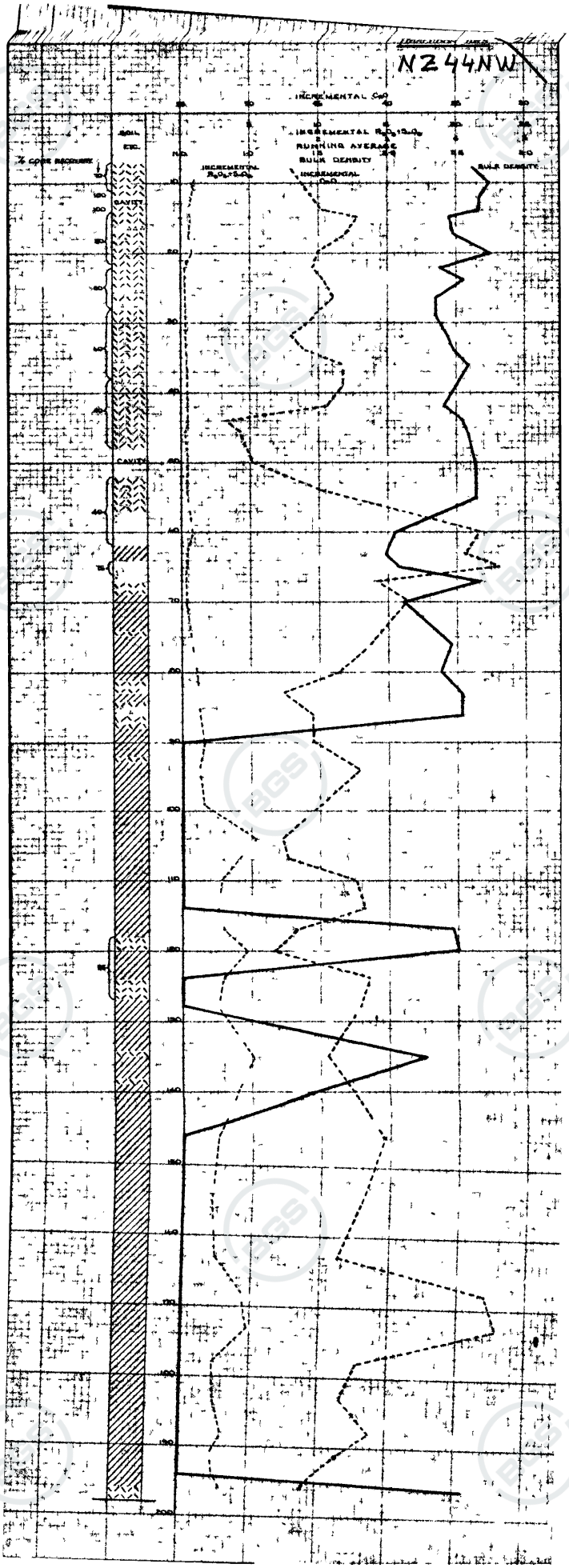
Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 772312 : BGS Reference: NZ44NW27
British National Grid (27700) : 442671,547042

		Thickness.			Depth from Surface.			
		Fathoms.	feet.	ins.	Fathoms.	feet.	ins.	

Contact BGS: ngdc@bgs.ac.uk


NZ44NW
INCREMENTAL CBO
INCREMENTAL R.L.B.C.
RUNNING AVERAGE
BULK DENSITY
% CORE RECOVERY
SOIL
ETC.
GRAVEL
CAVITY

British Geological Survey

BGS ID: 772373 : BGS Reference: NZ44NW49
British National Grid (27700) : 440198,546076

Form P.70
(Series 610)

NZ 44 NW/49

6-inch Map	B/H Regd.No
(County, Sheet and Qtr.)	
NZ 44 NW	130
(Nat.Grid, Sheet and Qtr.)	

Attach tracing from a map or sketch map if possible

SECTION OF Murton Colliery, Downover Borehole from High Main (E).

PURPOSE To prove Main (F).

EXACT SITE NZ. 40204. 46086.

LEVEL AT WHICH ~~shaft~~ bore ~~drift~~ COMMENCED RELATIVE TO O.D. 9356.0' A.A.D.

DATE OF SINKING OR BORING 21-5-1970 to 8-6-1970.

SINKER OR BORER National Coal Board

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS FEET	THICKNESS IN.	DEPTH FEET	DEPTH IN.
Open hole	Shale			22	6
	COAL	2	0	24	6
	Shale			40	0
Cored from 40' 0"	Sandstone, white, fine to medium grained, generally cross laminated with silty mudstone bands with fine grained white sandstone laminae up to 1'6" thick, occasional irony patches and bands in basal 3', base slightly erosive.			55	3
Top Main (F1)	COAL	1	5	56	8
	Seatearth, grey listric surfaces, soft.			58	6
	Seatearth, grey, silty.			62	9
	Mudstone, grey, silty, roots.			65	6
	Mudstone, grey, silty, ferruginous.			65	10
	Mudstone, grey, silty.			68	0
	Mudstone, grey, slightly silty, plants.			70	0
	Mudstone, grey with roots becoming seatearth grey with listric surfaces below 72'.			73	3
Bottom Main (F2)	COAL, no recovery.	2.	0		
	Coaly shale and thin bands, about 1'3" recovered	1	6	76	9
	Mudstone, dark grey, shaly, abundant coalified plants.			78	3
	Mudstone, grey, silty, some roots and some irony patches, occasional plants below 80', roots absent below 81'.			82	6
	Sandstone, white, fine grained, generally massive, occasional small mudstone and irony pellets at 83'3".			84	0
	Base of borehole.				

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 772385 : BGS Reference: NZ44NW57/E
British National Grid (27700) : 443351,546601

NZ 44 NW/57/e

COMMERCIAL IN CONFIDENCE

Borehole 4

DEPTH

No core to 10'

Dolomite, pale cream buff, generally soft and crumbly, in places oolitic (top 10') though not very common. Weakly MnO_2 speckled An occasional stromatolite flake can be seen. In places the rock is harder and partially calcitised, also more grey in colour, this does not usually extend round the circumference of the core but changes from cream-yellow to grey and back again rapidly. (These occur between 5'0"-5'6", 12'6"-12'9", 19'0" and 21'9"). In the hard material there are lined cavities. From 20' to 28' the rock is generally soft, yellow-buff, but with harder bands also 28'0"

Dolomite, probably very calcitic, hard to 29'6", quite a high proportion of soft dolomite in bands and patches. From 30' to 36' it is a fairly uniform, hard, grey-buff limestone (between 29'6" and 30', dolomite with cavities up to 1" diameter, some are lined and some filled with soft dolomite, also a hint of laminae dipping 30'-35' 36'0"

Dolomite, soft, yellow-buff, (between 36'6"-37'6" thinly laminated shallow dips 3^{0}-5^{0}). The rock is sometimes crumbly and sometimes not, all the way to the bottom of the hole. Harder beds occur throughout the soft dolomite between:-

36'3" - 37'6"
43' - 43'6"
45'6" - 46'
47'3" - 49'3"
54'3" - 56'
58'6" - 60'

E.O.B. 60'

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 772385 : BGS Reference: NZ44NW57/E
British National Grid (27700) : 443351,546601

C89

COMMERCIAL IN CONFIDENCE

24/1/71

NZ 44 NW/57/a-r

HAWTHORN QUARRY, CO. DURHAM. PROPOSED EXPLORATION

Holes 1,2,3 will be drilled in order to delineate the western reef boundary. If hole 1 penetrates reef, hole 2 will not be drilled, and hole 3 will. If hole 3 penetrates the reef, hole 2 will be moved 150' west until reef limit is proven. Estimated depths around 60'. Proving holes to penetrate at least 20' of reef limestone.

Holes 3 to 6A will be drilled to prove the eastern and western reef limits and to prove depths of overburden and limestone above the reef proper.

If hole 4 proves reef, hole 4A will be drilled, if not hole 4A will not be drilled.

If hole 3 has proved reef, and hole 5 also, then 5A will not be drilled. If hole 6 proves reef, then 6A will be drilled, but if hole 6 does not prove reef, then 6 A will be located between 6 and 5A.

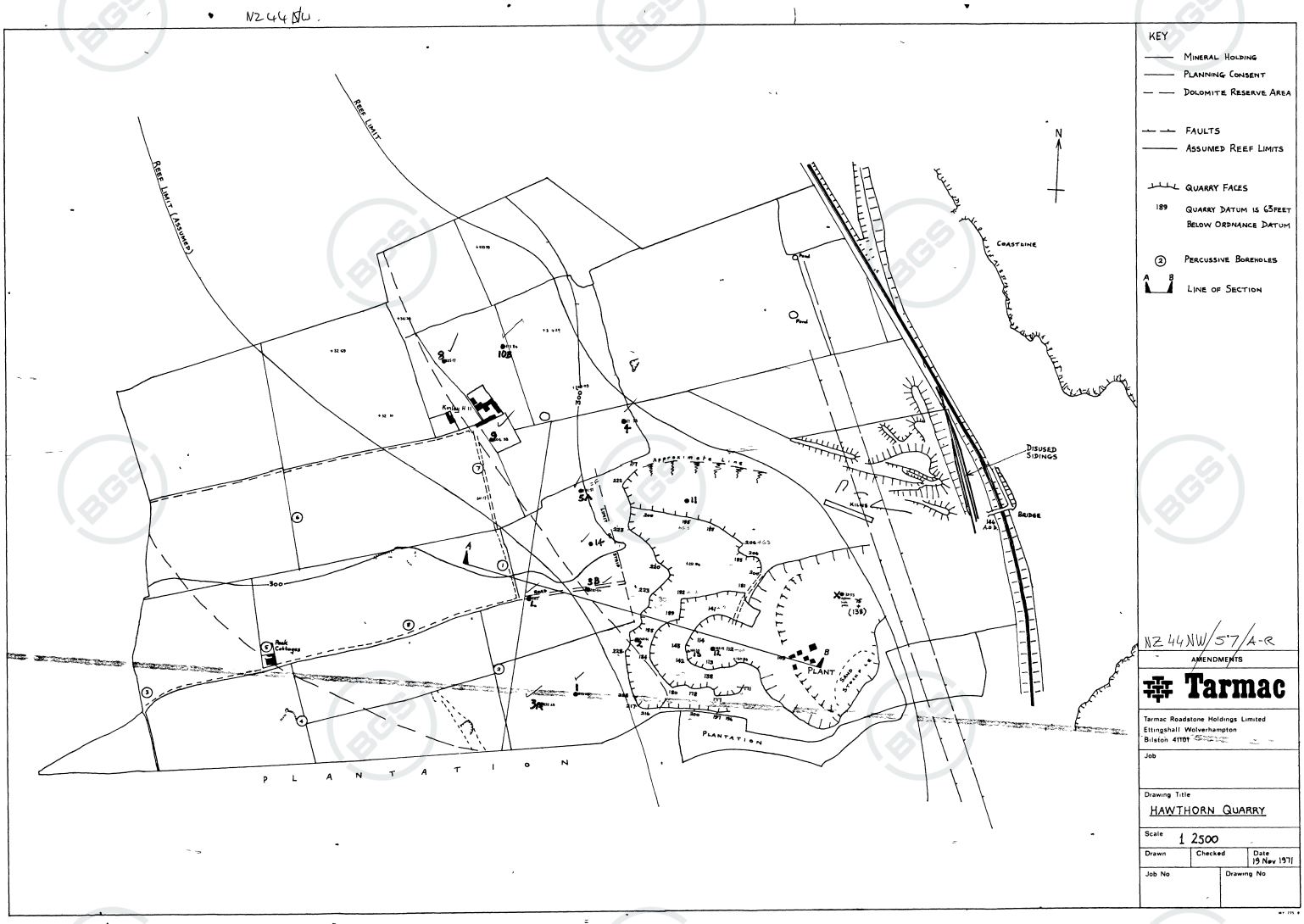
If hole 3 does not prove reef, then holes 5, 5A, 6, 6A, will be drilled in a closer pattern.

If holes 3 to 6A prove that the reef is of limited width then the programme will be halted.

If hole 3 to 6A prove that the reef is of exploitable width, then holes 7, 8 and 9 will be sited accordingly.

Holes X and H, to prove depth of reef limestone, will be drilled last.

Contact BGS: ngdc@bgs.ac.uk


NZ44NW.
KEY
Mineral Holding
Planning Consent
Dolomite Reserve Area
Faults
Assumed Reef Limits
Quarry Faces
189 Quarry Datum is 63 Feet Below Ordnance Datum
Percussive Boreholes
Line of Section
Reef Limit
Reef Limit (Assumed)
Coastline
Disused Sidings
Bridge
Plant
Plantation
Kilns
N
NZ44NW/57/A-R
Amendments
Tarmac
Tarmac Roadstone Holdings Limited
Ettingshall Wolverhampton
Bilston 41101
Job
Drawing Title
HAWTHORN QUARRY
Scale 1 2500
Drawn
Checked
Date 19 Nov 1971
Job No
Drawing No

British Geological Survey

BGS ID: 772389 : BGS Reference: NZ44NW57/J
British National Grid (27700) : 443152,546705

NZ 44 NW 57

COMMERCIAL IN CONFIDENCE

57/J

Borehole 10B

	DEPTH
No core to 5'	
Dolomite, buff yellow, soft and crumbly. May be a hint of oolites.	8'6"
Dolomite, hard in places, coarsely crystalline, with a grey purple tinge, cavities, some filled with quite large (up to $\frac{1}{8}$" long crystals) crystals of dog tooth and nail head spar	9'3"
Dolomite, buff yellow, soft, porous, no coliths	10'6"
Dolomite, hard, varying in colour from a purple tinged grey to brown buff, in places it has a marked appearance. There are some soft yellow patches and others which are moderately hard because of re-crystallisation cavities with light purple coloured crystals of ? calcite (the colour is very similar to that very typical purple fluorspar)	12'0"
Dolomite, buff yellow, soft, granular (fine sand-grade & medium sand-grade) also of a porous appearance. Towards 15'0" the rock becomes more creamy coloured	15'9"
Dolomite, creamy yellow, is generaly soft but there are patches of grey, hard calcitic dolomite, of random distribution. The transition between soft and hard is fairly sharp. There are also some quite large cavities in the hard rock, lined with red stained crystals. Between 23'-23'6" and 23'9"-24'. There is the yellow dolomite and hard limestone with bands and mottles or patches of brick red clay, the clay occurs with a very soft crumbly dolomite. There may be evidence of oolites also	24'3"
Dolomite, pale yellow buff in places, nearly all soft, a few thin harder bands are present but are very scarce. Some cavities have nice crystals, some clear and some red stained E.O.B.	37'0"

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 772389 : BGS Reference: NZ44NW57/J
British National Grid (27700) : 443152,546705

C89

COMMERCIAL IN CONFIDENCE

24/1/71

NZ 44 NW/57/a-r

HAWTHORN QUARRY, CO. DURHAM. PROPOSED EXPLORATION

Holes 1,2,3 will be drilled in order to delineate the western reef boundary. If hole 1 penetrates reef, hole 2 will not be drilled, and hole 3 will. If hole 3 penetrates the reef, hole 2 will be moved 150' west until reef limit is proven. Estimated depths around 60'. Proving holes to penetrate at least 20' of reef limestone.

