

Appendix 12A: Phase I Geotechnical and Geo- Environmental Site Assessment

***Phase 1
Geotechnical &
Geo-Environmental
Site Assessment -
Eggborough CCGT***

May 2017

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***Prepared for: Eggborough Power
Limited***

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1. INTRODUCTION

1.1 General Introduction

AECOM Infrastructure & Environment UK Ltd (hereafter referred to as AECOM) was commissioned by Eggborough Power Limited (EPL) (the Applicant) to undertake a Phase 1 Geotechnical and Geo-Environmental Site Assessment (ESA) of the site of the proposed gas-fired power station at Eggborough. A Site location plan is provided in Annex A.

1.2 The Proposed Development

EPL is seeking development consent for the construction, operation and maintenance of a new gas-fired electricity generating station with a gross output capacity of up to 2,500 megawatts ('MW'), including electrical and water connections, a new gas supply pipeline and other associated development (the 'Project' or 'Proposed Development') on land at and in the vicinity of the existing Eggborough coal-fired power station, near Selby, North Yorkshire.

Subject to the necessary consents, construction is anticipated to start in 2019 and be completed in 2022.

The Development Consent Order (DCO) Application Site ('the Site') extends to approximately 102.5 hectares (ha) and consists of land within the existing coal-fired power station site and corridors of land to the north associated with the Proposed Cooling Water and Gas Connections.

The Proposed Development will provide vital new energy infrastructure required to ensure security of supply. CCGT, alongside renewables, will form part of a diverse energy mix that will replace ageing coal and nuclear power stations which are due to close over the next five to ten years (including the existing coal-fired power station).

1.3 Objective & Aims

The objective of the Phase 1 ESA is to determine the likely ground conditions beneath the Site and the potential for ground contamination arising from historical or current on-site or off-site activities. Although the Phase 1 ESA considers the existing coal-fired power station, specific reference is made to the construction and operation of the Proposed Development.

The Site comprises a number of discrete components including the following main areas:

- the location of the proposed CCGT plant on the existing coal stockyard (referred to hereafter as the 'Proposed Power Plant Site');
- the Proposed Construction Laydown area for the Proposed Development in the north-east of the existing coal-fired power station site;
- a connection to the existing National Grid substation within the existing coal-fired power station site (the 'Proposed Electricity Connection');
- two corridors to the existing cooling water abstraction and discharge points on the River Aire (hereafter referred to as the 'Proposed Cooling Water Connections');
- two connections to existing groundwater abstraction wells and connections to towns water (referred to as the 'Proposed Borehole and Towns Main Water Connections');
- a Proposed Surface Water Drainage Connection to Hensall Dyke in the south-east of the Site;
- works to the existing rail infrastructure (referred to as the 'Proposed Rail and Access Works');
- areas of existing landscape planting on the embankment around the existing coal stockyard and north of Wand Lane, that will be retained and managed as part of the Proposed Development (referred to as the 'Retained Landscaping' areas; and
- the proposed route corridor of the gas pipeline and AGI site connecting the Proposed Power Plant Site to the National Transmission System gas network at a point approximately 3.1 km north of the existing coal-fired power station site and referred to as the Proposed Gas Connection and AGI. The Proposed Gas Connection is covered by a separate Groundsure

Report and is reported separately from the rest of the Proposed Development in Sections 6 to 9 of this report.

The southernmost of the two Proposed Borehole Connections was not included in the original site plan, and assessment of this part of the Site has been made based on the information presented in the Groundsure Reports (see Appendix 12B, Environmental Statement (ES) Volume III).

The specific objectives of this Phase I ESA include:

- obtain and review information on the underlying ground conditions, including reviewing data collected through previous intrusive investigations;
- obtain and review information on the Site's current operations, history, potential sources of contamination and environmental setting;
- identify potential development constraints; and
- develop an initial Conceptual Site Model for the Site, including identification of potential source-pathway-receptor linkages.

1.4 Scope of Works

The scope of services for this Phase I ESA included:

- a site walkover of external areas by AECOM (completed on 17th August 2016);
- commissioning and review of Groundsure reports (including a regulatory database search, Coal Authority Report and historical Ordnance Survey (OS) maps);
- review of publically available web-based sources, including the Environment Agency (EA) website and British Geological Survey (BGS);
- review of relevant previous site investigation reports;
- assessment of anticipated ground conditions and identification of potential development constraints; and
- development of a preliminary Conceptual Site Model (CSM), identifying potential contaminants of concern, sources, pathways and receptors.

2. SITE DESCRIPTION

2.1 Site Location

The Site comprises for the most part land within the boundary of the existing coal-fired power station site at Eggborough, North Yorkshire, DN14 0BS, within the administrative areas of Selby District Council (SDC). The Site (the proposed limits of the land to which any DCO would apply) extends to circa 102.5 ha in area. The location and extent of the Site are shown in Annex A.

2.2 Proposed Development Layout

The indicative Proposed Development layout is shown on the plans provided in Annex A.

The Proposed Power Plant Site currently comprises the existing coal-fired power station's main coal stockyard and associated rail loop. The Proposed Power Plant Site also includes a small areas to the north-east of the existing rail loop (see Figure 3.2 in Annex A). This land is all within EPL's land ownership.

Vegetation within the Proposed Power Plant Site is limited to a small area of trees at the north-east corner of the area, with the majority of the Proposed Power Plant Site comprising hardstanding, buildings/ structures associated with coal handling and bare ground. There are areas of tree planting around the Power Plant Site boundaries that help to screen the Site from off-site neighbours.

The Proposed Power Plant Site is bounded:

- to the north and north-west by the existing coal-fired power station buildings and structures;
- to the east and south by an earth embankment with existing tree planting (within the existing coal-fired power station site) and agricultural fields beyond (some of which, i.e. those immediately to the south and north-east of the existing coal-fired power station, are in the ownership of EPL);
- to the south-west by the Saint Gobain glass factory; and
- to the west by an agricultural field (Tranmore Farm, which is within the ownership of EPL).

Existing structures within the footprint of development within the Proposed Power Plant Site will be removed at the start of construction, including the majority of the railway loop and the coal handling equipment. Rail access into the Site will be retained to facilitate delivery of construction materials by rail if feasible.

The Proposed Construction Laydown Area including contractors' compounds will be located within the existing coal-fired power station site to the north of the Proposed Power Plant Site (see Figure 3.2 in Annex A), on land within EPL's ownership. This land currently comprises a large lagoon for back-up cooling water storage for the existing coal-fired power station, temporary offices, strategic (emergency) coal stockyard, access roads and open storage areas.

The existing Yorkshire Water waste water treatment works and Air Liquide air separation unit to the north are outside the Site boundary.

The Proposed Borehole, Towns Main Water, Surface Water Drainage and Electricity Connections are within the existing coal-fired power station site/ EPL land ownership (with the exception of small areas of land within adjacent highways for proposed connections). The northernmost borehole is located adjacent to the Eggborough Sports and Social Club and bowling green; the southernmost borehole is located close to the junction of the A19 and Weeland Road. The National Grid electricity sub station is located in the west of the existing coal-fired power station site, to the north-west of the Proposed Power Plant Site. The surface water drainage connection to Hensall Dyke from the Proposed Power Plant Site will be via the culvert beneath the coal stockyard earth embankment.

The Proposed Rail and Access Works area is located to the north-west of the Proposed Power Plant Site, within the existing coal-fired power station, and the Retained Landscaping Area is located around the periphery of the existing coal-fired power station on land owned by EPL.

The Proposed Cooling Water and Gas Connections extend to the north of the Proposed Power Plant Site, linking to the existing coal-fired power station's abstraction and discharge points on the River Aire and to the National Transmission System gas network respectively.

2.3 The Surrounding Area

The area surrounding the existing coal-fired power station is generally rural, characterised by arable fields bounded by hedgerows, punctuated by a network of B and C roads and interspersed with small villages and farms. This is intersected north-south by the A19 (which lies to the west of the existing coal-fired power station) and by the East Coast Main Line (to the east of the existing coal-fired power station), and intersected east-west by the A645, Goole to Knottingley railway line, Knottingley and Goole Canal, and M62 (which all lie to the south of the existing coal-fired power station), and by the River Aire (to the north of the existing coal-fired power station).

The River Aire flows in a roughly north-west, south-east direction. At its closest point it is located approximately 650 m north/ north-east of the Proposed Construction Laydown Area and approximately 1.1 km north/ north-east of the Proposed Power Plant Site, at a meander known as Eggborough Ings. The Proposed Gas Connection passes under the River at this point, and the cooling water abstraction and outfall points are located on the River to the west and east respectively.

The village of Eggborough is located west of the A19, approximately 750 m south-west of the Proposed Power Plant Site, on the opposite side of the A19 to the existing A19/A645 Weeland Road borehole.

Gallows Hill is located approximately 500 m to the east of the Proposed Power Plant Site and the neighbouring village of Hensall is located approximately 950 m to the east/ south-east of the Proposed Power Plant Site (approximately 700 m to the east/ south-east of the Proposed Construction Laydown area).

Chapel Haddlesey is located on the opposite bank of the River Aire to the existing cooling water abstraction point and the westernmost property in Chapel Haddlesey is located approximately 80 m to the west of the Proposed Gas Connection corridor.

The village of Burn is located approximately 600 m to the north-east of the Proposed Gas Connection corridor and approximately 750 m east/ north-east of the Proposed AGI.

There are a number of other industrial developments in the vicinity of the existing coal-fired power station site, including Saint Gobain glass and insulation factory to the south-west, a car auctioning centre and several light industrial units on the west side of the A19 to the west and south-west.

Eggborough Power Station Golf Course, Sports and Social Club, cricket ground and model steam railway (collectively referred to as the Eggborough Sports and Leisure Complex) are located to the west of the existing coal-fired power station.

Given the Site's location, the nature and scale of the Proposed Development and the character of the surrounding area, no transboundary effects are predicted to arise from the Proposed Development that would affect any other European Economic Area state. No further consideration is therefore made in this ES to transboundary effects.

2.4 Site Walkover

A site walkover was completed by Guy Brumfield and Alex Freeman of AECOM on 17th August 2016. During the walkover, interviews were also held with Keith Bradshaw and Simon Bate of Eggborough Power Limited. The walkover was mainly focussed on the Proposed Power Plant Site and parts of the Proposed Construction Laydown Area. Limited observations were made in the adjacent areas of the existing turbine house, boiler house, cooling towers and golf course.