Holes 3 to 6A will be drilled to prove the eastern and western reef limits and to prove depths of overburden and limestone above the reef proper.

If hole 4 proves reef, hole 4A will be drilled, if not hole 4A will not be drilled.

If hole 3 has proved reef, and hole 5 also, then 5A will not be drilled. If hole 6 proves reef, then 6A will be drilled, but if hole 6 does not prove reef, then 6 A will be located between 6 and 5A.

If hole 3 does not prove reef, then holes 5, 5A, 6, 6A, will be drilled in a closer pattern.

If holes 3 to 6A prove that the reef is of limited width then the programme will be halted.

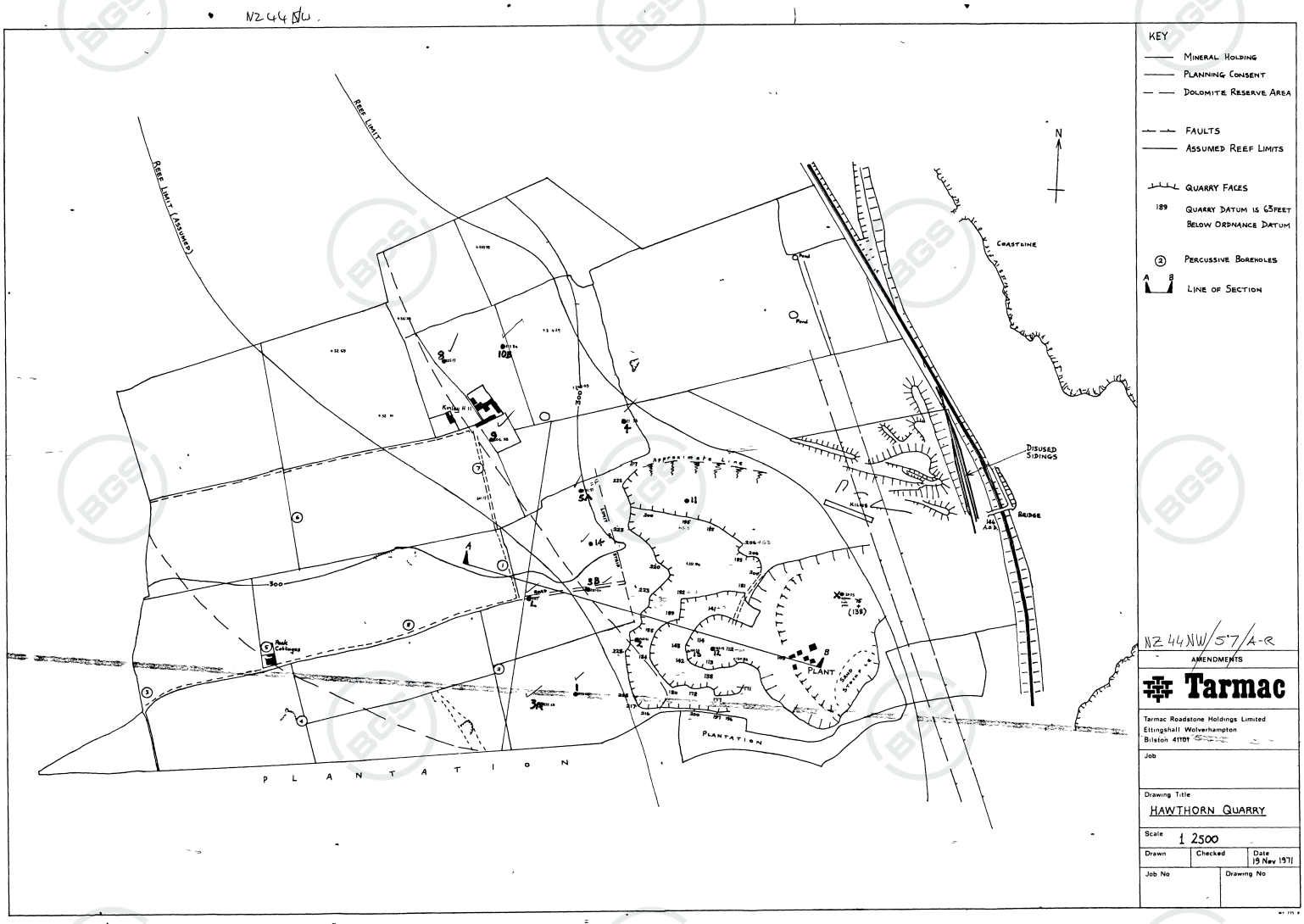
If hole 3 to 6A prove that the reef is of exploitable width, then holes 7, 8 and 9 will be sited accordingly.

Holes X and H, to prove depth of reef limestone, will be drilled last.

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 772389 : BGS Reference: NZ44NW57/J
British National Grid (27700) : 443152,546705



Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 772401 : BGS Reference: NZ44NW62
British National Grid (27700) : 443199,547374

NZ 44 NW/62

FORM P 70
SERIES 680

~~GEOLOGICAL SURVEY~~ NCE

31 ... 10

6-INCH MAP	B/H REGD No.
(County, Sheet and Qtr.)	
NZ.44 NW	49
(Nat. Grid, Sheet & Qtr.)	

Attach tracing from a map or sketch map if possible

Section of Dawdon Colliery, proposed quarry borehole No.3.

Purpose To prove Limestone

Exact Site NZ.43200. 47368.

Level at which ~~shaft~~ bore ~~drift~~ commenced relative to O.D. 10190.7' A.A.D. m or ft*

Date of sinking or boring 4.5.1974 to 9.5.1974

Sinker or borer Boyles Brothers Limited

*Delete as appropriate

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA *	THICKNESS m or ft*	THICKNESS cm or in*	DEPTH m or ft*	DEPTH cm or in*
	Glacial drift, boulders at base of drift 88' 1"			26	84
Cored from 26.84m	Limestone, grey, finely crystalline, segregation structures, (concretionary) ? boulders associated with carboniferous limestone with Crinoid debris, dolomite and sandstone with Calamites, re-crystallised magnesian limestone near base, ? channel with boulders 100' 1"			30	50
	Base of Borehole				

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 772424 : BGS Reference: NZ44NW74
British National Grid (27700) : 443930,546879

IN CONFIDENCE

NZ 44 NW/74

Form P.70 T
Series 680

6-INCH MAP (County, Sheet and Qtr.)	B/H REGD.No.
NZ 44 NW (Nat. Grid, Sheet & Qtr.)	80d

Attach tracing from a map or sketch map if possible

Section of Murton Colliery, Downover Borehole from Main (F) F.09.TG.

Purpose To prove seams to Busty (Q)

Exact Site NZ.43930. 46871.

Level at which ~~XXXX~~ bore ~~XXXX~~ commenced relative to O.D. 8832.33' A.A.D. 356.90 m or ft*

Date of sinking or boring 13.5.1980 to 10.10.1980.

Sinker or borer National Coal Board

* Delete as appropriate

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS m ~~XXXX~~	THICKNESS cm ~~XXXX~~*	DEPTH m ~~XXXX~~*	DEPTH cm ~~XXXX~~*
Open Hole	Sandstone			7	00
	No record of strata			15	20
Yard (G)	Coaf		309	18	29
	No record of strata			38	00
Top Maudlin (H1)	COAL and Bands, according to Driller		200	40	00
	No record of strata			44	00
Bottom Maudlin (H2)	COAL and Bands, according to Driller		150	45	50
	No record of strata			61	00
Low Main (J)	Coaf		180	62	80
	No record of strata			92	98
Hutton (L)	Coaf		182	94	78
	No record of strata			103	44
Cored from 103.44	Siltstone, grey, with fine grained pale grey sandstone laminae			103	96
	Mudstone, grey, silty, occasional fine sandy laminae			104	42
	Mudstone, grey, occasional ferruginous bands up to 2 cm. thick in top 20 cm. Small mussel at 105.25, poor mussel at 105.80 and a mussel also at 106.00. 7 cm. ferruginous band at approximately 106.05. Dark grey below with mussels. Shell bed partly ironstone in basal 10 cm.			106	84
	Note 24 cm. of core lost between 106~~XX~~ and 106.56.				

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 772424 : BGS Reference: NZ44NW74
British National Grid (27700) : 443930,546879

IN CONFIDENCE

FORM P 71 T
SERIES 660

6-INCH MAP	B/H
NZ 44 NW 74	99d

*Delete as appropriate

Section of Murton Colliery, Downcover Borehole from Main (F) F.09.TG.

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS m	THICKNESS cm	DEPTH m	DEPTH cm
	COAL		2		
	Mudstone		2		
	COAL		2	106	90
	Seatearth, dark grey, coaly partings at base			106	97
	Seatearth grey, silty,			107	16
	Sandstone, pale grey, fine grained, root disturbed, base irregular			107	40
	Siltstone, grey, rooty with small (1 cm.) ferruginous nodules, roots absent below 106.70. Plant pinnules below and stems below 109.20. Locally sandy below 111.30. Appearance of rapid deposition, local steep dip, generally massive			111	64
	Sandstone, pale grey, medium grained, cross bedded, local carbonaceous micaceous partings and occasional brown patches. Fine grained and cross bedded below 114.56. Coal scars between 115.69 and 116.18. Medium grained and cross bedded below with occasional carbonaceous micaceous partings. Base even and sharp			117	06
	Mudstone, grey, locally silty, thin irony bands			117	40
	COAL		19	117	69
	Mudstone, dark grey, carbonaceous			117	74
	Seatearth, grey, becoming silty below 117.94. Fine grained pale grey sandstone laminae (disturbed) below 118.46			118	70
	Siltstone, grey with frequent pale grey fine grained sandstone laminae. Base transitional			119	19
	Sandstone, pale grey, fine grained with siltstone laminae. Grading down below 119.45 into sandstone, pale grey, fine grained, cross laminated, frequent carbonaceous micaceous partings, base irregular			121	37
	Mudstone, dark grey, occasional Spirorbis and brown fish fragments, frequent mussels. 10° dip in top 20 cm. Less dark below 121.75 with fragmentary thin shelled mussels, mussels absent below 121.90. Dip gradually reduces to almost flat at 122.40. Occasional 2 cm. ferruginous bands, occasional mussels below 123.10			123	97

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 772424 : BGS Reference: NZ44NW74
British National Grid (27700) : 443930,546879

IN CONFIDENCE

6-INCH MAP	B/H
NZ 44 NW/74	668

*Delete as appropriate

Section of Murton Colliery, Downover Borehole from Main (F) F.09.TG.

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS m	THICKNESS cm	DEPTH m	DEPTH cm
	Silty mudstone, grey with sandy laminae, occasional plants			125	00
	Mudstone, dark grey, occasional mussels and plants. 6 cm. ferruginous band at 125.27, 4 cm. ferruginous band at 126.56. Occasional thin ferruginous bands below. Very dark at base, mussels			126	70
	Brown ferruginous band with abundant worm trails			126	84
	Mudstone, grey, crushed			126	90
	Brown ferruginous band			126	99
	Mudstone, dark grey, fragmentary mussels (Naiadites) Anthracosia below 127.25. Fairly abundant Anthracosia and Naiadites below 127.60. 5 cm. ferruginous band at 127.87. Slightly silty and mussels absent below 129.90. ? Fish fragment at 130.11			130	45
Harvey Marine Band	Mudstone, dark grey, abundant Lingula			130	78
	COAL		4	130	82
	Seatearth, grey, listric surfaces, plants in basal 20 cm.			132	07
	COAL		19	132	26
	Seatearth, grey, listric surfaces, becoming silty below 132.46. 10 cm. ferruginous patch at 133.15			133	80
	Seatearth, grey			133	91
	COAL		15	134	06
	Seatearth, grey, listric surfaces			134	20
	COAL		9	134	29
	Seatearth, grey			134	42
	Seatearth sandstone, fine grained, grey/brown			134	80
	Silty mudstone, grey, rooty, occasional sandy and irony bands			136	20
	Mudstone, grey, silty, listric surfaces, occasional roots			136	00
	Sandstone, pale grey, fine grained with silty mudstone. Streaked appearance. Occasional roots			136	64
	Siltstone, grey, irony nodules and irregular shredded pale grey fine grained sandstone laminae, base irregular			137	06

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 772424 : BGS Reference: NZ44NW74
British National Grid (27700) : 443930,546879

IN CONFIDENCE

FORM P 71 T
SERIES 680

- 4 -

6-INCH MAP	B/H
NZ 44 NW/74	60d

*Delete as appropriate

Section of Murton Colliery, Downover Borehole from Main (F) F.09.TG.

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS m XXX	THICKNESS cm XXX	DEPTH m XXX*	DEPTH cm XXX*
	Mudstone, dark grey, shaly, slightly canneloid			137	11
	COAL, 79% recovery		26		
	Mudstone, dark, carbonaceous, 100% recovery		2		
	COAL, inferior, 98% recovery		7		
	Mudstone, dark, carbonaceous, 92% recovery		8		
Harvey (N)	COAL, 98% recovery		34		
	Mudstone, dark, carbonaceous, 100% recovery		6		
	Seatearth, grey, carbonaceous in top 5 cm, 79% recovery		31		
	Ferruginous siltstone, grey/brown, hard. Base irregular, 5 mm. sandstone band 2 cm. from base, 99% recovery		20		
	COAL, 100% recovery		36	138	79
	Seatearth, grey/brown, highly listric			138	89
	Seatearth, grey/brown, becoming silty below 139.00			139	30
	Seatearth siltstone, grey/green, massive			140	35
	Sandstone, pale grey, fine grained with grey siltstone laminae			140	90
	Mudstone, grey, frequent coalified plants, occasional roots			141	50
	Siltstone, grey with sandy laminae in places. Occasional fragmentary plants			142	61
	Sandstone, pale grey, fine grained with grey siltstone laminae and bands. Generally massive sandstone below 143.75			145	37
	COAL		4	145	41
	Seatearth, grey/brown, sandy			145	90
	Sandstone, pale grey, fine to medium grained, root disturbed, base very irregular			146	66
	Seatearth, grey, listric surfaces			147	14
	Mudstone, dark grey, listric surfaces, plant debris			147	18
	COAL		9	147	27
	Seatearth siltstone, grey			147	37

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 772424 : BGS Reference: NZ44NW74
British National Grid (27700) : 443930,546879

IN CONFIDENCE

6-INCH MAP	B/H
NZ 44 NW 74	6WD

*Delete as appropriate

Section of Murton Colliery, Downcover Borehole from Main (F) F.09.TG.