Selected photographs from the site walkover are included in Annex B.

Key observations in each of the four main areas included in the walkover are summarised below:

- **Proposed Construction Laydown, Proposed Electricity Connection, Proposed Rail and Access Works, and Retained Landscaping Area:** These areas included operational areas of the current power station such as the flue gas desulphurisation (FGD) plant and the 400kV sub station. Oil storage tanks were present within the existing coal fired power station and oil-water interceptors were present within the effluent drainage system. Within the Proposed Construction Laydown area was a large water storage lagoon which was understood to be used as an emergency water supply. An adjacent open area was used as a storage area for additional coal

(referred to as the strategic coal stockyard), however no coal was present at the time of the site walkover. A wooded embankment surrounded the strategic coal stockyard and connected with the embankment surrounding the main coal stockyard. To the north of the lagoon, and immediately outside the site boundary for the purpose of this assessment, was a compressed air manufacturing facility operated by Air Liquide. A wedge shaped piece of land between the Air Liquide site and the strategic coal stockyard lay outside of the land owned by EPL and was occupied by a sewage treatment works operated by Yorkshire Water;

- **Proposed Power Plant Site:** The Proposed Power Plant site is currently occupied by the existing coal stockyard, which comprised an open, flat storage area and at the time of the site walkover most of the previous coal stockpiles had been removed down to the basal 'coal carpet', with the remaining coal stockpile estimated to be less than 1,000 tonnes. The coal stockyard included warehouses and conveyor systems used to transport coal into the main boiler house, as well as limestone and gypsum for the FGD system. In addition, a 'merry-go-round' railway line circled the outside of the coal stockyard. At the south-eastern end of the coal stockyard a shallow 1 m deep trench had been excavated to improve surface water drainage and prevent ponding. The underlying natural sand deposits were visible in the bottom 0.5 m of the trench. The coal stockyard area was enclosed on most of the southern and eastern ends by concrete-lined drains and a wooded embankment, with ground level sloping towards the southeastern corner of the site;
- **Proposed Borehole and Towns Main Water Connections:** Located immediately to the west of the Site, Eggborough Sports and Social Club comprised recreational facilities, including a golf course, cricket pitch, football pitch and associated club house. A groundwater abstraction borehole and pumphouse ('Borehole No. 2') was located in this area - the northernmost of the two Proposed Borehole Connections. The southernmost Proposed Borehole Connection extended south adjacent to the private railway line, to an existing groundwater abstraction borehole ('Borehole No. 1'). This area was not accessed by AECOM during the site walkover;
- **Proposed Cooling Water Connections:** The Proposed Cooling Water Connections will be via the existing coal-fired power station's abstraction and discharge points. The Proposed Cooling Water Connections corridor extends north of the Proposed Power Plant Site through an agricultural field to the north of Wand Lane, crossing a small stream (Ings and Tetherings Drain) and intersecting the River Aire in two separate locations; the abstraction point was located adjacent to the A19 bridge over the River Aire, while the discharge point was located approximately 1.1 km downstream of the abstraction point;
- **Proposed Surface Water Connection:** Surface water will be discharged to Hensall Dyke to the south-east of the Proposed Power Plant Site. The existing filter bed was observed during site walkover; and
- **Proposed Gas Connection:** The proposed gas connection will extend north of the Proposed Power Plant Site crossing beneath the River Aire and connecting to Feeder 29 west of Burn village.

2.5 Additional Information from Site Walkover and EPL Personnel

2.5.1 Abstractions

EPL is understood to operate two groundwater abstraction wells, referred to as the Proposed Borehole Connections.

The northernmost Proposed Borehole Connection, Borehole No. 2, was located adjacent to the golf course, and was visited during the site walkover. From discussions with site staff it is understood that water abstraction from this well has been discontinued at present due to the presence of high iron concentrations within the abstracted groundwater.

The southernmost Proposed Borehole Connection, Borehole No.1, was located adjacent to the A19 roundabout with Weeland Road, approximately 1 km south of the Proposed Power Plant Site at the southern extent of the Site.

Three active surface water abstraction licenses were recorded for provision of irrigation, evaporative cooling and potable water; these all related to surface water extraction from the same point on the River Aire which was visited during the site walkover.

2.5.2 Drainage

A concrete-lined drain surrounded the southern portion of the coal stockyard (the Proposed Power Plant Site). It is understood that surface water was previously collected at the low point of the drain in the south-eastern corner of the stockpile area and passed through a culvert underneath the perimeter embankment to discharge to a filter bed at the issue of a small watercourse (Hensall Dyke), located in the south-eastern corner of the Site. The eastern end of the stockpile had reportedly recently been subject to surface water flooding and several trenches had been excavated trending northwards from the concrete drain. The trenches indicated that a coal apron extended to approximately 0.1 to 0.2 m below surface and was underlain by medium orange brown sand. A band of fine gravel was present towards the base of the exposure, indicating that the sand represents a natural deposit rather than made ground.

From discussions with site staff, the culvert had been subsequently blocked and a pump installed to transfer the drainage from the coal stockyard to the ash pit via a pipe running beneath the embankment. The drainage is mixed with slurried Pulverised Fuel Ash (PFA), before being transferred as ash transport water to Gale Common along a pipeline.

At the time of the site visit, water was observed issuing into the filter bed at the Proposed Surface Water Connection to Hensall Dyke, and the source of this water was unclear. Site staff suspected that this could represent runoff and infiltration from the embankment, though an alternate source may be the original field drains installed beneath the coal stockyard.

A similar concrete drain encircling the strategic coal stockyard was also identified during the walkover. The strategic stockpile area comprised a large flat piece of land with an ash gravel surface. A 3 m high pile of topsoil / ash was identified in the extreme southern part of the stockyard, which was heavily vegetated with mature trees. It is understood that coal was stored here as recently as 2015. Surface water flooding was reported to have occurred in the south-eastern corner of the stockpile within the last 18 months.

The drain appeared full of compact black silt fines derived from the coal. There were no obvious signs during the walkover where this drain discharged, but during subsequent review of the drainage plans, it was shown to discharge under gravity to a soakaway, located north-west of the Site, potentially in the parcel of land currently leased to Air Liquide.

Effluent discharge is understood to be discharged into the River Aire via a licensed discharge point at the cooling water discharge point.

2.5.3 Lagoon

The lagoon is located within the Proposed Construction Laydown Area. According to site staff it was reportedly excavated in natural ground, with the arising soil placed around the lagoon to create a visual screening bund. At the time of the inspection, the bund was heavily vegetated with mature pine, spruce and deciduous trees present. A pipe was identified in the north-western corner of the Site, which was reportedly formerly linked to the 'million gallon tank' to the west within the existing coal-fired power station site. It is understood from discussions with site staff that the lagoon was originally designed as an emergency water supply for boiler / cooling water in the event that the Yorkshire Water mains supply and borehole water was not available, but that the lagoon was never used as an emergency water supply.

A geotextile membrane was exposed at the upper sections of the lagoon banking. Lilies, reeds and other aquatic vegetation were present in the lagoon, which was reportedly home to many large perch. The banks were identified to comprise brown silty sand, with occasional patches of PFA visible.

2.5.4 Former FGD Laydown Area

Immediately south of the lagoon (also within the Proposed Construction Laydown Area) was an area of gravel, which was formerly utilised as a laydown area for construction of the FGD plant. The southern portion of this area was occupied by series of small portacabin type offices.

A basement structure was present immediately east of these buildings which reportedly housed two pumps used to transport drainage to the ash reservoir. One of the pumps was reported to intermittently break down. An isolated incidence of surface water flooding of this portion of the Site was reported to have occurred following a period of heavy rainfall (date unknown), which was believed to be due to failure of both pumps.

3. SITE ENVIRONMENTAL SETTING (EXCLUDING PROPOSED GAS CONNECTION CORRIDOR)

3.1 Introduction

The physical setting and environmental characteristics of the Site (excluding the Proposed Gas Connection corridor) are based on information obtained from the following sources:

- Groundsure Report GS-3164957 dated 8th July 2016, including a Coal Authority Report, (available on request);
- the BGS website (www.bgs.ac.uk), accessed 11th July 2016; and
- the EA website (<http://maps.environment-agency.gov.uk/>), accessed 11th July 2016.

3.2 Geology

3.2.1 Superficial and Bedrock Geology

A review of the Groundsure reports (see Appendix 12B, ES Volume III), British Geological Survey (BGS) 1:50,000 solid and drift geology sheet 79 for Goole, existing site investigation records and publically available BGS borehole records have been reviewed to identify the likely geological sequence at the Site.

From a review of BGS information and the geology sections of the Groundsure reports (Appendix 12B, ES Volume III), the following superficial deposits have been identified which may be present beneath the Site is listed below:

- alluvium;
- lacustrine beach deposits;
- Brighton sand formation;
- Hemingbrough glacio-lacustrine; and
- glacial till.

The relative extent outcrops of the uppermost superficial deposits in relation to the Site are discussed in more detail below.

Based on a review of the BGS sheets and Groundsure Report, superficial deposits are shown to be absent from much of the Proposed Power Plant Site, with the following exceptions:

- lacustrine beach deposits – shingle, sand, silt and clay; present at the north-western corner of the Proposed Power Plant Site; and
- glacial till – typically sandy and gravelly clays, with cobbles and boulders. The geological map indicates that these deposits may encroach onto the extreme south-western corner of the Proposed Power Plant Site.

Given that much of the Proposed Power Plant Site is occupied by the coal stockyard for the existing coal-fired power station, the presence of made ground is also anticipated.

The bedrock geological map and Groundsure Report indicate that the Site (including both Proposed Power Plant Site and Proposed Cooling Water and Gas Connections) is underlain by Sherwood sandstone. The following boreholes located close to the site encountered Sherwood sandstone:

- SE52SE99, located adjacent to the golf course (Borehole No2) encountered Sherwood sandstone to a minimum depth of 90 m below ground level (bgl), and did not penetrate the full thickness of the unit;
- SE52SE43, located adjacent to Wand Lane immediately east of the Site encountered Sherwood sandstone to a minimum depth of 93 m bgl, and did not penetrate the full thickness of the unit; and
- SE52SE41, located immediately south of the junction between the A19 and Weeland Road, south of the Site (Borehole No.1), encountered Sherwood sandstone to a maximum depth of 86 m bgl, with Permian Marl below this.

3.2.2 Coal Mining

The Groundsure Report indicates that the Site is located in an identified coal mining reporting area. The Coal Authority Report indicates that the Site is in an area that could be affected by underground mining in one seam of coal located at a depth of 730 m to 760 m and last worked in 2015. The Coal Authority Report records four damage claims relating to ground subsidence, two located on the Site and two located within 50 m of the Site.

A review of the Coal Authority reports and mine abandonment plans identified that the southern limit of the Site is underlain by the Kellingley coal mine. Mining at Kellingley Colliery ceased in December 2015, with the last coal seam mined beneath the southern boundary of the Site.

The Coal Mining Abandonment plans (Catalogue No.:18339 Sheets 5, 10 and 11 of 35) indicate that the mined panel closest to the Proposed Power Plant Site is panel YZ502, which reached a final stop position in October 2012. Settlement monitoring commenced around the perimeter of the Proposed Power Plant Site in December 2013. By August 2014 settlement in the far south of the Proposed Power Plant Site reached approximately 100 mm, reducing to less than 5 mm in the north western corner. Between August 2014 and August 2016, recorded settlement around the perimeter of the Proposed Power Plant Site was approximately 10 mm. This suggests that settlement on the Proposed Power Plant Site is reducing and is nearing completion.

The Beeston Coal Seam was the only seam, within close proximity to the Site, which was worked from Kellingley Colliery. This seam was typically 2.6 m thick, and was worked at a depth of approximately 735 m below ground level. The extent of the worked Beeston Coal Seam stops before the existing power plant site boundary, however it is anticipated that mining infrastructure e.g. tunneling systems will be present beneath the south of the Site.

Parts of the Site are understood to have experienced surface settlement as a result of the Kellingley coal mining. Surface settlement movements of 100 mm have been measured towards the southern end of the Proposed Power Plant Site.

A detailed assessment of the amount of surface settlement to be expected as a result of deep mining has not been undertaken, however, monitoring of ongoing settlement being conducted for EPL by a third party is ongoing.

Based on results taken in September 2016, the continuing residual subsidence associated with the completion of mining in the Beeston seam could result in a 15 mm settlement contour extending to the existing Turbine Hall, a 30 mm contour reaching the most easterly natural draught cooling tower and subsidence at the eastern boundary increasing to 200 mm or more.

As a general rule, subsidence associated with mining is expected to continue at a diminishing rate and cease after 18 months to 2 years after the causative mining event. In this instance this would mean that subsidence at the Proposed Power Plant Site could theoretically continue at a diminishing rate until December 2017.

Based on the above, it is considered that the Proposed Power Plant Site is likely to experience settlement of more than 25 mm over the next 18 months.

Furthermore, ground settlement above the former coal mine may result in a series of fractures migrating to the surface through the Sherwood Sandstone cover. Fractures have the potential to act as a preferential pathway for migration of contaminated groundwater from the deep coal mine to shallower depths in the long term, in the event that groundwater recharge of the abandoned mine occurs in conjunction with rising water levels in the Sherwood Sandstone. Potential contaminants of concern would include sulphate, pH and metals.

3.3 Hydrogeology

The EA aquifer classifications for the identified superficial deposit and bedrock underlying the Site are summarised in Table A, below.

TABLE A: SUMMARY OF EA AQUIFER CLASSIFICATIONS

FORMATION	EA AQUIFER CLASSIFICATION
Superficial Deposits	
Lacustrine beach deposits (sand and gravel)	Secondary A Aquifer
Alluvium (clay, silt, sand and gravel)	Secondary A Aquifer
Breighton sand	Secondary A Aquifer
Glacial till (clay)	Secondary Undifferentiated Aquifer
Glaciolacustrine deposits (clays and silt)	Unproductive Strata
Bedrock	
Sherwood sandstone	Principal Aquifer

Key:

Principal Aquifer - defined by the EA as 'layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer'.

Secondary A Aquifer - defined by the EA as 'permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers'.

Secondary Undifferentiated Aquifer - defined by the EA as 'an aquifer where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.'

Unproductive Strata - defined by the EA as 'rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow'.

Soils at the Site (except those associated with glaciolacustrine superficial deposits) are classified as being of a high leaching potential, meaning that they readily transmit liquid discharges and pollutants.

The entire Site, with the exception of the southern Proposed Borehole Connection, is located in a groundwater Source Protection Zone (SPZ) 3 (total catchment).

The Groundsure Report records two currently licensed groundwater abstractions on Site; one for Eggborough Power Limited for the abstraction of a maximum of 4,800 m³ per day for use as a boiler feed and one for The Hambleton Abstraction Partnership for the abstraction of a maximum of 900 m³ per day for use in irrigation. Both abstractions are from the Sherwood Sandstone Principal Aquifer. There are also a further thirty-nine historical groundwater abstraction licences recorded 2 km of the Site including for potable water, farming and domestic use.

3.4 Hydrology

The Groundsure Report identified four surface water features on the Site, three of which intersect the Proposed Cooling Water and Gas Connection corridors:

- the River Aire, a primary water course, which intersects the Proposed Cooling Water Connection abstraction and discharge points in a generally south-easterly direction;
- Ings and Tetherings Drain, a secondary river which crosses the Proposed Cooling Water Connection in an east-west orientation; and
- an unnamed drain (secondary river) which runs south to north across the north-western corner of the Proposed Cooling Water Connection.

In addition to the three watercourses listed above, Hensall Dyke is located in the south-east corner of the Site within the Proposed Surface Water Connection area.

The GroundSure Report also identifies numerous other secondary and tertiary rivers, mostly drains, within 1 km of the Site.

Water quality in the River Aire and Ings and Tetherings Drain in the vicinity of the Site is generally graded C for chemical quality and D to E for biological quality on a scale of A (very good) to F (bad). Water quality data is not available for Hensall Dyke.

The GroundSure Report records three currently licensed surface water abstractions within the Site, for the purpose of irrigation, evaporative cooling and potable water supply. All these surface water abstraction licenses are on the Proposed Cooling Water Connection. There are a further ten surface water abstraction licenses recorded within 1 km of the existing coal-fired power station site for hydroelectric power generation, evaporative cooling and irrigation. The Proposed Cooling Water Connection corridor is designated by the EA as an area used for flood water storage. Small areas of the Proposed Construction Laydown Area are identified as having low to medium risk of flooding and are located within Flood Zones 2 or 3, defined by the EA as an area which has a 1 in 100 chance and 1 in 1,000 chance of being flooded in a given year, respectively (see Appendix 11A (Flood Risk Assessment) in ES Volume III).

Furthermore, as noted in Section 3.2.2, anecdotal evidence suggests that surface water flooding has occurred in recent years in the south-eastern corner of the Site, potentially as a result of coal mining related subsidence in this part of the Site.

3.5 Radon

The GroundSure Report indicates that the Site is not in located a Radon Affected Area, as less than 1% of properties are above the Action Level and no radon protective measures are necessary in construction of new properties or extensions.

3.6 Sensitive Land Use

The Site is located within a Nitrate Vulnerable Zone.

No other environmentally sensitive sites, including Sites of Special Scientific Interest, Special protection Areas, Special Areas of Conservation, Ramsar sites, or National and Local Nature Reserves, were identified within 2 km of the Site.

3.7 Overall Site Sensitivity

The environmental sensitivity of the Site is considered to be as follows with regards to:

- Groundwater – **High sensitivity** – Secondary A Superficial Aquifers and a Principal Bedrock Aquifer underlying the Site are considered to be sensitive receptors should a pollution incident occur;
- Surface water – **Moderate sensitivity** – The Site intersects various surface water features, including the River Aire, Ings and Tetherings Drain, an unnamed drain that crosses the Proposed Cooling Water Connection, Hensall Dyke and field drains along the Proposed Gas Connection corridor; and
- Land use – **Low sensitivity** – The Site is primarily surrounded by agricultural land and no significant sensitive land uses have been identified.

4. SITE HISTORY (EXCLUDING PROPOSED GAS CONNECTION CORRIDOR)

4.1 Introduction

AECOM has reviewed historical Ordnance Survey (OS) maps dating from 1852 to present obtained as part of the GroundSure Report in order to assess potential historical uses of the site and the surrounding land. The summary provided below identifies key historical land uses and features which are considered to have the potential to have impacted the soil and groundwater beneath the Site. The historical maps are included within the GroundSure Report (available on request).

4.2 History of the Site and Surrounding Land Use

A summary of potentially contaminative land uses identified on the historical maps is presented in Table B, below:

TABLE B: REVIEW OF HISTORICAL MAPS

DATE	ON-SITE LAND USE	OFF-SITE LAND USE
1852-1855	Agricultural land use.	Agricultural land use.
1891-1894	No significant changes.	Railway line approximately 750 m south of the Site; and Gravel pits approximately 750 – 900 m south of the Site.
1905-1908	No significant changes.	Gravel pit located approximately 500 m east of the Site; and Water works located adjacent to the west of the Site.
1948-1950	Numerous sand and gravel pits located on site.	Water works adjacent to the eastern corner of the Site; and Additional sand and gravel pits from approximately 300 m south of the Site.
1955-1957	No significant changes.	No significant changes.
1973	Eggborough Power Station has been constructed, including railway line, ash tip, tanks, lagoons etc. Sewage works present in north-eastern corner.	The majority of previous sand and gravel pits are no longer shown.
1983	No significant changes.	No significant changes.
2002	No significant changes.	A works complex has been constructed adjacent to the southwest of the Site (inferred to be the current glassworks and business park); Reservoir approximately 250 m south of the Site; and Depot and works approximately 600 m south of the Site.
2010	No significant changes.	No significant changes.
2014	No significant changes.	No significant changes.

4.3 **Summary of Site History**

Prior to its development as a power station in the 1960s, the Site was primarily used as agricultural land. A number of sand and gravel pits were present on Site and within 1 km of the Site between the later 1800s and the 1970s, which are inferred to have since been backfilled. A limited number of other potential sources of contamination have been identified from the historical maps including a railway, water works, sewage works and nearby industrial land use.

5. REGULATORY DATABASE SEARCH

5.1 Introduction

AECOM commissioned Groundsure to conduct a database search of available regulatory agency records to evaluate whether activities on or near the Site have the potential to create a significant adverse environmental effect. Groundsure reviews databases compiled by national and local governmental agencies. The Groundsure Report essentially relates to operational activities for which licences or authorisations are required and have been obtained pursuant to environmental laws. It is therefore possible that there are unauthorised activities being carried out in the vicinity of the Site that are not detailed. It is noted that the database is not updated regularly and more recent unlisted or otherwise unregistered activities may therefore be present in the surrounding area.