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS m	THICKNESS cm	DEPTH m	DEPTH cm
	Sandstone, grey, fine grained, rooty, small ferruginous nodules, roots absent below 148.20. Generally massive, grading down into massive siltstone below 150.50. Occasional irregular (1 cm.) bands of pale grey fine grained sandstone			152	20
	Mudstone, grey, seatearth texture			152	65
	Siltstone, grey, massive, 12 cm. ferruginous band at 152.88. Local steep depositional dip. Very occasional fragmentary plants, gradually becoming less silty below 155.60 and passing into silty mudstone			155	80
	Mudstone, grey, listric surfaces, broken and jointed			155	88
	COAL		49		
	Mudstone, dark, listric surfaces		3		
Top Tilley (P1)	COAL		20		
	Mudstone, dark, listric surfaces		34		
	COAL		6	157	00
	Seatearth, grey, becoming silty below 157.12			157	72
	Mudstone, grey, rooty, frequent ferruginous nodules (2 cm.) between 157.90 and 158.00			158	10
	Siltstone, grey with frequent bands of pale grey fine grained sandstone (irregular) up to 8 cm. thick. Plants and roots			159	60
	Sandstone, pale grey, fine grained, irregularly cross laminated with carbonaceous micaceous partings			159	95
	Siltstone, grey, occasional plants. Less silty near base			160	31
	Sandstone, pale grey, fine grained, grading down into grey siltstone below 160.46			160	60
	Mudstone, grey, frequent plant stems and pinnules. Becoming dark grey below 160.88 with abundant coalified plant stems. Less dark below 161.20. Irregular listric surfaces, coalified plants at base			161	84
	COAL, 92% recovery		20		
Bottom Tilley (P2)	Mudstone, black, canneloid, ironstone nodules, 98% recovery		30		
	COAL, inferior, 84% recovery		10		
	Dirt consisting of pyritic coal 92% recovery		2		
	COAL, inferior, 16%			162	52

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 772424 : BGS Reference: NZ44NW74
British National Grid (27700) : 443930,546879

IN CONFIDENCE

FORM P 71 T
SERIES 660

6-INCH MAP	B/H
NZ 44 NW/74	66d

*Delete as appropriate

Section of Murton Colliery, Downcast Borehole from Main (F) F.09.TG.

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS m	THICKNESS cm	DEPTH m	DEPTH cm
	Mudstone, carbonaceous			162	59
	Mudstone, black, carbonaceous, small listric surfaces			162	63
	Seatearth, grey, listric surfaces			162	86
	Seatearth grey, silty			163	18
	Seatearth siltstone, grey, becoming sandy below 163.90 with sand filled roots			164	37
	Sandstone, grey, fine grained, becoming pale grey with poorly developed cross bedding below 164.92. Carbonaceous micaceous partings, medium grained below 167.70, 8 cm. irregular mineralised coal inclusion at 168.20. Coarse grained and cross bedded below 171.73 and very coarse grained below 172.14. Base even and pyritic			172	24
Top Busty (Q1)	COAL, 100% recovery		32	172	56
	Mudstone, dark grey, carbonaceous			172	60
	Seatearth, grey, very silty, small ferruginous nodules between 173.07 and 173.20. Roots less frequent below 173.30. Irregular sandstone laminae and bands below 173.80, locally shredded appearance			174	30
	Mudstone, grey, silty, grading down into siltstone, grey below 176.70			176	69
	Mudstone, grey, frequent plants, some coalified dark, almost coaly shale between 177.68 and 177.84 and also between 177.90 and 177.94. Plants less frequent below 177.94, 10 cm. band of fine grained grey sandstone at 178.58. Papery in basal 5 cm			178	92
	Coaly shale/inferior coal		11	179	03
	Mudstone, grey, frequent coalified plants			179	16
	Sandstone, pale grey, fine grained, root disturbed in top 30 cm, occasional silty mudstone bands below 179.70			180	12
	Siltstone, grey with pale grey fine grained sandstone laminae and bands. Plant debris, mainly comminuted. Passing into silty mudstone below 181.60 and into grey mudstone below 181.70			181	76
	Mudstone, dark grey, slightly canneloid in basal 10 cm.			181	99

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 772424 : BGS Reference: NZ44NW74
British National Grid (27700) : 443930,546879

IN CONFIDENCE

FORM P 71 T
SERIES 660

6-INCH MAP	6/H
NZ 44 NW/74	6006

*Delete as appropriate

Section of Murton Colliery, Downcover Borehole from Main (F) F.09.TG.

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS m	THICKNESS cm	DEPTH m	DEPTH cm
	COAL, 42% recovery		2		
	Mudstone, dark grey, 88% recovery		3		
	COAL, 95% recovery		21		
	Seatearth mudstone, dark grey, listric surfaces, 100% recovery		14		
Bottom Busty (Q2)	COAL, inferior, 93% recovery		11		
	Mudstone, black, listric surfaces, 100% recovery		2		
	COAL, 97% recovery		9		
	Mudstone, black, highly carbonaceous, 91% recovery		9		
	COAL, 90% recovery		19	182	89
	Seatearth, grey,			183	22
	Mudstone, grey, silty, plants and roots			183	45
	Mudstone, grey, rooty			183	87
	Siltstone, grey, occasional roots			184	02
	Mudstone, grey, occasional roots			184	32
	Mudstone, dark grey, shaly, coalified plant debris, 5 cm. ferruginous band at 184.47. Almost canneloid below with abundant fish scales on bedding planes			184	56
	Seatearth, grey, listric surfaces, becoming silty below 184.80. Roots less frequent downwards and absent below 185.90			186	40
	Mudstone, grey, locally silty near top. Jointed and dark grey below 187.06 with fragmentary thin shelled mussels			187	24
	COAL		16	187	40
	Seatearth, grey, listric surfaces with thin ironstone bands below 188.00			190	40
	Base of Borehole				
	Sealing Details Borehole sealed with 42 bags of Cement (1 bag = 94 lbs.)				

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 772424 : BGS Reference: NZ44NW74
British National Grid (27700) : 443930,546879

IN CONFIDENCE

FORM P 71 T
SERIES 680

6-INCH MAP	B/H
NZ 44 NW 74	40d

*Delete as appropriate

Section of Murton Colliery. Downover Borehole from Main (F) F.09.TG.

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS m or XXX	THICKNESS cm or XXX	DEPTH m or XXX	DEPTH cm XXX
	Note				
	Details of casing left in borehole				
	(a) 171 mm. dia. from 0 m to 6.10 m.				
	(b) 149 mm. dia. from 0 m to 18.29 m.				
	(c) 121 mm. dia. from 27.43 m to 60.96 m.				
	Borehole Dimensions				
	177 mm. dia. to 7.00 m.				
	149 mm. dia. to 12.50 m.				
	140 mm. dia. to 18.29 m.				
	121 mm. dia. to 72.50 m.				
	99 mm. dia. to 103.44 m.				
	75 mm. dia. to 190.48 m.				

Contact BGS: ngdc@bgs.ac.uk

BOREHOLE RECORD

DRILCORP LTD NZ44/22

A. SITE DETAILS								Borehole N° 1
Borehole drilled for	Mrs M Moor							
Location	Little Coop House Farm, Hawthorn, Seaham, Co. Durham							
NGR (8fig)	NZ 40175 45774 Site plan attached No							
Ground level (if known)								
Date of drilling	Commenced: 24-07-2012 Completed:08-09-2012							
B. CONSTRUCTION DETAILS								
Borehole datum	Ground level			m below/above ground level				
Point from which all all measurements of depth are taken - eg flange, edge of chamber etc								
Borehole drilled diameter		152.4	mm from	G.L.	to	11.5	m/depth	
		127	mm from	11.5	to	14	m/depth	
		152.4	mm from	14	to	17	m/depth	
		127	mm from	17	to	27	m/depth	
		152.4	mm from	27	to	138	m/depth	
			mm from		to		m/depth	
			mm from		to		m/depth	
Casing material diameter and type (eg plain steel, plastic, slotted)								
Steel Odex	diameter	152.4	mm from	GL	to	11.5	m/depth	
Solid PVC	diameter	152.4	mm from	11.5	to	108M	m/depth	
Slotted PVC	diameter	152.4	mm from	108M	to	138M	m/depth	
Grouting details	Bentonite seal, with grout.							
Water struck at			m (depth below datum - mbd)					
			m (depth below datum - mbd)					
Rest water level on completion		95	mbd					
TEST PUMP SUMMARY								
Test pumping datum (if different from borehole datum)					above			
				m below borehole datum (mbd)				
Pump suction depth					mbd			
Water level (start of test)					mbd			
Water level (end of test)					mbd			
Pumping rate					m3/h			
			for		day			
Recovery to			mbd in		hrs			
(from end of pumping)								
Date(s) of measurements								
Chemical analysis available?								

Drilling Strata - 12023			
From (M)	To (M)	Strata	Thickness(M)
0	2.03	Overfill / Soils	2.03
2.03	9.53	Boulderclay	7.5
9.53	11.03	Boulderclay Slight	2.5
11.03	14	Mudstone	2.97
14	17	Mudstone	3
17	27.15	Limestone	10.15
27.15	51.15	Broken Limestone	24
51.15	77.85	Limestone	26.7
77.85	107.85	Limestone	30
107.85	138	Limestone	30.15

NORTHUMBRIAN WATER Scientific Services

Analytical Report

Northumbrian Water Scentific Services,Northumberland Dock Road, Wallsend, Tyne & Wear,
NE28 0QD Tel: 0191 2968500 Fax: 0191 2968560 www.nw-ss.co.uk

1181

Client: Steve Kirkland
Drilcorp Ltd

Address: Kinley Hall Farm
Hawthorn Seaham
County Durham
Postcode: SR7 8SW

Contract Ref.: DRILCORP-4035
Contract Description: Borehole Analysis
Project Manager: Mark Weatheritt (Horsley)

Lab No.: 378099
Sample Name: LITTLE COOP HOUSE FARM

Date & Time Taken: 17/08/12 13:45
Date Received: 17/08/12
Date Started: 17/08/12

Sample Point:
Collected From:

PARAMETER	RESULT	METHOD	SITE
colony counts after 3 days at 22C	>300 /ml	HY-003	HY
colony counts after 48 hours at 37C	81 /ml	HY-003	HY
enterococci (confirmed)	0 /100ml	HY-004	HY
enterococci (presumptive)	0 /100ml	HY-004	HY
clostridium perfringens (confirmed)	0 /100ml	HY-019	HY
clostridium perfringens (presumptive)	0 /100ml	HY-019	HY
E.coli	0 /100ml	HY-073	HY
total coliforms	29 /100ml	HY-073	HY
colour	<1.0 mg/l Pt/Co scale	HY-201	HN
electrical conductivity	680 uS/cm 20C	HY-201	HN
hydrogen ion (pH)	7.5 pH units	HY-201	HN
turbidity	0.22 NTU	HY-201	HN
ammonium	<0.012 mg/l NH4	HY-207	HY
nitrate	16 mg/l NO3	HY-207	HY
nitrite	0.027 mg/l NO2	HY-207	HY
hardness, total	140 mg/l Ca	HY-208	HY
hardness, total	350 mg/l CaCO3	HY-208	HY
aluminium	<6.6 ug/l Al	HY-251	HN
iron	19 ug/l Fe	HY-251	HN
manganese	2.3 ug/l Mn	HY-251	HN

Authorised by:

Mick Phelan
Team Leader

Under the authority of Paul Burton,
Laboratories Manager

This report was compiled by the Laboratory Optimisation Department
In the event of a query please contact them on the above telephone number.

Date: 24/08/2012

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

Results relate only to the items tested

Tests marked "*" in this report are NOT included in the UKAS accreditation schedule for this laboratory.
Tests marked HN analysed at Howdon Laboratory, Northumberland Dock Road, Wallsend, Tyne & Wear, NE28 0QD
Tests marked HY analysed at Horsley Laboratory, Horsley, Newcastle upon Tyne NE15 0PE
Tests marked CD analysed at Chelmsford Laboratory, Middlemead,South Hanningfield,Chelmsford,Essex CM3 8HS

NORTHUMBRIAN WATER Scientific Services

Analytical Report

Northumbrian Water Scentific Services,Northumberland Dock Road, Wallsend, Tyne & Wear,
NE28 0QD Tel: 0191 2968500 Fax: 0191 2968560 www.nw-ss.co.uk

1181

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Contract Ref.: DRILCORP-4035
Contract Description: Borehole Analysis
Project Manager: Mark Weatheritt (Horsley)

Lab No.: 378099
Sample Name: LITTLE COOP HOUSE FARM

Date & Time Taken: 17/08/12 13:45
Date Received: 17/08/12
Date Started: 17/08/12

Sample Point:
Collected From:

PARAMETER	RESULT	METHOD	SITE
copper	<0.00064 mg/l Cu	HY-256	HY
lead (total - 25)	0.12 ug/l Pb	HY-256	HY
zinc	<0.54 ug/l Zn	HY-256	HY

Authorised by: Mick Phelan
Team Leader

Under the authority of Paul Burton,
Laboratories Manager

This report was compiled by the Laboratory Optimisation Department
In the event of a query please contact them on the above telephone number.

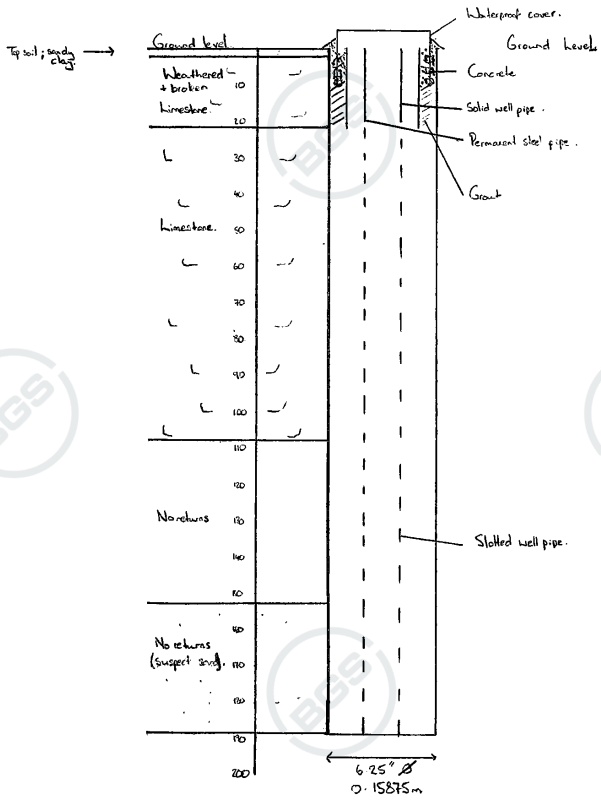
Date: 24/08/2012

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

Results relate only to the items tested

Tests marked "*" in this report are NOT included in the UKAS accreditation schedule for this laboratory.
Tests marked HN analysed at Howdon Laboratory, Northumberland Dock Road, Wallsend, Tyne & Wear, NE28 0QD
Tests marked HY analysed at Horsley Laboratory, Horsley, Newcastle upon Tyne NE15 0PE
Tests marked CD analysed at Chelmsford Laboratory, Middlemead,South Hanningfield,Chelmsford,Essex CM3 8HS

Kidney Hill Borehole



Notes.

- Samples taken at 1.00m intervals.
- Permanent casing inserted into Grouted hole.
- Penetration : 1 meter = 15 mins.
- Hammer lost on two occasions resulting in delays.

Materials

- 78m slotted well pipe.
- 20.5m solid well pipe.
- 1 x vandal proof cover
- Cement, gravel, bentonite.