It should be noted that this information is reported as AECOM received it from Groundsure (see Appendix 12B, ES Volume III), which in turn reports information as it is provided in various government databases. It is not possible for either AECOM or Groundsure to verify the accuracy or completeness of information contained in these databases. However, the use of this information is a generally accepted practice in the conduct of Phase 1 ESAs.

Sites identified within the study radius (500 m) are evaluated to assess if they are likely to have had an adverse impact on the subject property or could be adversely affected by the subject property. The criteria used to evaluate sites within the study radius include distance from the subject property, the expected depth and direction of groundwater and surface water flow, likely storm water flow direction and the presence / absence of documented contaminant releases at the identified sites.

The approximate distances to features described in this section have been estimated from the closest boundary of the Site and may also be subject to an error of up to 100 m.

5.2 Database Review

Table C below summarises key information from the Groundsure Report in relation to the regulatory database search that is considered pertinent to the subject site:

TABLE C: REGULATORY DATABASE SEARCH SUMMARY

CATEGORY	SUMMARY OF INFORMATION (<500m FROM THE EXISTING COAL FIRED POWER STATION)
Integrated Pollution Control (IPC)	<p>One IPC authorisation was recorded on site for British Energy for combustion processes. The entry shows that the IPC authorisation was revoked in 2006 and replaced with an IPPC permit.</p> <p>No other IPC authorisations are recorded within 500 m of the Site.</p>
Integrated Pollution Prevention & Control (IPPC) Permits	<p>Six active IPPC permits all located on Site or adjacent to the Site registered to Eggborough Power Limited for some or all of the following activities:</p> <ul style="list-style-type: none"> - mineral activities (processing with release of particulates into air); - mineral activities (loading, unloading, storing pulverised fuel ash in bulk prior to transportation); waste disposal (Hazardous); - combustion; - inorganic chemicals; - organic chemicals; and - associated processes. <p>No other IPPC authorisations are recorded within 500 m of the site.</p>

CATEGORY	SUMMARY OF INFORMATION (<500m FROM THE EXISTING COAL FIRED POWER STATION)
Dangerous Substance Inventory Sites	One record of a List 1 Dangerous Substance authorisation on site registered to British Energy Plc for mercury and cadmium. One record of a List 2 Dangerous Substance authorisation on site registered to British Energy Plc for arsenic, chromium, copper, iron, lead, nickel, silver, vanadium and zinc.
Enforcement & Prohibition Notices	Two Part B enforcements are recorded within 500 m of the Site: <ul style="list-style-type: none"> - enforcement against RMC Lytag, located immediately to the east of the Proposed Power Plant Site in 2002, relating to equipment failure; and - enforcement against Saint Gobain Glass UK Limited, located immediately to the east of the southern Proposed Borehole Connection in 2014, relating to particulate emissions failures. One Planning Hazardous Substance enforcement is recorded within 500 m of the Site: <ul style="list-style-type: none"> - enforcement against Air Liquide UK, located adjacent to the northern boundary of the Proposed Construction Laydown Area. No details of the enforcement are provided.
Discharge Consents	Two records of licensed discharge consents on Site for trade discharges (site drainage) and from an oil interceptor registered at Eggborough Power Station. A further four records of licensed discharge consents within 500 m of the Site: <ul style="list-style-type: none"> - trade discharges from Arbre Energy Power Plant (approximately 10 m west); - discharge of final/treated effluent and storm overflow from Eggborough water treatment works, 2 no. consents (approximately 210 m north-west); and - discharge of final/ treated effluent from Manor Farm (approximately 300 m north-east). No 'red list' discharge consents (potentially harmful discharges to Controlled Waters) are recorded within 500 m of the Site
Control of Major Accident Hazards Sites (COMAH)	One record of an active lower tier COMAH site (Air Liquide UK Limited) located adjacent to the northern boundary of the Proposed Construction Laydown Area.
Pollution Incidents	Two records of EA recorded pollution incidents on Site: <ul style="list-style-type: none"> - release of 'other pollutant' in January 2003 with minor impact to land; and - release of biodegradable materials and waste in August 2003 with minor impact to land; and Four further records of EA recorded pollution incidents within 500 m of the Site; <ul style="list-style-type: none"> - release of hydrocarbons, firefighting runoff water and smoke in September 2009 with minor to significant impacts on land, water and air (approximately 120 m

CATEGORY	SUMMARY OF INFORMATION (<500m FROM THE EXISTING COAL FIRED POWER STATION)
	<p>south-east); and</p> <ul style="list-style-type: none"> - release of sewage materials in November 2001 with significant impact to water (approximately 300 m north-east).
Registered Landfill Sites	<p>Two records of current landfill sites within 500 m of the Site:</p> <ul style="list-style-type: none"> - landfill accepting non-biodegradable wastes, registered to Tarmac Environmental Services Limited (adjacent to the southern boundary of the Proposed Power Plant Site); and - landfill accepting non-biodegradable wastes, registered to Wernick Hire Limited (approximately 250 m west).
Historical Landfill Sites	<p>Three records of historical landfill site adjacent to the Site:</p> <ul style="list-style-type: none"> - landfill accepting inert and industrial waste from 1940 – 1977, registered to Hobson Brothers Limited (adjacent to the existing coal-fired power station main entrance); - landfill accepting industrial waste from 1948 to an unknown date, registered to Hobson Brothers Limited (adjacent to the existing main entrance; and - landfill accepting industrial waste from 1994 to an unknown date, registered to Wernick Limited (adjacent to the existing main entrance). <p>Two further records of historical landfills sites within 500 m of the Site:</p> <ul style="list-style-type: none"> - landfill accepting industrial, commercial and household waste from 1983 – 1988, registered to Roy W Atkinson (adjacent to the south-eastern corner of the Site); and - landfill accepting industrial and commercial waste from 1976 – 1987, registered to Panvers Limited (approximately 160 m south of the Site).
Licensed Waste Treatment or Disposal Sites	<p>One record of current waste treatment or disposal sites within 500 m of the Site registered to Hazel Grove Quarry for non-biodegradable wastes, 25,000 and 75,000 tonnes (adjacent to the southern boundary of the Proposed Power Plant Site).</p>
Local Authority Integrated Pollution Prevention & Control (LAIPPC)	<p>One recorded LAIPPC listing identified within 500 m of the Site for Saint Gobain Glass UK Ltd for float glass manufacture (immediately to the east of the southern Proposed Borehole Water Connection).</p>

No Contaminated Sites (determined under Part 2A), Registered Radioactive Substance authorisations, Water industry referrals, national incident records other waste treatment, transfer or disposal sites or BGS or Local Authority Recorded Landfill Sites were identified within 500 m of the Site.

6. SITE DESCRIPTION (PROPOSED GAS CONNECTION CORRIDOR AND AGI SITE)

6.1 Site Location

The gas supply for the Proposed Development will be via a new connection to the National Grid Transmission gas network (Feeder 29) approximately 3.1 km to the north of the existing coal-fired power station site (note the pipeline length is longer, as it is not a straight line – see paragraph 3.8.3 below).

The Proposed Gas Connection will connect to Feeder 29 at a new Above Ground Installation (AGI) to the south-west of Burn to the west of West Lane, which will require a new access off West Lane.

From the AGI site the Proposed Gas Connection pipeline will be routed south-east across agricultural fields, crossing beneath the A19 south of the East Coast Main Line and north of Burn Lodge Farm, before heading south through agricultural land. The gas pipeline will cross Millfield Road to the east of Chapel Haddlesey, then cross more agricultural land (avoiding the archaeological feature at Hall Garths) heading south-west to cross beneath the River Aire at Eggborough Ings, to the west of the cooling water outfall point. The gas pipeline will then head south-west and south across another agricultural field, to the east of the cooling water connection pipelines, before crossing Wand Lane to the east of Hensall Gate and reaching the Proposed Power Plant Site via a corridor alongside the internal access road. The total pipeline length is approximately 4.6 km from the Proposed Power Plant Site to the Proposed AGI location.

7. SITE ENVIRONMENTAL SETTING (PROPOSED GAS CONNECTION CORRIDOR AND AGI SITE)

7.1 Introduction

The physical setting and environmental characteristics of the Proposed Gas Connection and AGI Site are based on information obtained from the following sources:

- Groundsure Report GS-3268330 dated 1st September 2016 (ES, Volume III);
- the BGS website (www.bgs.ac.uk), accessed 2nd December 2016; and
- the EA website (<http://maps.environment-agency.gov.uk/>), accessed 2nd December 2016.

7.2 Geology

From the online BGS geological map and Groundsure Report, the following units are anticipated to comprise the uppermost superficial deposit across the Proposed Cooling Water Connections and Proposed Gas Connection:

- a 250 m corridor immediately northeast of Wand Lane = Brighton sand;
- River Aire channel (extending approximately 1.2 km north-east to approximately Millfield Road) = Alluvium;
- a 300 m band from Millfield Road access to approximately Fox Lane access = Brighton sand; and
- Fox Lane access to West Lane = Hemingbrough formation.

The geological map and Groundsure Report indicate that the Proposed Gas Connection and AGI Site are underlain by Sherwood sandstone.

7.3 Coal Mining

There are no current coal workings recorded beneath the Proposed Gas Connection and AGI Site.

The entire Proposed Gas Connection and AGI Site is within a coal mining reporting area. The southern tip of the Proposed Gas Connection corridor is within a licensed deep coal mining area.

Previous assessments suggest potential influence at the surface from Kellingley Coal Mine, particularly towards the south-east of the Proposed Gas Connection corridor (as discussed in Section 3.2.2).

No further mineral commodities are recorded by BGS.

7.4 Hydrogeology

The Superficial deposits in the southern half of the Proposed Gas Connection corridor (alluvium and Brighton Sands) are classified as a Secondary A Aquifer.

The Sherwood Sandstone bedrock beneath the entire Proposed Gas Connection and AGI Site is a Principal Aquifer.

The southern half of the Proposed Gas Connection corridor is located within a Source Protection Zone 3.

BGS borehole data indicates that shallow groundwater is more than 6 m bgl in the centre of the Proposed Gas Connection corridor.

7.5 Hydrology

The Proposed Gas Connection corridor crosses the River Aire (primary river) as well as numerous secondary and tertiary rivers.

The southern part of the Proposed Gas Connection corridor is designated a flood storage area with a high risk of flooding from rivers and the sea. Northern half is in a Zone 2 and Zone 3 floodplain with a low (Zone 2) to medium (Zone 3) risk of flooding from rivers and the sea.

7.6 Engineering Geology

There is a very low to low risk from shrink-swell clays, landslides, ground dissolution, collapsible deposits and running sand hazards. There is a moderate risk from compressible deposits for majority of the Proposed Gas Connection and AGI Site.

There is an area of marshland shown on topographic maps to the north of the River Aire (approximately 150 m wide).

7.7 Radon

The Groundsure Report indicates that the Proposed Gas Connection and AGI Site is not in located a Radon Affected Area, as less than 1% of properties are above the Action Level and no radon protective measures are necessary in construction of new properties or extensions.

7.8 Sensitive Land Use

The Proposed Gas Connection and AGI Site is entirely within a Nitrate Vulnerable Zone.

No further environmentally sensitive sites (e.g. SSSIs, NNRs, SACs, SPAs, Ramsar sites) have been identified within the Proposed Gas Connection corridor and AGI Site.

7.9 Overall Site sensitivity

The environmental sensitivity of the Proposed Gas Connection and AGI Site is considered to be as follows with regards to:

- Groundwater – **High sensitivity** – Secondary A Superficial Aquifers and a Principal Bedrock Aquifer underlying the site are considered to be sensitive receptors should a pollution incident occur;
- Surface water – **Moderate sensitivity** – The Proposed Gas Connection intersects two surface water features (River Aire and Ings and Tetherings Drain); and
- Land use – **Low sensitivity** – The site is primarily surrounded by agricultural land and no significant sensitive land uses have been identified.

8. SITE HISTORY (PROPOSED GAS CONNECTION CORRIDOR AND AGI SITE)

8.1 Summary of Site History

The historical land uses of the Proposed Gas Connection and AGI Site, based on historical maps in the Groundsure Report are:

- agricultural land use (1850s to present); and
- infilled ponds / moats around former hall (1850s - 1950s).

9. REGULATORY DATABASE SEARCH (PROPOSED GAS CONNECTION CORRIDOR AND AGI SITE)

9.1 Introduction

AECOM commissioned Groundsure to conduct a database search of available regulatory agency records to evaluate whether activities on or near the Proposed Gas Connection and AGI Site have the potential to create a significant adverse environmental effect. Groundsure reviews databases compiled by national and local governmental agencies. The Groundsure Report (see Appendix 12B in ES Volume III) essentially relates to operational activities for which licences or authorisations are required and have been obtained pursuant to environmental laws. It is therefore possible that there are unauthorised activities being carried out in the vicinity of the Proposed Gas Connection and AGI Site that are not detailed. It is noted that the database is not updated regularly and more recent unlisted or otherwise unregistered activities may therefore be present in the surrounding area.

It should be noted that this information is reported as AECOM received it from Groundsure, which in turn reports information as it is provided in various government databases. It is not possible for either AECOM or Groundsure to verify the accuracy or completeness of information contained in these databases. However, the use of this information is a generally accepted practice in the conduct of Phase 1 ESAs.

Sites identified within the study radius (500 m) are evaluated to assess if they are likely to have had an adverse impact on the subject property or could be adversely affected by the subject property. The criteria used to evaluate sites within the study radius include distance from the subject property, the expected depth and direction of groundwater and surface water flow, likely storm water flow direction and the presence / absence of documented contaminant releases at the identified sites.

9.2 Database Review

No current or historical landfills have been identified within the Proposed Gas Connection corridor and AGI Site.

1 no. pollution incident was identified at the southern tip of the Proposed Gas Connection corridor involving release of general biodegradable materials and waste to land in 2003. The impact to land was classified as minor.

10. DOCUMENT REVIEW

10.1 Introduction

AECOM have reviewed the following historical reports as part of this Phase 1 ESA:

- *Ground Investigation for a Proposed Glass-making Plant at Eggborough, North Yorkshire*, Soil Mechanics, dated July 1998;
- *Soils Investigation – Flue Gas Desulphurisation Plant, Eggborough Power Station*, Wilkinson Associates, dated 10th November 2000;
- *Eggborough Power Station FGD – Factual Report on Ground Investigation*, Exploration Associates, dated December 2001;
- *Geotechnical Interpretative Report – Eggborough Flue Gas Desulphurisation Plant*, Ove Arup & Partners, dated February 2002;
- *Ground Investigation Report - Factual Report on a Ground Investigation at Eggborough Power Station*, Pontefract, Strata Surveys Limited, dated 8th August 2012;
- *Geophysical Investigation – Eggborough Power Station*, Fugro Aperio, dated April 2009;
- *Geological Report on the Investigation of Faulting in the Vicinity of Eggborough Power Station*, Wardell Armstrong, March 2010;
- *Eggborough power Station Site Protection and Monitoring Programme – Annual Report 2015*, Geosyntec, dated 4th January 2016.

The key findings of these reports are summarised in the following sections.

10.2 Soil Mechanics (1998)

Soil Mechanics undertook a ground investigation at the location of the Saint Gobain glassworks, to the east of the southern Proposed Borehole Water Connection, in 1998. A summary of information considered relevant to the Site is provided below:

- Twenty-seven boreholes were advanced by cable percussion and rotary coring and nineteen trial pits were excavated to a maximum depth of 25.7m bgl in April/May 1998;
- No Made Ground was encountered, consistent with the lack of previous development of the investigation location. However sandy topsoil was present to a depth of approximately 0.4 m;
- Superficial deposits were found to comprise glacial clay, sand and gravel, ranging in thickness from 2.0 m to 12.9 m and generally thickening towards the north. The sand and gravel was reported to be loose to dense;
- Sherwood sandstone was encountered beneath the superficial deposits as very weak to moderately weak red-brown sandstone. Occasional layers of mudstone were identified; and
- Groundwater level was noted to have been artificially lowered by pumping at the power station, however groundwater was encountered in boreholes at the far north of the investigation area (furthest from the abstraction borehole). Perched groundwater was also encountered in the superficial deposits towards the northeast.

10.3 Wilkinson Associates (2000)

Wilkinson Associates undertook an investigation on behalf of Kvaerner E&C UK Limited October 2000 with the aim of providing an assessment of ground conditions for the proposed FGD Plant (partly within the Proposed Construction Laydown area). A summary of information is provided below:

- The investigation comprised the drilling of eight boreholes to a maximum depth of 11.1 m bgl and excavation of four trial pits to a maximum depth 3.0 m bgl;
- Made Ground was encountered at all locations between a thickness of 0.3 – 0.9 m, generally consisting of sands and gravels;

- In eight locations, the Made Ground was found to directly overlie weathered Sherwood Sandstone. In the remaining three locations, towards the north-east of the investigation area, glacial sand and gravel was encountered at a thickness of 1.2 – 2.3 m;
- The Sherwood Sandstone bedrock was found to be weathered in all locations ranging from grade VI (residual soil) close to the surface to grade III (moderately weathered) at the base of the boreholes. Geotechnical testing (unconfined compressive strength) indicated that the rock was moderately weak;
- No significant groundwater was encountered. The report notes that this is consistent with the 1982 published hydrogeological map which records groundwater at a depth of approximately 12 m bgl in the area of investigation;
- No soil or groundwater samples were submitted for chemical analysis; and
- The report concluded that conventional spread foundations would likely be suitable for the proposed FGD plant.

10.4 Exploration Associates (2001)

In December 2001, Exploration Associates were commissioned to conduct a site investigation in order to help better understand the ground conditions at the site of the proposed FGD plant (located partly within the Proposed Construction Laydown area). A summary of information is provided below:

- Four boreholes were drilled by cable percussion and rotary coring techniques to a maximum depth of 25.5 m bgl and ten trial pits were excavated to a maximum depth of 3.5 m bgl. Cone Penetration Tests (CPT) were undertaken at a further twenty-two locations. A crosshole seismic survey was also undertaken to determine the shear wave velocity profile.
- Made Ground was encountered at a thickness of 0.5 - >1.2 m, generally comprising sands and gravels;
- Superficial deposits of glacial sand and gravel were encountered at all borehole locations at a thickness of approximately 1.5 – 2.5 m;
- Sherwood Sandstone bedrock was encountered as a weakly cemented, weathered sandstone; and
- Groundwater strikes were encountered at approximately 9.0 – 15.6 m bgl during drilling, with a standing water level of 1.7 m bgl recorded during post-fieldwork monitoring.

No soil or groundwater samples were submitted for chemical analysis. Samples were collected for geotechnical testing, however the results of this testing, the CPT testing, or the geophysical survey were not available for review.

10.5 Ove Arup & Partners (2002)

A Geotechnical Interpretative Report was prepared by Ove Arup in 2002 based on the results of the Wilkinson Associates and Exploration Associates investigations of the FGD site (within part of the Proposed Construction Laydown area), as well as a desk study carried out by Ove Arup (not available for review). A summary of information from the interpretative report is provided below:

- An 'odour' was encountered in two locations;
- Made Ground is generally medium dense to dense and likely suitable for re-use as engineered fill if required.
- Design Class DS1 sulphate resisting concrete was recommended for foundations based on pH and sulphate analysis of soil; and
- Groundwater elevation is likely around 0 m AOD in the Sherwood Sandstone; and
- Glacial sands and gravels and Sherwood sandstone in the FGD Plant area provide generally favourable conditions for foundations. Pad or raft foundations could be used in either strata, or piles could be extended into the Sherwood Sandstone.

10.6 Fugro (2009)

A geophysical investigation was conducted for EPL by Fugro to investigate the potential presence of faults beneath the existing coal-fired power station footprint. Previous 'deep' seismic investigations

carried out in the area on behalf of UK Coal indicated highly reflective strata within the underlying Permo-Triassic sequence. Electrical resistivity tomography and multichannel seismic reflection techniques were deployed to explore to 30 m and 250 m depth respectively. The key findings included:

- Structural discontinuities were identified within reflection data that were consistent with post-Permian faulting;
- Reflection data were consistent with the presence of an unnamed fault previously identified to the north of the existing coal-fired power station;
- Data suggested the absence of north-west south-east fault shown on a historic BGS map beneath the existing coal-fired power station; and
- The vulnerability of the existing coal-fired power station to fault reactivation through subsurface coal mining was likely to be greatest from those existing structures that may link the proposed mining area to the existing coal-fired power station on its eastern flank.