Josh Bell 27/7/16.
Interpretation from Driller's record

British Geological Survey

BGS ID: 20014079 : BGS Reference: NZ44NW370
British National Grid (27700) : 443110,546640

Allied Exploration & Geotechnics Ltd. Tel: (0207) 230099

DAILY DRILLING REPORT - ROTARY

DAY/DATE: FRI 31.1.92 1992 SHEET 1 OF 1

CONTRACT No.	CLIENT	SITE NAME	RIG No.	DRILLER	DRILL ASSISTANTS
2002	N.R.A.	EAST DURHAM	R03	J GOWANS	D. GOWANS.

BOREHOLE No KIDNEY HILL	FLUSHING MEDIUM AIR	WATER HORIZONS 1) m 2) m 3) m			
INCLINATION VERTICAL.	HOURS ON SITE FROM TO	WATER LEVEL START OF SHIFT m	CASING AT m		
WEATHER SUNNY.	DAY/NIGHT SHIFT TOTAL HRS	WATER LEVEL END OF SHIFT m	CASING AT m		

DRILLING RECORD								CASING			FLUSH RETURN	BIT NUMBER
RUN No.	TIME	SIZE	FROM	TO	O.H.	CORE	REC.	SIZE	DEPTH	STRATA DESCRIPTION	%	
1.	~	6¼"	0.00	2.00	2.00	~	~	~	~	Top Soil; Sandy Clay.		
2.	~	6¼"	2.00	21.40	19.40	~	~	~	~	Weathered, Very Broken Limestone.		
				TOTALS	21.40							

CASING TODAY

SIZE	FROM	TO	TOTAL

BITS USED

SIZE	TYPE	NUMBER

MATERIALS USED (Cement, Coreboxes etc.)

3 Bags Bentonite
6 Bags Cement.
22m Plastic Permanant Casing

OPERATIONS	HRS	COMMENTS - OPERATIONS (IN-SITU TESTS, STANDPIPE, PIEZOMETER, INSTALLATIONS, INSPECTION PITS ETC.)
TRAVELLING		
RIG MOVE DIST	1	Set up on Borehole; KIDNEY HILL
DRILLING	4	As above taking Samples at 1.00m Intervals
STANDING/DAYWORKS	3½	Insert permanant Casing into Grouted Hole.
DELAYS	1	locating position of Borehole.
TOTAL	9½	

PLANT ON SITE

CO PLANT	No.	HIRE PLANT
R03		Generator
		STYL SAW
		Bowser.

DRILLER SIGNATURE..... J. Gowans.....

CLIENT SIGNATURE.....

Form DDR 002

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey
BGS ID: 20014079 : BGS Reference: NZ44NW370
British National Grid (27700) : 443110,546640

Allied Exploration & Geotechnics Ltd. Tel: (0207) 230099

DAILY DRILLING REPORT - ROTARY

DAY/DATE: MON 3 . 2 1991 SHEET 1 OF 1

CONTRACT No.	CLIENT	SITE NAME	RIG No.	DRILLER	DRILL ASSISTANTS
2002	N.R.A.	EAST DURHAM	R03	J. GOWANS	J. LAING

BOREHOLE No	KIDNEY HILL	FLUSHING MEDIUM	AIR	WATER HORIZONS	1) m 2) m 3) m
INCLINATION	VERTICAL	HOURS ON SITE	FROM TO	WATER LEVEL START OF SHIFT m	CASING AT m
WEATHER	DRY	DAY/NIGHT SHIFT	TOTAL HRS	WATER LEVEL END OF SHIFT m	CASING AT m

RUN No.	TIME	SIZE	FROM	TO	O.H.	CORE	REC.	CASING SIZE	CASING DEPTH	STRATA DESCRIPTION	FLUSH RETURN %	BIT NUMBER
3		6¼	21.40	101.40	80.00	-	-	-	-	LIMESTONE		
				TOTALS	80.00							

CASING TODAY

SIZE	FROM	TO	TOTAL

BITS USED

SIZE	TYPE	NUMBER

MATERIALS USED (Cement, Coreboxes etc.)

OPERATIONS	HRS	COMMENTS - OPERATIONS / IN-SITU TESTS, STANDPIPE, PIEZOMETER, INSTALLATIONS, INSPECTION PITS ETC.
TRAVELLING		
RIG MOVE (DIST)		
DRILLING	8½	AS ABOVE
STANDING/DAYWORKS		
DELAYS	1	TRAVEL TO SEDGEFIELD FOR DIESEL
TOTAL	9½	

DRILLER SIGNATURE.........................

PLANT ON SITE

CO PLANT	No.	HIRE PLANT
RIG, R03		COMPRESSOR
		TRANSIT
		WATER BOWSER

CLIENT SIGNATURE.........................

Form DDR 002

British Geological Survey

BGS ID: 20014079 : BGS Reference: NZ44NW370
British National Grid (27700) : 443110,546640

Allied Exploration & Geotechnics Ltd. Tel: (0207) 230050

DAILY DRILLING REPORT - ROTARY

DAY/DATE: TUE 4.2 1991 SHEET 1 OF 1

CONTRACT No.	CLIENT	SITE NAME	RIG No.	DRILLER	DRILL ASSISTANTS
2002	N.R.A.	EAST DURHAM	R03	S. COWANS	S. LAING

BOREHOLE No HIDNEY HILL	FLUSHING MEDIUM AIR	WATER HORIZONS 1) m 2) m 3) m	
INCLINATION VERTICAL	HOURS ON SITE FROM TO	WATER LEVEL START OF SHIFT m	CASING AT m
WEATHER DRY	DAY/NIGHT SHIFT TOTAL HRS	WATER LEVEL END OF SHIFT m	CASING AT m

DRILLING RECORD								CASING			FLUSH RETURN	BIT NUMBER
JN No.	TIME	SIZE	FROM	TO	O.H.	CORE	REC.	SIZE	DEPTH	STRATA DESCRIPTION	%	
4		6¼	101.40	107.60	6.20	—	—	—	—	LIMESTONE		
5		6¼	107.60	119.40	11.80	—	—	—	—	NO RETURNS (40% RETURNS 104.40 → 107.60)		
NOTE: OPERATION 1 METRE = 15 MINS												
DELAYS												
										i) TRAVEL TO SEDGEFIELD FOR DRILL	1h	
										ii) FILL WATER BOWSER	2h	
			TOTALS									

CASING TODAY			
SIZE	FROM	TO	TOTAL

BITS USED		
SIZE	TYPE	NUMBER

MATERIALS USED (Cement, Coreboxes etc.)

OPERATIONS		HRS	COMMENTS - OPERATIONS (IN-SITU TESTS, STANDPIPE, PIEZOMETER, INSTALLATIONS, INSPECTION PITS ETC.)
TRAVELLING			
RIG MOVE	DIST		
DRILLING		6½	AS ABOVE
STANDING/DAYWORKS			
DELAYS		3	AS ABOVE
TOTAL		9½	

PLANT ON SITE		
CO PLANT	No.	HIRE PLANT
RIG, R03		TRANSIT
		COMPRESSOR
		WATER BOWSER

Form DDR 002

DRILLER SIGNATURE.....

CLIENT SIGNATURE.....

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 20014079 : BGS Reference: NZ44NW370
British National Grid (27700) : 443110,546640

Allied Exploration & Geotechnics Ltd. Tel: (0207) 230099

DAILY DRILLING REPORT - ROTARY

DAY/DATE: WED 5 2 1991 SHEET 1 OF 1

CONTRACT No.	CLIENT	SITE NAME	RIG No.	DRILLER	DRILL ASSISTANTS
2002	N.C.B.	EAST DURHAM	R03	J. COWANS	S. LAING

BOREHOLE No	KIDNEY HILL	FLUSHING MEDIUM	AIR	WATER HORIZONS 1) m 2) m 3) m	
INCLINATION	VERTICAL	HOURS ON SITE FROM	TO	WATER LEVEL START OF SHIFT m	CASING AT m
WEATHER	DRY	DAY/NIGHT SHIFT	TOTAL HRS	WATER LEVEL END OF SHIFT m	CASING AT m

DRILLING RECORD								CASING			FLUSH RETURN	BIT NUMBER
JN No.	TIME	SIZE	FROM	TO	O.H.	CORE	REC.	SIZE	DEPTH	STRATA DESCRIPTION	%	
6		6¼	119.40	122.70	3.30	~	~	~	~	NO RETURNS		
DELAYS												
			LOST HAMMER DOWN HOLE DUE TO ROD SNAPPING [redacted] 111.40m O.C.L.									
			ATTEMPT TO RETRIEVE HAMMER WITH FISHING TOOL TO NO AVAIL.									
			TOTALS		3.30							

CASING TODAY			
SIZE	FROM	TO	TOTAL

BITS USED		
SIZE	TYPE	NUMBER

MATERIALS USED (Cement, Coreboxes etc.)

OPERATIONS		HRS	COMMENTS - OPERATIONS IN-SITU TESTS, STANDPIPE, PIEZOMETER, INSTALLATIONS, INSPECTION PITS ETC.
TRAVELLING			
RIG MOVE	DIST		
DRILLING		2	AS ABOVE
STANDING/DAYWORKS			
DELAYS		7½	AS ABOVE
TOTAL			

PLANT ON SITE		
CO PLANT	No.	HIRE PLANT
RIG, R03		COMPRESSOR
		TRANSIT
		WATER BOWSER

DRILLER SIGNATURE.....

CLIENT SIGNATURE.....

Form DDR 002

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 20014079 : BGS Reference: NZ44NW370
British National Grid (27700) : 443110,546640

Allied Exploration & Geotechnics Ltd. Tel: (0207) 230099

DAILY DRILLING REPORT - ROTARY

DAY/DATE: THUR 6.2 1991 SHEET 1 OF 1

CONTRACT No.	CLIENT	SITE NAME	RIG No.	DRILLER	DRILL ASSISTANTS
2002	N.E.A.	EAST DURHAM	203	J. GOWANS	J. LONG

BOREHOLE No	KIDNEY HILL	FLUSHING MEDIUM	AIR	WATER HORIZONS 1) m 2) m 3) m	
INCLINATION	VERTICAL	HOURS ON SITE FROM	TO	WATER LEVEL START OF SHIFT m	CASING AT m
WEATHER	DRY	DAY/NIGHT SHIFT	TOTAL HRS	WATER LEVEL END OF SHIFT m	CASING AT m

DRILLING RECORD								CASING			FLUSH RETURN	BIT NUMBER
JN No.	TIME	SIZE	FROM	TO	O.H.	CORE	REC.	SIZE	DEPTH	STRATA DESCRIPTION	%	
ELOYS												
			BEGINS HAMMER FROM HOLE WITH FISHING TOOL (5½")									
7		6"4	122.7	152.3	29.6	–	–	–	–	NO RETURNS		
			TOTALS		29.6							

CASING TODAY

SIZE	FROM	TO	TOTAL

BITS USED

SIZE	TYPE	NUMBER

MATERIALS USED (Cement, Coreboxes etc.)

OPERATIONS		HRS	COMMENTS - OPERATIONS (IN-SITU TESTS, STANDPIPE, PIEZOMETER, INSTALLATIONS, INSPECTION PITS ETC.)
TRAVELLING			
RIG MOVE	DIST		
DRILLING		4	AS ABOVE
STANDING/DAYWORKS			
DELAYS		5½	AS ABOVE
	TOTAL	9½	

DRILLER SIGNATURE.....

PLANT ON SITE

CO PLANT	No.	HIRE PLANT
RIG, R03		TRANSIT
		COMPRESSOR
		WATER BOWSER

CLIENT SIGNATURE.....

Form DDR 002

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 20014079 : BGS Reference: NZ44NW370
British National Grid (27700) : 443110,546640

Allied Exploration & Geotechnics Ltd. Tel: (0207) 230099

DAILY DRILLING REPORT - ROTARY

DAY/DATE: FRI 7 · 6 2 19 91 SHEET 1 OF 1

CONTRACT No.	CLIENT	SITE NAME	RIG No.	DRILLER	DRILL ASSISTANTS
2002	N.R.A.	EAST DURHAM	203	J. GOWANS	J. LAING

BOREHOLE No	KIDNEY HILL	FLUSHING MEDIUM	AIR	WATER HORIZONS 1) m 2) m 3) m	
INCLINATION	VERTICAL	HOURS ON SITE FROM	TO	WATER LEVEL START OF SHIFT m	CASING AT m
WEATHER	DRY	DAY/NIGHT SHIFT	TOTAL HRS	WATER LEVEL END OF SHIFT m	CASING AT m

DRILLING RECORD JN No.	TIME	SIZE	FROM	TO	O.H.	CORE	REC.	CASING SIZE	CASING DEPTH	STRATA DESCRIPTION	FLUSH RETURN %	BIT NUMBER
8			152.30	188.30	36.00	-	-	-	-	NO RETURNS		
	NOTE:		FROM 177.30 - 166.30							PENETRATION 3MINS/METER (SUSPECT SAND)		
	DAYS:											
			CUTTINGS BLEW BACK, CASING HAMMER TO GET PAST									
			IN HOLE (SUSPECT SAND) TRY TO RETRIEVE HAMMER									
			FROM HOLE TO NO AVAIL (2hr)									
			TOTALS		36.00							

CASING TODAY SIZE	FROM	TO	TOTAL

BITS USED SIZE	TYPE	NUMBER

MATERIALS USED (Cement, Coreboxes etc.)

OPERATIONS	HRS	COMMENTS - OPERATIONS (IN-SITU TESTS, STANDPIPE, PIEZOMETER, INSTALLATIONS, INSPECTION PITS ETC.)
TRAVELLING		
RIG MOVE DIST		
DRILLING	7½	AS ABOVE
STANDING/DAYWORKS		
DELAYS	2	AS ABOVE
TOTAL	9½	

PLANT ON SITE CO PLANT	No.	HIRE PLANT
RIG 203		TRANSIT
		COMPRESSOR
		WATER BOWSER

DRILLER SIGNATURE.....

CLIENT SIGNATURE.....

Form DDR 002

Contact BGS: ngdc@bgs.ac.uk

Allied Exploration & Geotechnics Ltd. Tel: (0207) 230099

DAILY DRILLING REPORT - ROTARY

DAY/DATE: FRI 14 . 2 19 92 SHEET 1 OF 1

CONTRACT No.	CLIENT	SITE NAME	RIG No.	DRILLER	DRILL ASSISTANTS
2002	N.R.A.	EAST DURHAM	R03	J. GOWANS	J. LAING

BOREHOLE No LIONEL MILL	FLUSHING MEDIUM AIR.	WATER HORIZONS 1) m 2) m 3) m	
INCLINATION VERTICAL	HOURS ON SITE FROM TO	WATER LEVEL START OF SHIFT m	CASING AT m
WEATHER DRY	DAY/NIGHT SHIFT TOTAL HRS	WATER LEVEL END OF SHIFT m	CASING AT m

DRILLING RECORD								CASING			FLUSH RETURN	BIT NUMBER
RUN No.	TIME	SIZE	FROM	TO	O.H.	CORE	REC.	SIZE	DEPTH	STRATA DESCRIPTION	%	
DELAYS.												
1) RETRIVE HAMMER FROM HOLE										5h		
2) CLEAN HOLE OUT TO 145.30m										2½h		
3) INSTALLATION OF PLASTIC WELL PIPE TO 90m											2h	
		TOTALS										

CASING TODAY

SIZE	FROM	TO	TOTAL

BITS USED

SIZE	TYPE	NUMBER

MATERIALS USED (Cement, Coreboxes etc.)