10.7 Wardell Armstrong (2010)

Wardell Armstrong completed a review of the seismic surveys completed by Fugro (2009), and consulted with UK Coal Mining Ltd (UKMCL) to reassess the potential presence of faults beneath the existing coal-fired power station footprint. The key findings included:

- The major fault shown on the 1971 published BGS map, the Bowers House Fault, does not pass through the existing coal-fired power station;
- Correlation with parts of the Kellington fault zone, probably passing through the northern part of the existing coal-fired power station but probably outside the area of influence of the mining;
- Further evidence of faults which appears to be parts of a zone of irregular minor faults previously interpreted by UKMCL from detailed seismic surveys of the Beeston mining panels and intersected by underground roadways, which may pass beneath the existing coal-fired power station.

10.8 Strata Surveys Limited (2012)

Strata Surveys' ground investigation of the existing coal-fired power station site focused largely on the coal stockyard area with a small number of boreholes also located around the existing coal-fired power station buildings to the north (part of the Proposed Power Plant Site). A summary of information is provided below:

- Twenty-two boreholes were drilled by cable percussion and rotary coring techniques to a maximum depth of 25.0 m bgl and eleven trial pits were excavated to a maximum depth of 4.6 m bgl. Samples were collected for chemical testing and field and laboratory geotechnical testing was carried out;
- Made Ground in the coal stockyard comprised coal as fine to coarse gravels at a thickness of 0.2 m – 9.9 m, as well as localised sand, limestone gravel and brick fragments.
- Superficial deposits of soft to firm gravelly clay, often interbedded with sand, was encountered in the southern part of the coal stockyard. Elsewhere on the coal stockyard and around the existing coal-fired power station buildings to the north, glacial sand and gravel was encountered. The base of the superficial deposits was encountered between 1.7 m and 3.7 m bgl,
- Sherwood Sandstone bedrock in the coal stockyard area was encountered at depths ranging from 0.8 m - 10.3 m bgl, and around the existing coal-fired power station buildings to the north from 0.4 m - 2.00 m bgl;
- Groundwater monitoring wells were installed in six locations, which returned standing elevations of 4.1 – 9.0 m bgl in June/July 2012; and
- Thirteen soil samples and five groundwater samples were scheduled for chemical analysis. Identified impacts included Polycyclic Aromatic Hydrocarbons (PAHs) Total Petroleum Hydrocarbons (TPH) and BTEX (benzene, toluene, ethylbenzene and xylene) in Made Ground as well as TPH in groundwater.

10.9 Geosyntec (2016)

Geosyntec have undertaken regular groundwater monitoring as part of Eggborough Power Station's Site Protection and Monitoring Programme (SPMP) since 2008 in line with the requirements of the Environmental Permit to identify potential changes in groundwater quality as a result of the permitted operations. A summary of information considered relevant to the Site is provided below:

- Groundwater flow direction is inferred to be radial towards the south and west from a high point in the northern-central part of the existing coal-fired power station site;
- A general decrease in pH (i.e. increase in acidity) of groundwater has been observed over time; and
- Chemical concentrations in groundwater are generally consistent with historical trends, However molybdenum, a potential indicator of PFA contamination, has been identified in a number of locations in 2015.

10.10 Summary of Anticipated Ground Conditions – Proposed Power Plant Site

The ground investigation completed on part of the Proposed Power Plant Site (Strata Surveys, 2012) identified that the ground conditions beneath the northern part of the Proposed Power Plant Site comprised a mantle of made ground comprising black coal to 0.5 m to 1.5 m bgl, overlying completely weathered sandstone bedrock (Sherwood Sandstone). Competent sandstone bedrock is encountered at a relatively shallow depth across the Proposed Power Plant Site, as shown in Table D below:

TABLE D: GENERALISED GROUND CONDITIONS BENEATH THE PROPOSED POWER PLANT SITE

GEOLOGICAL UNIT	TOP OF STRATA (METRES BELOW GROUND LEVEL)	DESCRIPTION
Made ground	Ground surface	Black coal, recovered and fine to coarse gravel sized fragments (coal carpet).
Weathered Sherwood sandstone bedrock	0.5 – 1.5	Extremely weathered red brown sandstone.
Sherwood sandstone bedrock	4.0 – 7.0	Highly weathered red brown sandstone.

Previous reports and geophysical investigations (Arup, 2008, Fugro, 2009, Wardell Armstrong, 2010) suggest that there may be a possible fault, with a surface position within the far east of the Proposed Power Plant Site. It should be noted that fault positions have not been accurately located and could comprise a fault zone, which could result in disturbed ground, weaker rock or a deeper weathering profile.

AECOM conducted a ground investigation in March 2017 to determine ground conditions at the proposed fixed CCGT stack locations for the Proposed Development. Three exploratory boreholes were drilled to 20 m bgl to observe stratigraphy and shear strength. No evidence could be found to suggest that stacks could not be built at the proposed locations. Groundwater wells installed during the Strata Surveys ground investigation (Strata Surveys, 2012) conducted in July and August 2012 suggests that the depth to groundwater may be approximately 7 m to 8 m below ground level (bgl).

10.10.1 Possible Foundation Solutions

Depending on structural loading and settlement tolerances, foundations may comprise shallow pads/rafts or piles. It is likely that some of the more sensitive structures of the Proposed Development, including the stacks, turbine blocks and cooling towers will require piled foundations.

11. ASSESSMENT OF ANTICIPATED GROUND CONDITIONS

11.1 Introduction

Based on a review of the available information relating to the underlying ground conditions at the site and previous investigation data, AECOM has undertaken an assessment of the anticipated ground conditions at the site to identify potential development constraints that will require further consideration as part of the detailed design for the Proposed Development.

11.2 Summary of Potential Development Constraints

Identified potential constraints associated with ground conditions at the Site include:

- Ground settlement related to the former Kellingley coal mine, where mining activities ceased in December 2015. Up to 100 mm of settlement has already been identified in the southern part of the Proposed Power Plant Site. The degree of settlement and potential future movement is under evaluation through settlement monitoring and the settlement continues to progress westerly from the mine workings over time. Recent data indicates that the existing natural draught cooling towers at the existing coal-fired power station have subsided by between 4 mm and 25 mm and the existing turbine hall by between 7 mm and 12 mm. In the eastern part of the existing coal-fired power station complex, the survey indicates subsidence of between 30 mm and 150 mm has occurred. As a general rule, subsidence associated with mining is expected to continue at a diminishing rate and cease after 18 months to two years after the causative mining event. In this instance this would mean that subsidence at the Site could theoretically continue at a diminishing rate until December 2017. The continuing residual subsidence associated with the completion of mining in the Beeston seam could result in 15 mm of subsidence at the existing turbine hall, 30 mm at the easterly existing cooling tower and up to 200 mm at the eastern boundary of the Proposed Power Plant Site. Further investigation into potential ground settlement as result of coal mining is ongoing;
- Foundation design for large structures associated with the Proposed Development. Some ground investigation and geotechnical data already exists for the Proposed Power Plant Site, however further assessment once the detailed design/ layout of the Proposed Development is known (including loadings etc.) is anticipated to be required to refine the foundation design;
- Potential flood risk. A topographic survey of the part of the Site within the existing coal-fired power station has been undertaken to inform the Proposed Development and preparation of the DCO application (refer to Appendix 11A: Flood Risk Assessment (ES Volume III));
- Uncertainty with respect to groundwater levels. It is understood that groundwater levels reported in previous investigations are artificially low as a result of drawdown of the water table by the power station abstractions. Long term water levels, e.g. if pumping rates change, will need to be considered during the detailed design of the Proposed Development; and
- Potential aggressive ground conditions in relation to pH and sulphate may exist, particularly in the vicinity of the Proposed Power Plant Site. Previous investigations for the FGD Plant recommended using Design Class DS1 sulphate resisting concrete for founding materials.

12. PRELIMINARY CONCEPTUAL SITE MODEL

12.1 Introduction

AECOM has developed a preliminary conceptual site model (CSM) based on a qualitative “Source → Pathway → Receptor” (SPR) risk assessment. The following sections consider the identified potential sources, pathways and receptors.

12.2 Potential Sources

Based upon the available information, potential sources of contamination include:

On Site

- Permitted activities relating to the Site’s existing operation as a coal-fired power station, including contaminants associated with the existing power station from the nearby buildings such as the boiler house, turbine house, sub station etc.;
- The coal stockyard, strategic stockpile and associated activities, including impacted soil and groundwater as identified by the Strata Surveys 2012 investigation;
- A private railway line, which surrounds the coal stockyard;
- The FGD plant and associated chemical storage and handling;
- On site above ground fuel oil storage tanks;
- The site’s effluent system, including oil-water interceptors, drains, sumps and gulleys;
- Contamination associated with storing and handling of PFA, including the ‘ash reservoir’;
- On-site pollution incidents which have been identified as having a minor impact to land;
- Historical contamination, including ground gas generation, related to the sand and gravel pits which are inferred to have been infilled prior to construction of the power station; and
- Historical agricultural land use (e.g. use of pesticides, heavy equipment); and
- Infilled former pond (Proposed Gas Connection corridor).

Off site

- Sewage works, located adjacent to the Proposed Construction Laydown area;
- Nearby St Gobain glass manufacturing facility, located adjacent to the southernmost Proposed Borehole Connection;
- Former Lytag plant to the east of the Proposed Power Plant Site, including pipeline formerly used to transport materials from the existing coal-fired power station site;
- Nearby depot/works, located approximately 600 m to the south of the Site;
- A public railway line, located approximately 750 m south of the Site;
- Nearby historical landfill sites;
- Nearby water works to the east and west of the Site;
- Nearby registered waste treatment facility which accepts non-biodegradable wastes;
- Historical contamination, including ground gas generation, related to numerous former sand and gravel pits in the vicinity of the Site;
- Offsite pollution incidents located within 500 m of the Site having a minor to significant impacts on air, land and water; and
- Historical agricultural land use (e.g. use of pesticides, heavy equipment).

Potential Contaminants of Concern

Potential compounds of concern associated with the identified potential sources of contamination may include, but are not limited to:

- Volatile Organic Compounds (VOCs), including BTEX;
- Semi Volatile Organic Compounds (SVOCs) including PAH;
- TPH;
- Polychlorinated Biphenyls (PCBs);
- heavy metals;
- asbestos;
- inorganic ions, including alkalinity and sulphate; and
- ground gases (carbon dioxide, methane, hydrogen sulphide etc.).