90m PLASTIC WELL PIPE (SLOTTED)

OPERATIONS	HRS	COMMENTS - OPERATIONS (IN-SITU TESTS, STANDPIPE, PIEZOMETER, INSTALLATIONS, INSPECTION PITS ETC.)
TRAVELLING		
RIG MOVE (DIST)		
DRILLING		
STANDING/DAYWORKS		
DELAYS		
TOTAL	9½	

PLANT ON SITE

CO PLANT	No.	HIRE PLANT

Form DDR 002

DRILLER SIGNATURE..

CLIENT SIGNATURE..

British Geological Survey
BGS ID: 20014079 : BGS Reference: NZ44NW370
British National Grid (27700) : 443110,546640

Allied Exploration & Geotechnics Ltd. Tel: (0207) 230099

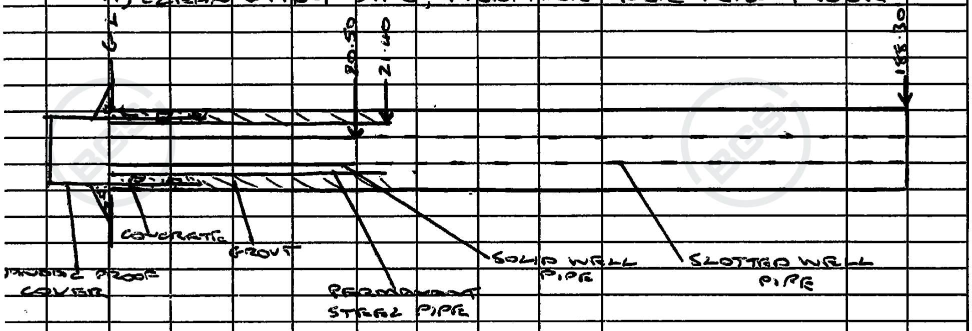
DAILY DRILLING REPORT - ROTARY

DAY/DATE: SAT 15 . 2 1992 SHEET 1 OF 1

CONTRACT No.	CLIENT	SITE NAME	RIG No.	DRILLER	DRILL ASSISTANTS
2002	N.R.A.	EAST DURHAM	203	J. GOWANS	J. LAING

BOREHOLE No [redacted] KIDNEY HILL	FLUSHING MEDIUM	WATER HORIZONS 1) m 2) m 3) m	
INCLINATION VERTICAL	HOURS ON SITE FROM TO	WATER LEVEL START OF SHIFT m	CASING AT m
WEATHER DRY	DAY/NIGHT SHIFT TOTAL HRS	WATER LEVEL END OF SHIFT m	CASING AT m

DRILLING RECORD								CASING			FLUSH RETURN	BIT NUMBER
RUN No.	TIME	SIZE	FROM	TO	O.H.	CORE	REC.	SIZE	DEPTH	STRATA DESCRIPTION	%	
DELAYS												
		i) RIG BRAKEDOWN (SPLIT HYDRAULIC STEERING PIPE)										
		ii) CLEAN + TIDY SITE, PREPARE FOR RIG MOVE										
		TOTALS										



CASING TODAY			
SIZE	FROM	TO	TOTAL

BITS USED		
SIZE	TYPE	NUMBER

MATERIALS USED (Cement, Coreboxes etc.)
78m SLOTTED WELL PIPE
20.50m SOLID WELL PIPE
1 x VANDAL PROOF COVER
1 x BAG SAND
1 x BAG CEMENT
1 x BAG GRAVEL

OPERATIONS	HRS	COMMENTS - OPERATIONS (IN-SITU TESTS, STANDPIPE, PIEZOMETER, INSTALLATIONS, INSPECTION PITS ETC.)
TRAVELLING		
RIG MOVE (DIST)		
DRILLING		
STANDING/DAYWORKS	3	INSTALLATION OF PLASTIC WELL PIPE (AS ABOVE) + INSTALLATION OF VANDAL PROOF COVER.
DELAYS	4½	AS ABOVE
TOTAL	7½	

PLANT ON SITE		
CO PLANT	No.	HIRE PLANT
RIG, 203		TRANSIT
		COMPRESSOR
		WATER BOWSER

DRILLER SIGNATURE..

CLIENT SIGNATURE..

Form DDR 002

Contact BGS: ngdc@bgs.ac.uk

BGS ID: 20014079 : BGS Reference: NZ44NW370
British National Grid (27700) : 443110,546640

Contact BGS: ngdc@bgs.ac.uk

Allied Exploration & Geotechnics Ltd.

Tel: (0207) 230099

DAILY DRILLING REPORT - ROTARY

DAY/DATE: MON 17 · 2 19 92 SHEET 1 OF 1

CONTRACT No.	CLIENT	SITE NAME	RIG No.	DRILLER	DRILL ASSISTANTS
2002	N.G.A.	EAST DURHAM	R03	J. GOWANS	S. LAING

BOREHOLE No [redacted] KIDNEY HILL	FLUSHING MEDIUM	WATER HORIZONS 1) m 2) m 3) m	
INCLINATION	HOURS ON SITE FROM TO	WATER LEVEL START OF SHIFT m	CASING AT m
WEATHER	DAY/NIGHT SHIFT TOTAL HRS	WATER LEVEL END OF SHIFT m	CASING AT m

DRILLING RECORD								CASING			FLUSH RETURN	BIT NUMBER
JN No.	TIME	SIZE	FROM	TO	O.H.	CORE	REC.	SIZE	DEPTH	STRATA DESCRIPTION	%	
	i) STRIP & CLEAN HAMMER (FULL OF SAND DUE TO SLOW BACK 7.2.92)											
	ii) WAIT FOR NEW HYDROLIC STEERING PIPE TO BE MADE											
	iii) FIT NEW HYDROLIC PIPE ON RIG											
			TOTALS									

CASING TODAY			
SIZE	FROM	TO	TOTAL

BITS USED		
SIZE	TYPE	NUMBER

MATERIALS USED (Cement, Coreboxes etc.)

OPERATIONS		HRS	COMMENTS - OPERATIONS IN-SITU TESTS, STANDPIPE, PIEZOMETER, INSTALLATIONS, INSPECTION PITS ETC.
TRAVELLING			
RIG MOVE	DIST		
DRILLING			
STANDING/DAYWORKS			
DELAYS			
TOTAL		9½	

PLANT ON SITE		
CO PLANT	No.	HIRE PLANT
RIG, R03		TRANSIT
		COMPRESOR
		WATER BOWSER

Form DDR 002

DRILLER SIGNATURE.....

CLIENT SIGNATURE.....

British Geological Survey

BGS ID: 20631324 : BGS Reference: NZ44NW395
British National Grid (27700) : 441468,545979

BOREHOLE REFERENCE			
25	5	183	

Grid Reference	NZ 4149 4600
Name	Hawthorn West

Licence Number	Catchment Area Number	Archive Number	1in Geol Map Number	N.C.B. Number

Level Reference (metres OD)	Surface Level (metres OD)	Depth of Bore (metres)	Diameter of Bore (centimetres)	Initial Water Level
107·895		146·65	15	

Date Drilled	FEB 91
Driller	AEG
Pump Test	
Geol Log	✓
Water Analysis	

Aquifer Details and Casing Information

Mag Lst

Steel casing to 15m

Slotted 5" ϕ well screen from 15m to 146·65 m, extended to surface with plain screen.

455F0174

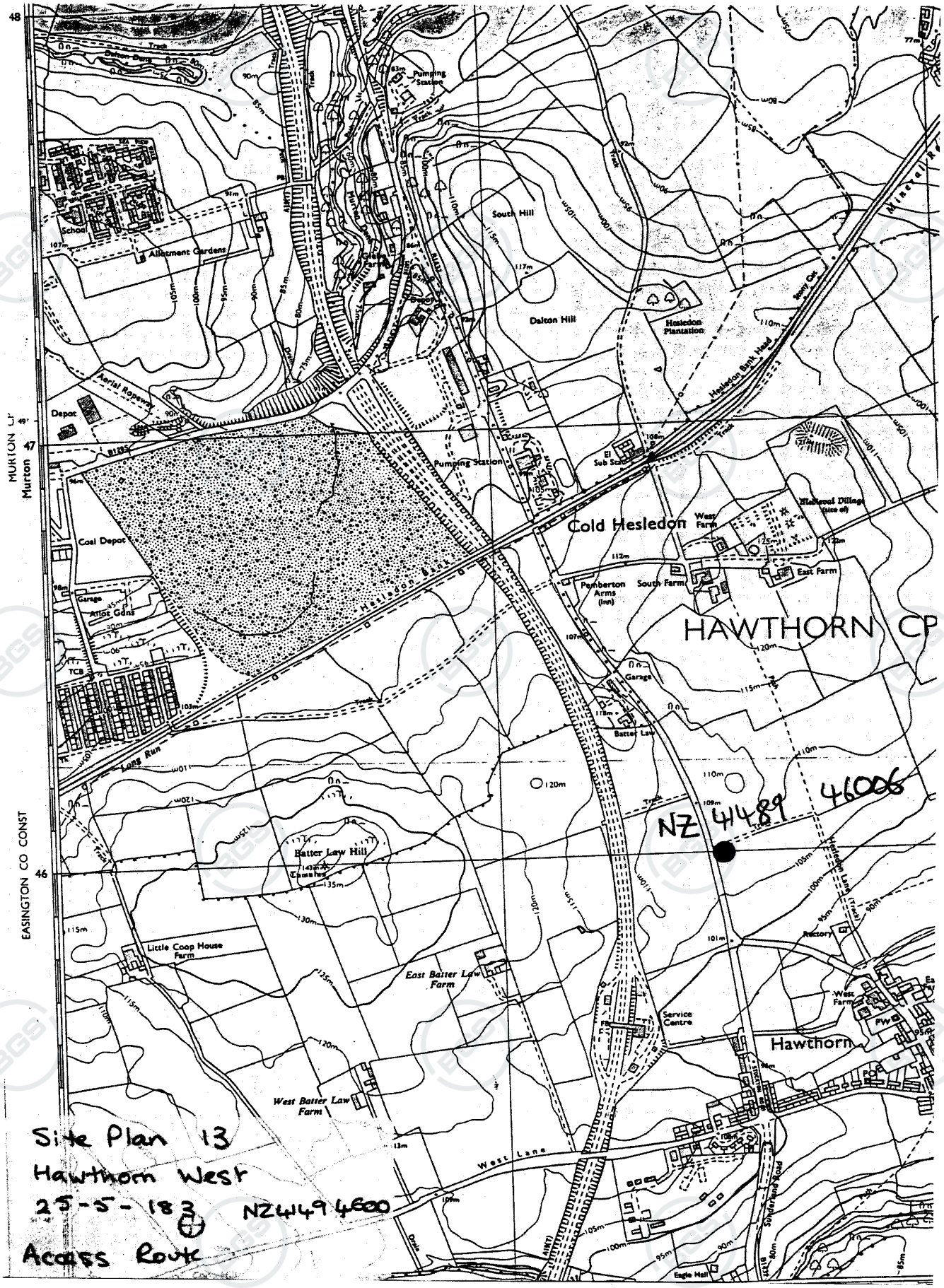
Borehole Use	OBH
Licenced Quantity	

Owner / Tenant

[redacted],
West Farm
Hawthorn Village
Seaham
Co. Durham SR7 8SG
[redacted]

Additional Information

Contact BGS: ngdc@bgs.ac.uk


Cold Hesledon
HAWTHORN CP
Hawthorn
South Hill
Dalton Hill
Batter Law Hill
Pumping Station
Allotment Gardens
Coal Depot
Depot
Aerial Ropeway
Pemberton Arms (Inn)
South Farm
East Farm
West Farm
Service Centre
Factory
Little Coop House Farm
East Batter Law Farm
West Batter Law Farm
Hesledon Plantation
Hesledon Burn
Long Run
West Lane
Eagle Hall
Site Plan 13
Hawthorn West
25-5-18
NZ4149 4600
Access Route
NZ 4148 46006

British Geological Survey

BGS ID: 20631324 : BGS Reference: NZ44NW395
British National Grid (27700) : 441468,545979

Allied Exploration & Geotechnics Ltd.

Tel: (0207) 230099

DAILY REPORT

LOCATION SOUTH DURHAM | CLIENT N.R.A.

Water Levels	Start of Day	Mid-day	End of Day	On Pulling Casing	24 Hrs After Pulling Casing
Depth to Water			DRY		
Depth of Borehole	GL		9.20		
Depth Cased	GL		8.83		
Water Strike	HOIST AT 2.90 DOWN TO 3.70.			Movement in the water level after strike. Level in Metres BGL	
Depth Cased				5 MIN.	
Depth Sealed				10 MIN.	
Depth Water Added				15 MIN.	
				20 MIN.	

Casing Diameter	Depth Start of day	Depth End of Day
250 mm	GL	8.83
200 mm		
150 mm		
BH Dia 250 mm	GL	9.20
200 mm		
150 mm		

Crew Hrs.
P. DIXON.
M. ROWLANDS.

Contract No. 2002
Rig No. SA6
Date 20-1-92
BH No. HAWTHORN WEST
Sheet No. 1 of 1
Weather Conditions FINE.

Thickness of Strata Change From	To	DESCRIPTION OF STRATA Consistency - Colour - Soil Type	DEPTH TAKEN/DRIVEN From	To	SAMPLES No	Type	Jar Tube No	U100 Length Recovered	Blows	SPT/CPT BLOWS 150 mm	75 mm	75 mm	75 mm	75 mm	S/C
GL	0.40	LOOSE BLACK TOP SOIL.	1.00		1	LABEL BAG									
			2.00		2	"		"							
0.40	0.85	FIRM, LIGHT BROWN SANDY CLAY	3.00		3	"		"							
		WITH GREY VEINS AND VEGETATION	4.00		4	"		"							
		CONTENT.	5.00		5	"		"							
			6.00		6	"		"							
0.85	2.90	STIFF DARK BROWN BOULDER CLAY.	7.00		7	"		"							
			8.00		8	"		"							
2.90	3.60	SOFT TO FIRM LIGHT BROWN VERY	9.00		9	"		"							
		SANDY CLAY WITH SMALL GRAVEL													
		CONTENT.													
3.60	6.90	FIRM TO STIFF, DARK GREY SILTY													
		CLAY, CHANGING TO LIGHT BROWN													
		FROM 6.55.													
6.90	9.00	VERY STIFF, BROWN, SANDY BOULDER													
		CLAY WITH LIMESTONE AND COAL CONTENT.													
9.00	9.20	DENSE VERY BADLY BROKEN LIMESTONE, WITH COURSE GRIT AND SMALL GRAVELS.													

QUANTITIES: Boring 9.20 m Bulks ..... Jars ..... U100 ..... CPT/SPT .....

Hours on Site

		Hrs.
Boring and Sampling from	GL to 9.20	Hrs.
Moves Between	SET RIG UP ON HAWTHORN WEST.	Hrs.
Delays		Hrs.
Total	WAITING FOR M. ROWLANDS, ARRIVING FROM THE YARD.	Hrs.

Standing Time of Day Works

Reason	Hrs.