12.3 Potential Pathways

Based upon the available information, the following are considered potential pathways:

Human Health

- Dermal contact with substances in shallow soil and/or shallow groundwater;
- Inhalation of substances in dust;
- Inhalation of substances from the partitioning of vapours from soil and/or shallow groundwater; and
- Accidental ingestion of substances in soil/dust and/or shallow groundwater during potential groundworks.

Controlled Waters

- Vertical migration through unsurfaced areas, vegetated areas and hardstanding (where there are joins/ cracks) and drains/ pipework into the Made Ground/ shallow soil;
- Lateral and vertical migration within the Made Ground and superficial deposits, e.g. leaching from soils in the unsaturated zone into shallow groundwater;
- Preferential lateral and vertical migration along routes of underground services, pipelines and associated trenches (including granular backfilling materials);
- Lateral and vertical migration within shallow groundwater in the Made Ground/ superficial deposits, including to deeper groundwater;
- Lateral and vertical migration within deeper groundwater in the bedrock; and
- Lateral migration within groundwater to surface water courses.

Infrastructure

- Direct contact of substances within shallow groundwater with concrete foundations, plastic water pipes etc.; and
- Migration of ground gases and accumulation in confined spaces (e.g. basements, service ducts).

Ecology

- Plant uptake and subsequent ingestion by fauna.

12.4 Potential Receptors

Based upon the available information, the following are considered potential receptors:

Human Health

- Current power station employees;
- Offsite employees on neighbouring sites;
- Residential neighbours (nearest dwellings is adjacent to the northernmost Proposed Borehole Connection at the Eggborough Sports and Social Club);
- Residential neighbours (close to the Proposed Gas Connection corridor); and
- Future onsite and offsite employees including during construction and demolition activities.

Controlled Waters

- Shallow groundwater within the superficial deposits (Secondary A Aquifer);
- Deeper groundwater within the bedrock (Principal Aquifer); and

Surface water, including Ings and Tetherings Drain, the River Aire and Hensall Dyke, assumed to be in hydraulic continuity with the shallow groundwater.

Infrastructure

- Below-ground structures, e.g. concrete foundations, plastic water pipes; and
- Confined spaces within buildings (e.g. basements, store cupboards, service ducts).

Ecology

- Flora and fauna in woodlands surrounding the Site.

12.5 Risk Assessment Principles

A summary of the risk assessment principles used to evaluate potential pollutant linkages is presented as Annex C.

12.6 Summary of Potential Pollutant Linkages

A summary of the potential pollutant linkages is summarised in Table E, below.

Table E: Summary of Potential Pollutant Linkages

SOURCE	PATHWAY	RECEPTOR	POTENTIAL SEVERITY	LIKELIHOOD OF OCCURRENCE	LEVEL OF RISK	DISCUSSION
Identified substances of potential concern within shallow soils and/or groundwater beneath the Site and nearby offsite locations.	Human Health - Direct dermal contact, inhalation and ingestion	Current on-site workers	Medium	Low	Low / Moderate	Much of the Site is currently covered with hardstanding so the risk of contact and ingestion of impacted soils is low. Workers in the Proposed Power Plant Site have a higher risk of dust inhalation from coal fines however the majority of the coal has been removed from Site. There is also an embankment which shelters the stockyard from the wind, so reducing the risk of excess dust being generated.
		Future on-site workers	Medium	Likely	Moderate	It is anticipated that much of the Proposed Power Plant Site will be covered by hardstanding so future on-site workers are unlikely to be affected. Workers in demolition of the existing structures on Site and construction of the Proposed Development will face the highest risk of contact with impacted soils during the excavation of foundations etc. Appropriate measures will be taken to limit exposure during construction works.
		Offsite workers and residents	Medium	Unlikely	Low	The most likely pathway for exposure of offsite workers and residents is inhalation of dust. As mentioned above, given the current and future proposed site layouts, generation of excess dust is not anticipated during construction. Dust mitigation measures will be included in the Construction Environmental Management Plan (CEMP) in accordance with a draft DCO Requirement.
	Inhalation of vapours	Current and future on-site workers	Medium	Low	Low/ Moderate	PAH and BTEX impacts have been identified in soil which have the potential to partition into the vapour phase. However, the identified impacted soil is in the coal stockyard where no large buildings are present (i.e. vapours are unlikely to accumulate). There is the potential for impacted soil to be present elsewhere on Site, including beneath existing buildings.

		Off-site workers and residents	Medium	Low	Low / Moderate	The likelihood of migration of vapours to the nearest off-site receptors is considered to be low.
Identified substances of potential concern within shallow soils and/or groundwater beneath the site.	Leaching of substances from Made Ground into groundwater, including vertical migration into deeper groundwater.	Shallow groundwater in the superficial deposits (Secondary A Aquifer) and deeper groundwater within the bedrock (Principal Aquifer)	High	Likely	High	<p>Leaching of contaminants from the coal stockyard soils into groundwater has already been observed. However, if this area is largely covered in hardstanding as part of the Proposed Development, the potential for leaching of substances from soil would be reduced.</p> <p>Superficial deposits and bedrock are present at shallow depth beneath the coal stockyard and previous investigations identified few low permeability deposits to afford any protection to the underlying aquifers.</p> <p>Construction works, e.g. including foundations/ piling has the potential to create preferential pathways between shallow soils and underlying groundwater. The design of any piling will need to take into account a risk assessment in line with EA standards and guidance and mitigation measures proposed where necessary. A piling risk assessment will be undertaken in accordance with draft DCO Requirement.</p>
	Lateral migration of substances into surface water, including via preferential pathways e.g. service corridors.	Ings and Tetherings Drain and River Aire	Medium	Unlikely	Low / Moderate	Lateral migration of impacted perched and deeper groundwater may occur, however it is considered unlikely given the distance of the identified surface water courses from the identified sources. Although the surface waters intersect the Proposed Cooling Water Connections, the identified potential contaminant sources are not located in this area.

Identified substances of potential concern within shallow soils and/or groundwater beneath the site and nearby offsite locations, including potential ground gas.	Direct contact with leached substances and/or shallow groundwater	Current and future site infrastructure (e.g. foundations, underground service pipes, basements)	Medium	Likely	Moderate	Previous investigations indicate that buried concrete structures should be DS1 sulphate-resisting concrete based on potentially aggressive pH and sulphate conditions. Furthermore, ongoing groundwater monitoring as part of the SPMP suggest that pH is gradually decreasing (i.e. increasing acidity) beneath the Site. There is also the potential for VOCs to impact plastic service pipes (e.g. water pipes) if present.
	Migration of ground gases and/or vapours and accumulation in confined spaces		Mild	Likely	Low / Moderate	A number of landfills have been identified in close proximity to the Site. Furthermore, former gravel pits have been identified both on-site and off-site, which are inferred to have been infilled. There is therefore the potential for migration of gases from the identified sources and accumulation in current and future site buildings.
Identified substances of potential concern within shallow soils and/or groundwater beneath the site.	Plant uptake, and subsequent ingestion by fauna.	Flora and fauna	Minor	Low	Very Low	The majority of the Site is covered by hardstanding/ buildings/ coal stockyards, and the Proposed Development is anticipated to be similar in this respect. However small areas of trees are present (e.g. the embankment surrounding the coal stockyard) as well as fields (currently leased to a local farmer) at the south of the Site.

13. SUMMARY AND RECOMMENDATIONS

13.1 Summary

This Phase 1 ESA comprises a review of available geotechnical and geo-environmental information for Site in order to assess the likely ground conditions beneath the Site and the potential for ground contamination arising from historical or current on-site or off-site activities. Key findings of the assessment included:

- The geology underlying the Site is anticipated to comprise variable depths of Made Ground, superficial deposits (lacustrine beach deposits, alluvium, Brighton sand formation and glaciolacustrine deposits), generally increasing towards the north. These strata are underlain by Sherwood sandstone;
- The superficial deposits have a range of EA aquifer classifications, from Secondary A to Unproductive Strata. The Sherwood sandstone is classified as a Principal Aquifer. Licensed groundwater abstractions are present from the Sherwood Sandstone bedrock aquifer on Site. The Site is located within a total catchment SPZ (3);
- Three surface water features (Ings and Tetherings Drain, an unnamed drain and the River Aire) intersect the Proposed Cooling Water and Gas Connections. Hensall Dyke is located in the south-eastern corner of the Site. A number of other drains and tributaries of the River Aire are also present in close proximity to the Site. Parts of the Site are designated floodwater storage areas and/or in Flood Zones 2 and 3;
- Historical site use, prior to its development as a power station in the 1960s, was primarily agricultural land. A number of sand and gravel pits were present on the existing coal-fired power station site and within 1 km of the existing power station site between until the 1970s, which are inferred to have since been backfilled. A limited number of other potential sources of contamination were identified from historical maps including a railway, water works, sewage works and nearby industrial land use;
- The regulatory database search identified previous pollution incidents on-Site and close to the Site. In addition, several current and historical landfill sites were identified adjacent to the Site;
- A number of previous investigations have been undertaken at the Site, mainly for the FGD Plant, but also within the coal stockyard (covering parts of the Proposed Construction Laydown and Proposed Power Plant Sites) and on the Saint Gobain glassworks to the east of the southern Proposed Borehole Water Connection. The investigations generally confirm the inferred geological sequence, typically identifying granular Made Ground, overlying glacial and sand gravel, which in turn overlies Sherwood Sandstone bedrock. Depth to bedrock was as shallow as 0.4 m under parts of the Site (FGD plant area). Geotechnical results were generally limited to the FGD Plant area, however were favourable for foundations in that area. Chemical analytical data was reviewed for the coal stockyard area which identified impacted from TPH, PAH and BTEX in shallow soil and/or groundwater;
- An assessment of anticipated ground conditions and a preliminary conceptual site model have been prepared based on the findings of the assessment.

13.2 Recommendations

Based upon the information made available as part of this Phase 1 ESA, targeted intrusive ground investigations will be required to further assess potential development constraints associated with ground conditions at the Site as well as potential pollutant linkages to inform the detailed design (secured by draft DCO Requirement).

Additional investigations will also include further assessment of ground settlement as a result of coal mining (ongoing). Existing geotechnical data will be reviewed for adequacy to characterise the foundation design for the Proposed Development.