Chiselling

From	To	Hrs.
7.10 BOULDER	7.60	½

Drillers Signature P. Dix

Supervisors Signature

Clients Representatives Signature

Remarks

Key: W = Water Sample. SPT CPT = Insitu Penetration Test. S = Spoon C = Cone.
U100 = Undisturbed. J = Small Disturbed (jar) Sample B = Bulk Disturbed Sample.

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 20631324 : BGS Reference: NZ44NW395
British National Grid (27700) : 441468,545979

Allied Exploration & Geotechnics Ltd.

Tel: (0207) 230099

DAILY REPORT

LOCATION SOUTH DURHAM | CLIENT N.R.A.

Water Levels	Start of Day	Mid-day	End of Day	On Pulling Casing	24 Hrs After Pulling Casing
Depth to Water	DRY				
Depth of Borehole	9.20		14.50		
Depth Cased	8.83		14.20		
Water Strike				Movement in the water level after strike. Level in Metres BGL	
Depth Cased				5 MIN.	
Depth Sealed				10 MIN.	
Depth Water Added	FROM 9.20 TO 14.50 AT ALL TIMES			15 MIN.	
				20 MIN.	

Casing Diameter	Depth Start of day	Depth End of Day
250 mm	8.83	14.20
200 mm		
150 mm		
BH Dia		
250 mm	9.20	14.50
200 mm		
150 mm		

Crew Hrs.
P. DIXON
M. ROWLANDS.

Contract No. 2002
Rig No. SA6
Date 21-1-92
BH No. HAWTHORN WEST
Sheet No. 1 of 1
Weather Conditions FINE.

Thickness of Strata Change From	To	DESCRIPTION OF STRATA Consistency - Colour - Soil Type	DEPTH TAKEN/DRIVEN From	To	SAMPLES No.	Type	Jar Tube No	U100 Length Re covered	Blows	SPT/CPT BLOWS 150 mm	75 mm	75 mm	75 mm	75 mm	S/C
9.20	12.90	VERY DENSE COURSE GRIT WITH	10.00		10	LARGE BAG									
		SMALL TO MEDIUM GRAVELS. AND	11.00		11	"	"	"							
		LIMESTONE, BOULDERS AND COBBLES	12.00		12	"	"	"							
			13.00		13	"		"							
12.90	13.30	FIRM TO STIFF, BROWN BOULDER CLAY.	14.00		14	"		"							
13.30	14.50	WEATHERED LIMESTONE													
	✱	PICK 7" PERMANENT CASING UP FROM U.D.S. INSTALL IT IN BH HAWTHORN WEST. GROUT UP BH FROM 14.50 UP TO 1.00M.													

QUANTITIES: Boring 5.20 m Bulks ..... Jars ..... U100 ..... CPT/SPT .....

Hours on Site		Hrs.
	Boring and Sampling from 9.20 to 14.50	Hrs.
	Moves Between	Hrs.
	Delays fill WATER BOWSER	Hrs.
	Total	Hrs.

Standing Time of Day Works

Reason	Hrs.

Chiselling

From	To	Hrs.
9.20	12.90	4

LIMESTONE BOULDERS AND COBBLES.

Remarks

Drillers Signature P. Dixon

Supervisors Signature

Clients Representatives Signature

Key: W = Water Sample. SPT CPT = Insitu Penetration Test. S = Spoon C = Cone.
U100 = Undisturbed J = Small Disturbed (jar) Sample. B = Bulk Disturbed Sample.

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 20631324 : BGS Reference: NZ44NW395
British National Grid (27700) : 441468,545979

Allied Exploration & Geotechnics Ltd. Tel: (0207) 230099

DAILY DRILLING REPORT - ROTARY

DAY/DATE: TUE 18.2 19 92 SHEET 1 OF 1

CONTRACT No.	CLIENT	SITE NAME	RIG No.	DRILLER	DRILL ASSISTANTS
2002	N.R.A.	EAST DURHAM	203	J. GOWANS	J. GANG

BOREHOLE No HAWTHORN WEST	FLUSHING MEDIUM AIR		WATER HORIZONS	1) 116.42m	2) m 3) m
INCLINATION VERTICAL	HOURS ON SITE FROM	TO	WATER LEVEL START OF SHIFT	m	CASING AT m
WEATHER	DAY/NIGHT SHIFT	TOTAL HRS	WATER LEVEL END OF SHIFT	m	CASING AT m

DRILLING RECORD								CASING			FLUSH RETURN	BIT NUMBER
RUN No.	TIME	SIZE	FROM	TO	O.H.	CORE	REC.	SIZE	DEPTH	STRATA DESCRIPTION	%	
1		6 1/4	14.65	31.50	16.85	~	~	~	~	LIMESTONE		
2		6 1/4	31.50	34.05	2.45	~	~	~	~	CALCITE GRAVELS		
3		6 1/4	34.05	35.60	1.55	~	~	~	~	CALCITE GRAVELS WITH CLAY BANDS		
[redacted]												
4		6 1/4	35.60	122.65	87.05	~	~	~	~	LIMESTONE.		
				TOTALS	108.00							

CASING TODAY

SIZE	FROM	TO	TOTAL

BITS USED

SIZE	TYPE	NUMBER

MATERIALS USED (Cement, Coreboxes etc.)

OPERATIONS	HRS	COMMENTS - OPERATIONS (IN-SITU TESTS, STANDPIPE, PIEZOMETER, INSTALLATIONS, INSPECTION PITS ETC.)
TRAVELLING		
RIG MOVE DIST	2	FROM KIRKLEY HILL TO HAWTHORN WEST
DRILLING	7 1/2	AS ABOVE
STANDING/DAYWORKS		
DELAYS		
TOTAL	9 1/2	

PLANT ON SITE

CO PLANT	No.	HIRE PLANT
RIG, RO3		TRANS IT
		COMPRESOR
		WATER RANGER
		TRACTOR

DRILLER SIGNATURE.....

CLIENT SIGNATURE.....

Form DDR 002

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 20631324 : BGS Reference: NZ44NW395
British National Grid (27700) : 441468,545979

Allied Exploration & Geotechnics Ltd.

Tel: (0207) 230099

DAILY DRILLING REPORT - ROTARY

DAY/DATE: WED 15. 2199 SHEET 1 OF 1

CONTRACT No.	CLIENT	SITE NAME	RIG No.	DRILLER	DRILL ASSISTANTS
2002	N.Z.A.	EAST DURHAM	R03	J. GOWANS	J. LANG

BOREHOLE No HAWTHORN WEST	FLUSHING MEDIUM AIR	WATER HORIZONS 1) m 2) m 3) m	
INCLINATION VERTICAL	HOURS ON SITE FROM TO	WATER LEVEL START OF SHIFT m	CASING AT m
WEATHER	DAY/NIGHT SHIFT TOTAL HRS	WATER LEVEL END OF SHIFT m	CASING AT m

DRILLING RECORD								CASING			FLUSH RETURN	BIT NUMBER
RUN No.	TIME	SIZE	FROM	TO	O.H.	CORE	REC.	SIZE	DEPTH	STRATA DESCRIPTION	%	
5		6¼	122.65	125.40	2.75	~	~	~	~	LIMESTONE		
6		6¼	125.40	145.05	19.65	~	~	~	~	NO RETURNS		
7		6¼	145.05	146.65	1.60	~	~	~	~	NO RETURNS (SUSPECT SAND)		
DELAYS												
		i)	TRAVEL TO BLAYDON TO PICK UP PLASTIC WELL PIPE									
		ii)	INSTALLATION OF PLASTIC WELL PIPE TO 60m									
			TOTALS		24.00							

CASING TODAY

SIZE	FROM	TO	TOTAL

BITS USED

SIZE	TYPE	NUMBER

MATERIALS USED (Cement, Coreboxes etc.)

60m SLOTTED WELL PIPE.

OPERATIONS	HRS	COMMENTS - OPERATIONS (IN-SITU TESTS, STANDPIPE, PIEZOMETER, INSTALLATIONS, INSPECTION PITS ETC.)
TRAVELLING		
RIG MOVE DIST		
DRILLING	3	AS ABOVE
STANDING/DAYWORKS		
DELAYS	6½	AS ABOVE
TOTAL	9½	

PLANT ON SITE

CO PLANT	No.	HIRE PLANT
RIG, R03		TRANSIT
		COMPRESSOR
		WATER BOWSER

DRILLER SIGNATURE.....

CLIENT SIGNATURE.....

Form DDR 002

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 20631324 : BGS Reference: NZ44NW395
British National Grid (27700) : 441468,545979

Allied Exploration & Geotechnics Ltd. Tel: (0207) 230099

DAILY DRILLING REPORT - ROTARY

DAY/DATE: THUR 20.2 1992 SHEET 1 OF 1

CONTRACT No.	CLIENT	SITE NAME	RIG No.	DRILLER	DRILL ASSISTANTS
2002	N.R.A.	EAST DURHAM	R03	J. GOWANS	J. LAING

BOREHOLE No HAWTHORN WEST	FLUSHING MEDIUM AIR	WATER HORIZONS 1) m 2) m 3) m			
INCLINATION VERTICAL	HOURS ON SITE FROM TO	WATER LEVEL START OF SHIFT m	CASING AT m		
WEATHER	DAY/NIGHT SHIFT TOTAL HRS	WATER LEVEL END OF SHIFT m	CASING AT m		

DRILLING RECORD								CASING			FLUSH RETURN	BIT NUMBER
RUN No	TIME	SIZE	FROM	TO	O.H.	CORE	REC.	SIZE	DEPTH	STRATA DESCRIPTION	%	
				16.50								146.65
										MANHOLE PROOF COVER		
										CONCRETE		
										GROUT		
										PROTECTIVE STEEL PIPE		
										SOLID WELL PIPE		
										SLOTTED WELL PIPE		
										DELAYS		
										i) INSTALLATION OF PLASTIC WELL PIPE FROM 60m TO 146.65m		
										ii) INSTALLATION OF MANHOLE PROOF COVER		
										iii) REMOVE DRILL RODS FROM FARM TO WIDNEY HILL FARM		
				TOTALS								

CASING TODAY			
SIZE	FROM	TO	TOTAL

BITS USED		
SIZE	TYPE	NUMBER

MATERIALS USED (Cement, Coreboxes etc.)
72m SLOTTED WELL PIPE
15m SOLID WELL PIPE

OPERATIONS	HRS	COMMENTS - OPERATIONS (IN-SITU TESTS, STANDPIPE, PIEZOMETER, INSTALLATIONS, INSPECTION PITS ETC.)
TRAVELLING		
RIG MOVE DIST		
DRILLING		
STANDING/DAYWORKS		
DELAYS	9½	AS ABOVE
TOTAL	9½	

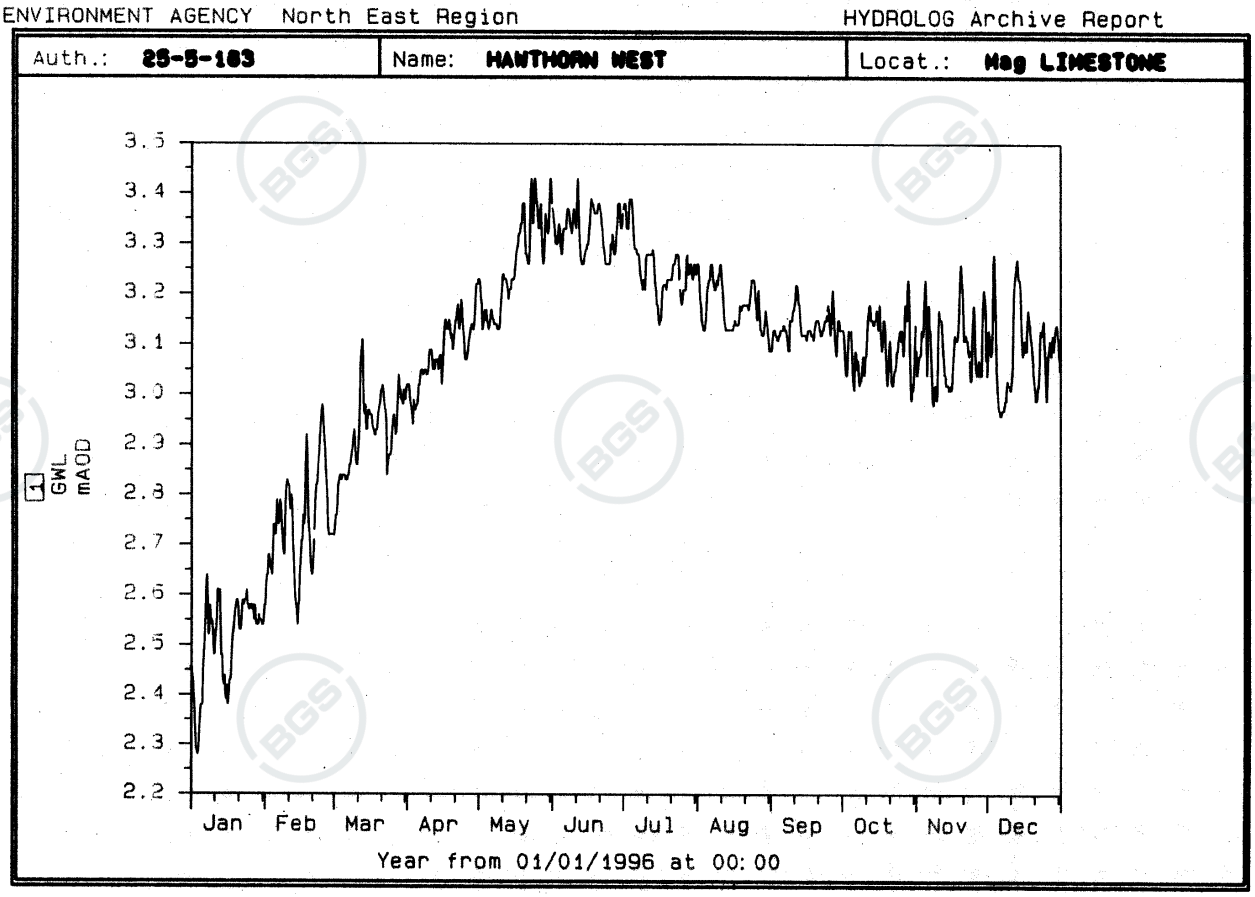
PLANT ON SITE		
CO PLANT	No.	HIRE PLANT
RIG, R03		TRANSIT
		COMPRESSOR 15
		WATER BOWSER

Form DDR 002

DRILLER SIGNATURE.....

CLIENT SIGNATURE

Contact BGS: ngdc@bgs.ac.uk


ENVIRONMENT AGENCY North East Region
HYDROLOG Archive Report
Auth.: 25-5-103
Name: HAWTHORN WEST
Locat.: Mag LIMESTONE
GWL mAOD
3.5
3.4
3.3
3.2
3.1
3.0
2.9
2.8
2.7
2.6
2.5
2.4
2.3
2.2
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Year from 01/01/1996 at 00:00

Borehole Log

BH201

Project Name: A19/A82 Junction Project No: S210427

Borehole ID: BH201

Location: Co-ords (British National Grid): 441091.8 - 546476 Level: 109.93

Hole Type: CP+RC Logged By: Dates: -

Client: Durham County Council Contractor: Project Engineer:

Plant Used: SPT Hammer Serial No:

Well	Water	Samples Depth (m)	Samples Type	Result	Depth (m)	Level (m)	Legend	Stratum Description	Depth m
								MADE GROUND Firm becoming stiff consistency brown slightly sandy slightly gravelly clay fill Sand is fine to coarse Gravel is fine to coarse angular to subrounded of sandstone limestone and mudstone Low cobble content Cobbles are subangular to subrounded of sandstone and mudstone Possibly reworked	0.5
				N=15 (3,3/15 for 450mm)					1.0
									1.5
					2.00	107.93			2.0
								Stiff consistency brown slightly sandy slightly gravelly high strength CLAY Sand is fine to coarse Gravel is fine to coarse angular to subrounded of sandstone limestone and mudstone Low cobble content Cobbles are subangular to subrounded of sandstone and mudstone	2.5
				N=18 (3,3/18 for 450mm)					3.0
									3.5
								Light yellowish cream highly weathered dolomitic LIMESTONE Recovered as slightly clayey slightly sandy fine to coarse angular gravel FORD FORMATION	4.0
									4.5
					4.80	105.13			
				N=50+ (25 for 110mm/50 for 160mm)					

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Project Name: A19/A82 Junction Project No: S210427

Borehole ID: BH201

Location: Co-ords (British National Grid): 441091.8 - 546476 Level: 109.93

Hole Type: CP+RC Logged By: Dates: -

Client: Durham County Council Contractor: Project Engineer:

Plant Used: SPT Hammer Serial No:

Well	Water	Samples Depth (m)	Samples Type	Result	Depth (m)	Level (m)	Legend	Stratum Description	Depth m
				N=50+ (25 for 110mm/50 for 160mm)					
					5.50	104.43		Light yellowish cream highly weathered dolomitic LIMESTONE Recovered as slightly clayey slightly sandy fine to coarse angular gravel FORD FORMATION	
								Very weak to weak yellowish brown moderately weathered displaying homey comb texture fine to coarse grained dolomitic LIMESTONE Fractures Sub horizontal very closely to medium spaced irregular and rough FORD FORMATION	

5.5
6.0
6.5
7.0
7.5
8.0
8.5
9.0
9.5

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Project Name: A19/A82 Junction Project No: S210427

Borehole ID: BH201

Location: Co-ords (British National Grid): 441091.8 - 546476 Level: 109.93

Hole Type: CP+RC Logged By: Dates: -

Client: Durham County Council Contractor: Project Engineer:

Plant Used: SPT Hammer Serial No:

Well	Water	Samples Depth (m)	Samples Type	Result	Depth (m)	Level (m)	Legend	Stratum Description	Depth m
								Very weak to weak yellowish brown moderately weathered displaying homey comb texture fine to coarse grained dolomitic LIMESTONE Fractures Sub horizontal very closely to medium spaced irregular and rough FORD FORMATION	10.5
									11.0
									11.5
									12.0
									12.5
				N=50+ (25 for 25mm/50 for 85mm)					13.0
									13.5
				N=50+ (25 for 0mm/50 for 35mm)					14.0
									14.5
				N=50+ (25 for 10mm/50 for 50mm)					

IMPORTANT: This is a basic log auto-generated from AGS data held by the National Geoscience Data Centre (NGDC) and does not necessarily include all of the information supplied in the original AGS file. If you wish to deposit AGS files to the NGDC please see www.bgs.ac.uk/services/ngdc. Generated 08-07-2026 at 15:34. BGS Reference 20220627140324271198

Project Name: A19/A82 Junction Project No: S210427

Borehole ID: BH201

Location: Co-ords (British National Grid): 441091.8 - 546476 Level: 109.93

Hole Type: CP+RC Logged By: Dates: -

Client: Durham County Council Contractor: Project Engineer:

Plant Used: SPT Hammer Serial No:

Well	Water	Samples Depth (m)	Samples Type	Result	Depth (m)	Level (m)	Legend	Stratum Description	Depth m
				N=50+ (25 for 10mm/50 for 50mm)	15.45	94.48		Very weak to weak yellowish brown moderately weathered displaying homey comb texture fine to coarse grained dolomitic LIMESTONE Fractures Sub horizontal very closely to medium spaced irregular and rough FORD FORMATION	15.5
									16.0
									16.5
									17.0
									17.5
									18.0
									18.5
									19.0
									19.5

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GENERAL REMARKS

1. Hand dug inspection pit to 1.20m. 2. No groundwater encountered. 3. Piezometer installed on completion.

Borehole Log

BH202

Project Name: A19/A82 Junction Project No: S210427

Borehole ID: BH202

Location: Co-ords (British National Grid): 441068.6 - 546510.6 Level: 110.47

Hole Type: CP+RC Logged By: Dates: -

Client: Durham County Council Contractor: Project Engineer:

Plant Used: SPT Hammer Serial No:

Well	Water	Samples Depth (m)	Samples Type	Result	Depth (m)	Level (m)	Legend	Stratum Description	Depth m
								MADE GROUND Firm becoming stiff consistency brown slightly sandy slightly gravelly clay fill Sand is fine to coarse Gravel is fine to coarse angular to subrounded of sandstone limestone and mudstone Low cobble content Cobbles are subangular to subrounded of sandstone and mudstone Possibly reworked	0.5
									1.0
					1.40	109.07			1.5
				N=17 (2,3/17 for 450mm)					2.0
									2.5
								Stiff consistency brown sandy to very sandy slightly gravelly high strength CLAY Sand is fine to coarse Gravel is fine to coarse angular to subrounded of sandstone limestone and mudstone Low cobble content Cobbles are subangular to subrounded of sandstone and limestone	3.0
									3.5
				N=23 (3,4/23 for 450mm)					4.0
									4.5

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Borehole Log

BH202

Project Name: A19/A82 Junction Project No: S210427

Borehole ID: BH202

Location: Co-ords (British National Grid): 441068.6 - 546510.6 Level: 110.47

Hole Type: CP+RC Logged By: Dates: -

Client: Durham County Council Contractor: Project Engineer:

Plant Used: SPT Hammer Serial No:

Well	Water	Samples Depth (m)	Samples Type	Result	Depth (m)	Level (m)	Legend	Stratum Description	Depth m
					5.50	104.97		Stiff consistency brown sandy to very sandy slightly gravelly high strength CLAY Sand is fine to coarse Gravel is fine to coarse angular to subrounded of sandstone limestone and mudstone Low cobble content Cobbles are subangular to subrounded of sandstone and limestone	5.5
				N=50+ (25 for 35mm/50 for 105mm)					6.0
									6.5
									7.0
									7.5
								Very weak to weak yellowish brown highly to moderately weathered displaying homey comb texture fine to coarse grained dolomitic LIMESTONE Fractures Sub horizontal very closely to closely spaced irregular and rough FORD FORMATION	8.0
									8.5
									9.0
									9.5

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Borehole Log

BH202

Project Name: A19/A82 Junction Project No: S210427

Borehole ID: BH202

Location: Co-ords (British National Grid): 441068.6 - 546510.6 Level: 110.47

Hole Type: CP+RC Logged By: Dates: -

Client: Durham County Council Contractor: Project Engineer:

Plant Used: SPT Hammer Serial No:

Well	Water	Samples Depth (m)	Samples Type	Result	Depth (m)	Level (m)	Legend	Stratum Description	Depth m
								Very weak to weak yellowish brown highly to moderately weathered displaying homey comb texture fine to coarse grained dolomitic LIMESTONE Fractures Sub horizontal very closely to closely spaced irregular and rough FORD FORMATION	10.5
									11.0
									11.5
									12.0
									12.5
				N=50+ (25 for 20mm/50 for 70mm)					13.0
									13.5
				N=50+ (25 for 5mm/50 for 55mm)					14.0
									14.5
					15.00	95.47			

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GENERAL REMARKS

1. Hand dug inspection pit to 1.20m. 2. No groundwater encountered. 3. Piezometer installed on completion.

Borehole Log

BH203

Project Name: A19/A82 Junction Project No: S210427

Borehole ID: BH203

Location: Co-ords (British National Grid): 441045.7 - 546540.8 Level: 109.45

Hole Type: CP+RC Logged By: Dates: -

Client: Durham County Council Contractor: Project Engineer:

Plant Used: SPT Hammer Serial No:

Well	Water	Samples Depth (m)	Samples Type	Result	Depth (m)	Level (m)	Legend	Stratum Description	Depth m
					0.30	109.15		MADE GROUND Grass over dark brown slightly sandy slightly gravelly clayey topsoil Sand is fine to coarse Gravel is fine to coarse angular to subangular of sandstone	0.5
				N=14 (2,3/14 for 450mm)	1.20	108.25		MADE GROUND Firm to stiff consistency dark brown slightly sandy slightly gravelly clay fill Sand is fine to coarse Gravel is fine to coarse angular to subangular of sandstone mudstone limestone dolomite and coal	1.0 1.5 2.0 2.5
				N=15 (2,3/15 for 450mm)					3.0
				N=29 (3,4/29 for 450mm)				MADE GROUND Medium dense light to dark brown very sandy gravel Sand is fine to coarse Gravel is angular to subrounded of sandstone limestone and mudstone	3.5 4.0
				N=23 (2,3/23 for 450mm)					4.5

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Project Name: A19/A82 Junction Project No: S210427

Borehole ID: BH203

Location: Co-ords (British National Grid): 441045.7 - 546540.8 Level: 109.45

Hole Type: CP+RC Logged By: Dates: -

Client: Durham County Council Contractor: Project Engineer:

Plant Used: SPT Hammer Serial No:

Well	Water	Samples Depth (m)	Samples Type	Result	Depth (m)	Level (m)	Legend	Stratum Description	Depth m
				N=23 (2,3/23 for 450mm)				MADE GROUND Medium dense light to dark brown very sandy gravel Sand is fine to coarse Gravel is angular to subrounded of sandstone limestone and mudstone	
									5.5
									6.0
									6.5
								Firm becoming stiff consistency dark brown to grey slightly sandy slightly gravelly high strength CLAY Sand is fine to coarse Gravel is fine to coarse angular to subangular of sandstone limestone and mudstone	
				N=19 (3,3/19 for 450mm)	7.00	102.45			7.0
									7.5
									8.0
									8.5
								Light yellowish cream highly weathered dolomitic LIMESTONE Recovered as slightly clayey slightly sandy fine to coarse angular gravel FORD FORMATION	
									9.0
					9.50	99.95			9.5
					10.00	99.45			

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Borehole Log

BH203

Project Name: A19/A82 Junction Project No: S210427

Borehole ID: BH203

Location: Co-ords (British National Grid): 441045.7 - 546540.8 Level: 109.45

Hole Type: CP+RC Logged By: Dates: -

Client: Durham County Council Contractor: Project Engineer:

Plant Used: SPT Hammer Serial No:

Well	Water	Samples Depth (m)	Samples Type	Result	Depth (m)	Level (m)	Legend	Stratum Description	Depth m
				N=50+ (25 for 30mm/50 for 95mm)	15.00	94.45		Very weak to weak yellowish brown highly to moderately weathered displaying homey comb texture fine to coarse grained dolomitic LIMESTONE Fractures Sub horizontal very closely to medium spaced irregular and rough FORD FORMATION	10.5 11.0 11.5 12.0 12.5 13.0 13.5 14.0 14.5

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GENERAL REMARKS

1. Hand dug inspection pit to 1.20m. 2. No groundwater encountered. 3. Piezometer installed on completion.

Borehole Log

BH205

Project Name: A19/A82 Junction Project No: S210427

Borehole ID: BH205

Location: Co-ords (British National Grid): 441004.4 - 546572.6 Level: 110.84

Hole Type: CP Logged By: Dates: -

Client: Durham County Council Contractor: Project Engineer:

Plant Used: SPT Hammer Serial No:

Well	Water	Samples Depth (m)	Samples Type	Result	Depth (m)	Level (m)	Legend	Stratum Description	Depth m
					0.25	110.59		MADE GROUND Grass over dark brown slightly sandy slightly gravelly clayey topsoil Sand is fine to coarse Gravel is fine to medium angular to subangular of sandstone mudstone and dolomite	0.5
								MADE GROUND Firm consistency slightly sandy slightly gravelly becoming gravelly clay fill Sand is fine to coarse Gravel is fine to coarse angular to subrounded of sandstone and dolomite	1.0
									1.5
				N=50+ (1,1/8 for 450mm)	1.90	108.94		MADE GROUND Loose to medium dense light yellowish brown slightly sandy gravel Sand is fine to coarse Gravel is fine to coarse angular to subangular of dolomite	2.0
									2.5
				N=11 (2,2/11 for 450mm)				MADE GROUND Firm consistency brown to dark brown slightly sandy gravelly clay fill Sand is fine to coarse Gravel is fine to coarse angular to subrounded of sandstone mudstone limestone and dolomite	3.0
					3.50	107.34			3.5
				N=14 (2,2/14 for 450mm)	4.10	106.74		Stiff consistency dark brown to mottled grey slightly sandy slightly gravelly medium strength CLAY Sand is fine to coarse Gravel is fine to coarse angular to subrounded of sandstone mudstone and limestone Low cobble content Cobbles are subangular to subrounded of sandstone and limestone	4.0
									4.5

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Project Name: A19/A82 Junction Project No: S210427

Borehole ID: BH205

Location: Co-ords (British National Grid): 441004.4 - 546572.6 Level: 110.84

Hole Type: CP Logged By: Dates: -

Client: Durham County Council Contractor: Project Engineer:

Plant Used: SPT Hammer Serial No:

Well	Water	Samples Depth (m)	Samples Type	Result	Depth (m)	Level (m)	Legend	Stratum Description	Depth m
				N=13 (2,3/13 for 450mm)				Stiff consistency dark brown to mottled grey slightly sandy slightly gravelly medium strength CLAY Sand is fine to coarse Gravel is fine to coarse angular to subrounded of sandstone mudstone and limestone Low cobble content Cobbles are subangular to subrounded of sandstone and limestone	5.5
									6.0
									6.5
									7.0
					7.20	103.64			7.5
				N=17 (2,3/17 for 450mm)				Stiff consistency grey to dark grey slightly sandy slightly gravelly high strength CLAY Sand is fine to coarse Gravel is fine to coarse angular to subrounded of sandstone mudstone and limestone Low cobble content Cobbles are subangular to subrounded of sandstone and limestone	8.0
									8.5
									9.0
									9.5
				N=21 (2,3/21 for 450mm)					

IMPORTANT: This is a basic log auto-generated from AGS data held by the National Geoscience Data Centre (NGDC) and does not necessarily include all of the information supplied in the original AGS file. If you wish to deposit AGS files to the NGDC please see www.bgs.ac.uk/services/ngdc. Generated 13-08-2026 at 12:31. BGS Reference 20220627140324271201

Project Name: A19/A82 Junction Project No: S210427

Borehole ID: BH205

Location: Co-ords (British National Grid): 441004.4 - 546572.6 Level: 110.84

Hole Type: CP Logged By: Dates: -

Client: Durham County Council Contractor: Project Engineer:

Plant Used: SPT Hammer Serial No:

Well	Water	Samples Depth (m)	Samples Type	Result	Depth (m)	Level (m)	Legend	Stratum Description	Depth m
				N=21 (2,3/21 for 450mm)				Stiff consistency grey to dark grey slightly sandy slightly gravelly high strength CLAY Sand is fine to coarse Gravel is fine to coarse angular to subrounded of sandstone mudstone and limestone Low cobble content Cobbles are subangular to subrounded of sandstone and limestone	10.5
									11.0
									11.5
				N=20 (3,4/20 for 450mm)					12.0
									12.5
									13.0
									13.5
				N=23 (3,4/23 for 450mm)					14.0
									14.5

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Project Name: A19/A82 Junction Project No: S210427

Borehole ID: BH205

Location: Co-ords (British National Grid): 441004.4 - 546572.6 Level: 110.84

Hole Type: CP Logged By: Dates: -

Client: Durham County Council Contractor: Project Engineer:

Plant Used: SPT Hammer Serial No:

Well	Water	Samples Depth (m)	Samples Type	Result	Depth (m)	Level (m)	Legend	Stratum Description	Depth m
					15.50	95.34		Stiff consistency grey to dark grey slightly sandy slightly gravelly high strength CLAY Sand is fine to coarse Gravel is fine to coarse angular to subrounded of sandstone mudstone and limestone Low cobble content Cobbles are subangular to subrounded of sandstone and limestone	15.5 16.0 16.5 17.0 17.5 18.0 18.5 19.0 19.5

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GENERAL REMARKS

1. Hand dug inspection pit to 1.20m. 2. No groundwater encountered. 3. Piezometer installed on completion.

Borehole Log

BH208

Project Name: A19/A82 Junction Project No: S210427

Borehole ID: BH208

Location: Co-ords (British National Grid): 440908.2 - 546582.7 Level: 110.16

Hole Type: CP Logged By: Dates: -

Client: Durham County Council Contractor: Project Engineer:

Plant Used: SPT Hammer Serial No:

Well	Water	Samples Depth (m)	Samples Type	Result	Depth (m)	Level (m)	Legend	Stratum Description	Depth m
					0.20	109.96		MADE GROUND Dark brown slightly sandy slightly gravelly clayey topsoil Sand is fine to coarse Gravel is fine to coarse angular to subangular of sandstone limestone mudstone and brick fragments	0.5
					0.90	109.26			1.0
				N=14 (5,4/14 for 450mm)				MADE GROUND Firm consistency light to dark brown slightly sandy gravelly clay fill Sand is fine to coarse Gravel is fine to coarse angular to subangular of sandstone limestone and brick	1.5
				N=19 (3,4/19 for 450mm)					2.0
								MADE GROUND Firm consistency dark brown to grey slightly sandy very gravelly clay fill Sand is fine to coarse Gravel is fine to medium angular of mudstone	2.5
					2.90	107.26			3.0
				N=14 (3,3/14 for 450mm)					
								MADE GROUND Firm consistency light brown slightly sandy gravelly clay fill Sand is fine to coarse Gravel is fine to coarse angular to subangular of sandstone limestone and mudstone Possibly reworked	3.5
				N=16 (3,3/16 for 450mm)					4.0
									4.5
				N=19 (3,4/19 for 450mm)					

IMPORTANT: This is a basic log auto-generated from AGS data held by the National Geoscience Data Centre (NGDC) and does not necessarily include all of the information supplied in the original AGS file. If you wish to deposit AGS files to the NGDC please see www.bgs.ac.uk/services/ngdc. Generated 01-09-2026 at 15:23. BGS Reference 20220627140324271202

Project Name: A19/A82 Junction Project No: S210427

Borehole ID: BH208

Location: Co-ords (British National Grid): 440908.2 - 546582.7 Level: 110.16

Hole Type: CP Logged By: Dates: -

Client: Durham County Council Contractor: Project Engineer:

Plant Used: SPT Hammer Serial No:

Well	Water	Samples Depth (m)	Samples Type	Result	Depth (m)	Level (m)	Legend	Stratum Description	Depth m
				N=19 (3,4/19 for 450mm)				MADE GROUND Firm consistency light brown slightly sandy gravelly clay fill Sand is fine to coarse Gravel is fine to coarse angular to subangular of sandstone limestone and mudstone Possibly reworked	
				N=21 (3,5/21 for 450mm)					5.5
									6.0
					6.50	103.66			6.5
				N=10 (2,4/10 for 450mm)				Firm to stiff consistency reddish brown slightly sandy gravelly medium strength CLAY Sand is fine to coarse Gravel is fine to coarse angular of sandstone mudstone and limestone	7.0
									7.5
									8.0
					8.30	101.86		Stiff consistency grey sandy slightly gravelly high strength CLAY Sand is fine to coarse Gravel is fine to coarse angular to subangular of sandstone limestone and mudstone Low cobble content Cobbles are subangular of limestone and sandstone	8.5
				N=19 (2,3/19 for 450mm)					9.0
									9.5

IMPORTANT: This is a basic log auto-generated from AGS data held by the National Geoscience Data Centre (NGDC) and does not necessarily include all of the information supplied in the original AGS file. If you wish to deposit AGS files to the NGDC please see www.bgs.ac.uk/services/ngdc. Generated 01-09-2026 at 15:23. BGS Reference 20220627140324271202

Project Name: A19/A82 Junction Project No: S210427

Borehole ID: BH208

Location: Co-ords (British National Grid): 440908.2 - 546582.7 Level: 110.16

Hole Type: CP Logged By: Dates: -

Client: Durham County Council Contractor: Project Engineer:

Plant Used: SPT Hammer Serial No:

Well	Water	Samples Depth (m)	Samples Type	Result	Depth (m)	Level (m)	Legend	Stratum Description	Depth m
								Stiff consistency grey sandy slightly gravelly high strength CLAY Sand is fine to coarse Gravel is fine to coarse angular to subangular of sandstone limestone and mudstone Low cobble content Cobbles are subangular of limestone and sandstone	10.5
				N=20 (2,3/20 for 450mm)					11.0
									11.5
									12.0
									12.5
				N=25 (3,4/25 for 450mm)					13.0
									13.5
									14.0
									14.5
				N=23 (3,4/23 for 450mm)					

IMPORTANT: This is a basic log auto-generated from AGS data held by the National Geoscience Data Centre (NGDC) and does not necessarily include all of the information supplied in the original AGS file. If you wish to deposit AGS files to the NGDC please see www.bgs.ac.uk/services/ngdc. Generated 01-09-2026 at 15:23. BGS Reference 20220627140324271202

Project Name: A19/A82 Junction Project No: S210427

Borehole ID: BH208

Location: Co-ords (British National Grid): 440908.2 - 546582.7 Level: 110.16

Hole Type: CP Logged By: Dates: -

Client: Durham County Council Contractor: Project Engineer:

Plant Used: SPT Hammer Serial No:

Well	Water	Samples Depth (m)	Samples Type	Result	Depth (m)	Level (m)	Legend	Stratum Description	Depth m
				N=23 (3,4/23 for 450mm)	15.45	94.71		Stiff consistency grey sandy slightly gravelly high strength CLAY Sand is fine to coarse Gravel is fine to coarse angular to subangular of sandstone limestone and mudstone Low cobble content Cobbles are subangular of limestone and sandstone	15.5 16.0 16.5 17.0 17.5 18.0 18.5 19.0 19.5

IMPORTANT: This is a basic log auto-generated from AGS data held by the National Geoscience Data Centre (NGDC) and does not necessarily include all of the information supplied in the original AGS file. If you wish to deposit AGS files to the NGDC please see www.bgs.ac.uk/services/ngdc. Generated 01-09-2026 at 15:23. BGS Reference 20220627140324271202

GENERAL REMARKS

1. Hand dug inspection pit to 1.20m. 2. No groundwater encountered. 3. Piezometer installed on completion.

Appendix C Qualitative Risk Assessment Methodology

Confidential

RISK ASSESSMENT METHODOLOGY

The environmental risk assessment aims to assess the significance of each potential contaminant linkage. The key to the classification is that the designation of risk is based upon the consideration of both:

- **The magnitude of the potential consequence** (i.e. severity). It takes into account both the potential severity of the hazard and the sensitivity of the receptor.
- **The magnitude of probability** (i.e. likelihood). It takes into account both the presence of the hazard and receptor and the integrity of the pathway.

The definitions for the qualitative risk assessment have been taken from "Guidance for the Safe Development of Housing on Land Affected by Contamination" Annex 4 R&D Publication 66: 2008 Volume 2.

The Likelihood Probability Classifications of SPR Linkage being realised is presented in **Table C.1.**

TABLE C.1 LIKELIHOOD PROBABILITY CLASSIFICATIONS OF SPR LINKAGE BEING REALISED

Classification	Definition	Examples
Unlikely	There is pollutant linkage but circumstances are such that it is improbable that an event would occur even in the very long-term.	a) Elevated concentrations of toxic contaminants are present below hardstanding. b) Light industrial unit <10 yrs old containing a double skinned UST with annual integrity testing results available.
Low Likelihood	There is pollutant linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a long period such an event would take place and is less likely in the shorter term.	a) Elevated concentrations of toxic contaminants are present in soils at depths >1m in a residential garden, or 0.5-1.0m in public open space. b) Ground/groundwater contamination could be present on a light industrial unit constructed in the 1990s containing a UST in operation over the last 10 years – the tank is double skinned but there is no integrity testing or evidence of leakage.
Likely	There is pollutant linkage and all the elements are present and in the right place which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short-term and likely over the long-term.	a) Elevated concentrations of toxic contaminants are present in soils at depths of 0.5-1.0m in a residential garden, or the top 0.5m in public open space. b) Ground/ groundwater contamination could be present from an industrial site containing a UST present between 1970 and 1990. The tank is known to be single skin. There is no evidence of leakage although there are no records of integrity tests.
High Likelihood	There is pollutant linkage and an event would appear very likely in the short-term and almost inevitable over the long-term, or there is evidence at the receptor of harm or pollution	a) Elevated concentrations of toxic contaminants are present in soils in the top 0.5m in a residential garden. b) Ground/groundwater contamination could be present from chemical works, containing a number of USTs, having been in operation on the same site for over 50 years.

“Potential Consequence of Contaminant Linkage” gives an indication of the sensitivity of a given receptor to a particular source or contaminant of concern under consideration. It is based on full exposure via the particular linkage being examined. The classification of consequence is presented in **Table C.2**.

TABLE C.2 OUTLINE OF HAZARD CONSEQUENCE CLASSIFICATIONS FOR RECEPTOR TYPES FROM CONTAMINATION IMPACT:

Classification	Human Health	Controlled Water	Ecology	Property	Examples
				Structures/ Crops and animals	
Severe	Highly elevated concentrations **likely** to result in "significant harm" to human health as defined by the EPA 1990, Part 2A, if exposure occurs.	Equivalent to EA Category 1 pollution incident including persistent and/or extensive effects on water quality; leading to closure of a potable abstraction point; major impact on amenity value or major damage to agriculture or commerce.	Major damage to aquatic or other ecosystems, which **is likely** to result in a substantial adverse change in its functioning or harm to a species of special interest that endangers the long-term maintenance of the population.	Catastrophic damage to crops, buildings or property.	Significant harm to humans is defined in circular 01/2006 as death, disease*, serious injury, genetic mutation, birth defects or the impairment of reproductive functions. Major fish kill in surface water from large spillage of contaminants from site. Highly elevated concentrations of Hazardous or priority substances present in groundwater close to small potable abstraction (high sensitivity). Explosion, causing building collapse (can also equate to immediate human health risk if buildings are occupied).
Medium	Elevated concentrations which **could** result in "significant harm" to human health as defined by the EPA 1990, Part 2A if exposure occurs.	Equivalent to EA Category 2 pollution incident including significant effect on water quality; notification required to abstractors; reduction in amenity value or significant damage to agriculture or commerce.	Significant damage to aquatic or other ecosystems, which **may** result in a substantial adverse change in its functioning or harm to a species of special interest that may endanger the long-term maintenance of the population.	Significant damage to crops, buildings or property.	Significant harm to humans is defined in circular 01/2006 as death, disease*, serious injury, genetic mutation, birth defects or the impairment of reproductive functions. Damage to building rendering it unsafe to occupy e.g. foundation damage resulting in instability. Ingress of contaminants through plastic potable water pipes.

Classification	Human Health	Controlled Water	Ecology	Property	Examples
				Structures/ Crops and animals	
Mild	Exposure to human health **unlikely** to lead to "significant harm".	Equivalent to EA Category 3 pollution incident including minimal or short lived effect on water quality; marginal effect on amenity value, agriculture or commerce.	Minor or short lived damage to aquatic or other ecosystems, which **is unlikely** to result in a substantial adverse change in its functioning or harm to a species of special interest that would endanger the long-term maintenance of the population.	Minor damage to crops, buildings or property.	Exposure could lead to slight short-term effects (e.g. mild skin rash). Surface spalling of concrete.
Minor	No measurable effects on humans	Equivalent to insubstantial pollution incident with no observed effect on water quality or ecosystems.	Equivalent to insubstantial pollution incident with no observed effect on water quality or ecosystems.	Repairable effects of damage to buildings, structures and services.	The loss of plants in a landscaping scheme. Discoloration of concrete.

The risk matrix to link the likelihood and consequence is shown in **Table C.3**.

TABLE C.3 RISK MATRIX

Likelihood:	Unlikely	Low Likelihood	Likely	High Likelihood
Potential Consequence:				
Severe	Moderate/low risk	**Moderate Risk**	**High Risk**	**Very High Risk**
Medium	Low	Moderate/low risk	**Moderate Risk**	**High Risk**
Mild	Very low risk	Low Risk	Moderate/low risk	**Moderate Risk**
Minor	Very low risk	Very low risk	Low Risk	Low Risk

The overall risk definitions are summarised in **Table F.4.**

TABLE F.4 RISK DEFINITIONS

Risk	Definition
Very Low	It is a low possibility that harm could arise to a designated receptor, but it is likely at worst, that this harm if realised would normally be mild or minor.
Low	It is possible that harm could arise to a designated receptor from identified hazard, but it is likely at worst, that this harm if realised would normally be mild. It is unlikely that the site owner/or occupier would face substantial liabilities from such a risk. Further investigative work (which is likely to be limited) to clarify the risk may be required. Any subsequent remediation works are likely to be relatively limited.
Moderate	It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, and if any harm were to occur it is more likely, that the harm would be relatively mild. Further investigative work is normally required to clarify the risk and to determine the potential liability to site owner/occupier. Some remediation works may be required in the longer term.
High	Harm is likely to arise to a designated receptor from an identified hazard at the site without remediation action. Realisation of the risk is likely to present a substantial liability to the site owner/or occupier. Investigation is required as a matter of urgency to clarify the risk. Remediation works may be necessary in the short-term and are likely over the longer term.

Risk	Definition
Very High	There is a high probability that severe harm could arise to a designated receptor from an identified hazard at the site without remediation action OR there is evidence that severe harm to a designated receptor is already occurring. Realisation of that risk is likely to present a substantial liability to be site owner/or occupier. Investigation is required as a matter of urgency and remediation works likely to follow in the short-term.