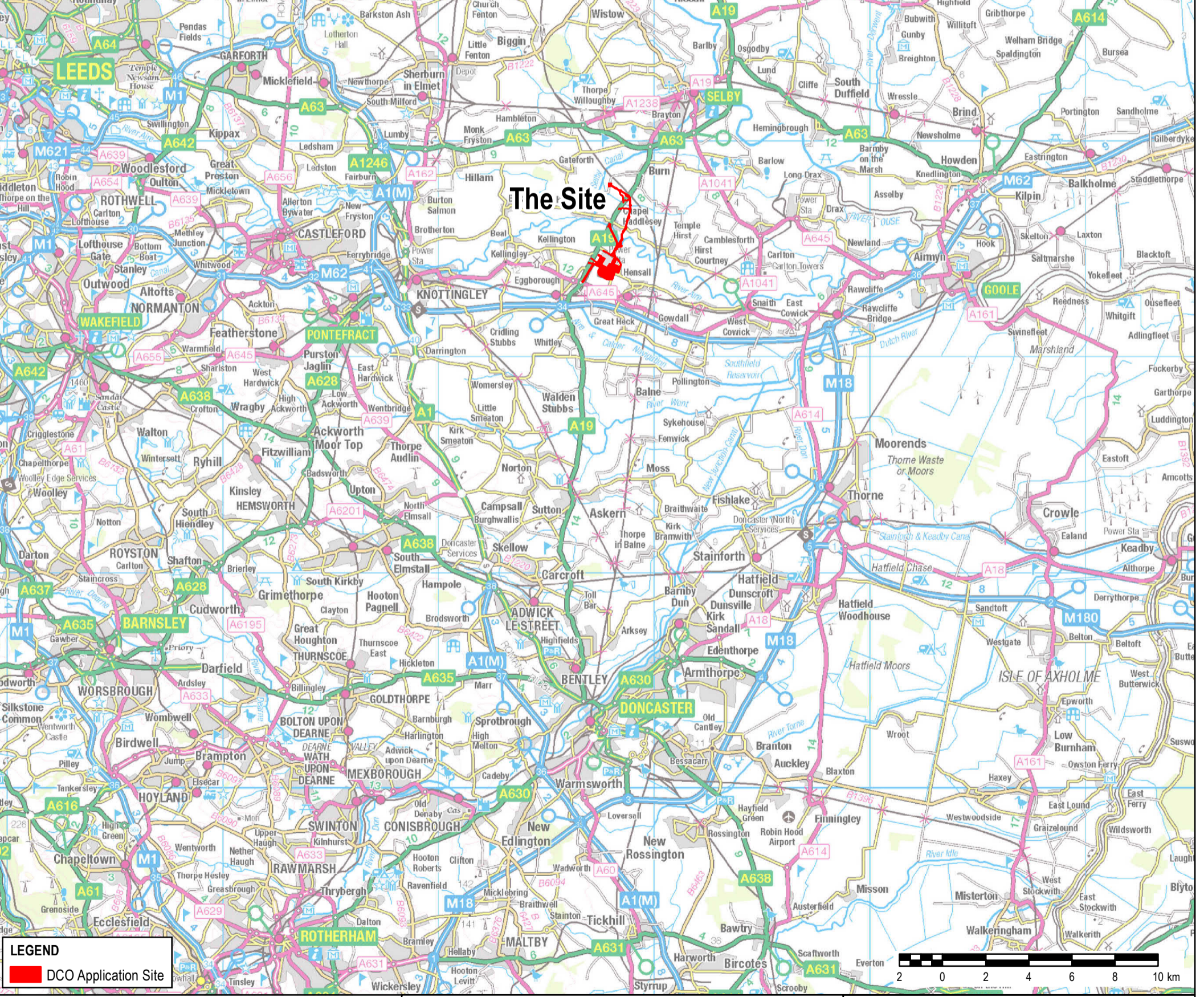
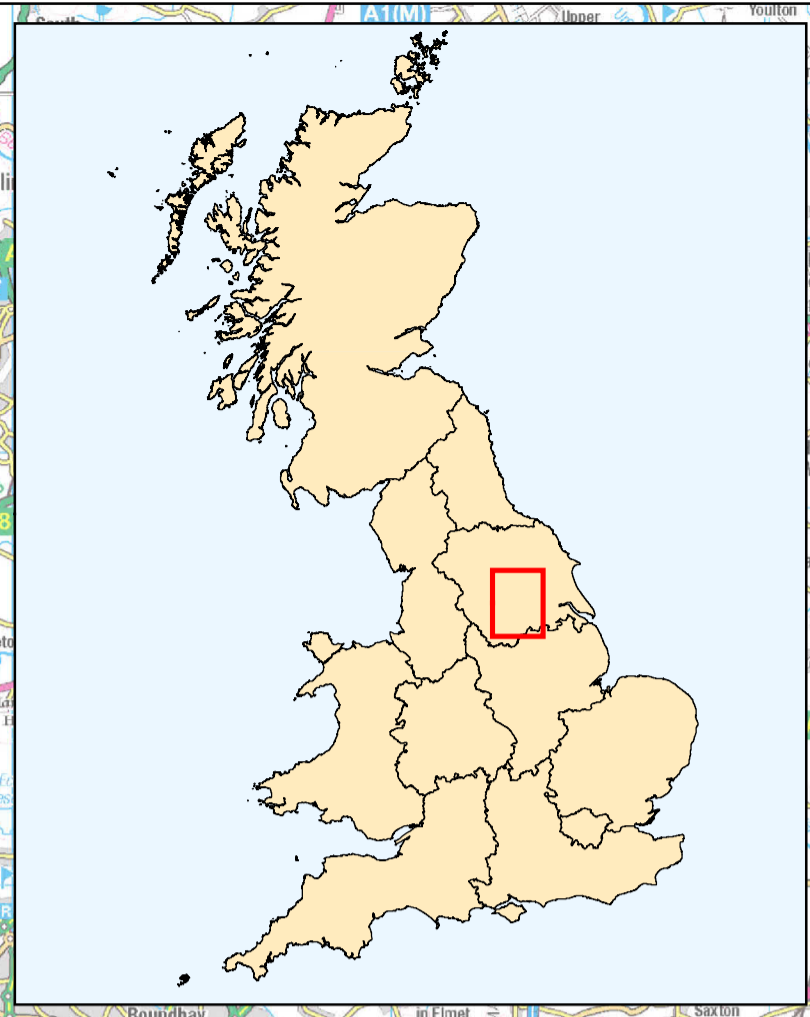
The topographical data for the Site has been reviewed against EA flood mapping data and modelled flood level data to determine the risk of flooding associated with the Proposed Development (see Appendix 11A (Flood Risk Assessment) in ES Volume III).

14. REFERENCES

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**ANNEX A –
SITE AND PROPOSED DEVELOPMENT
PLANS**

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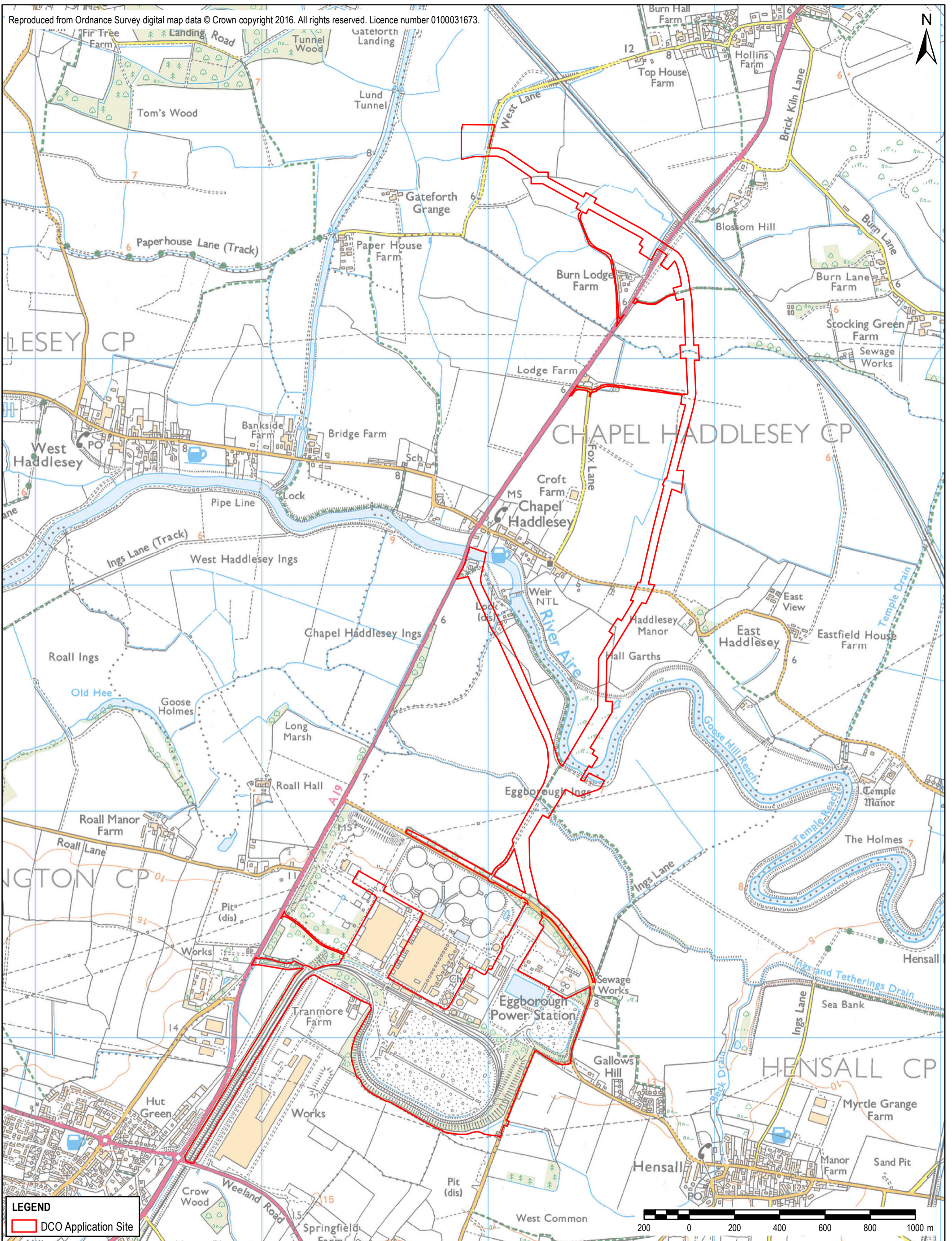


LEGEND
■ DCO Application Site



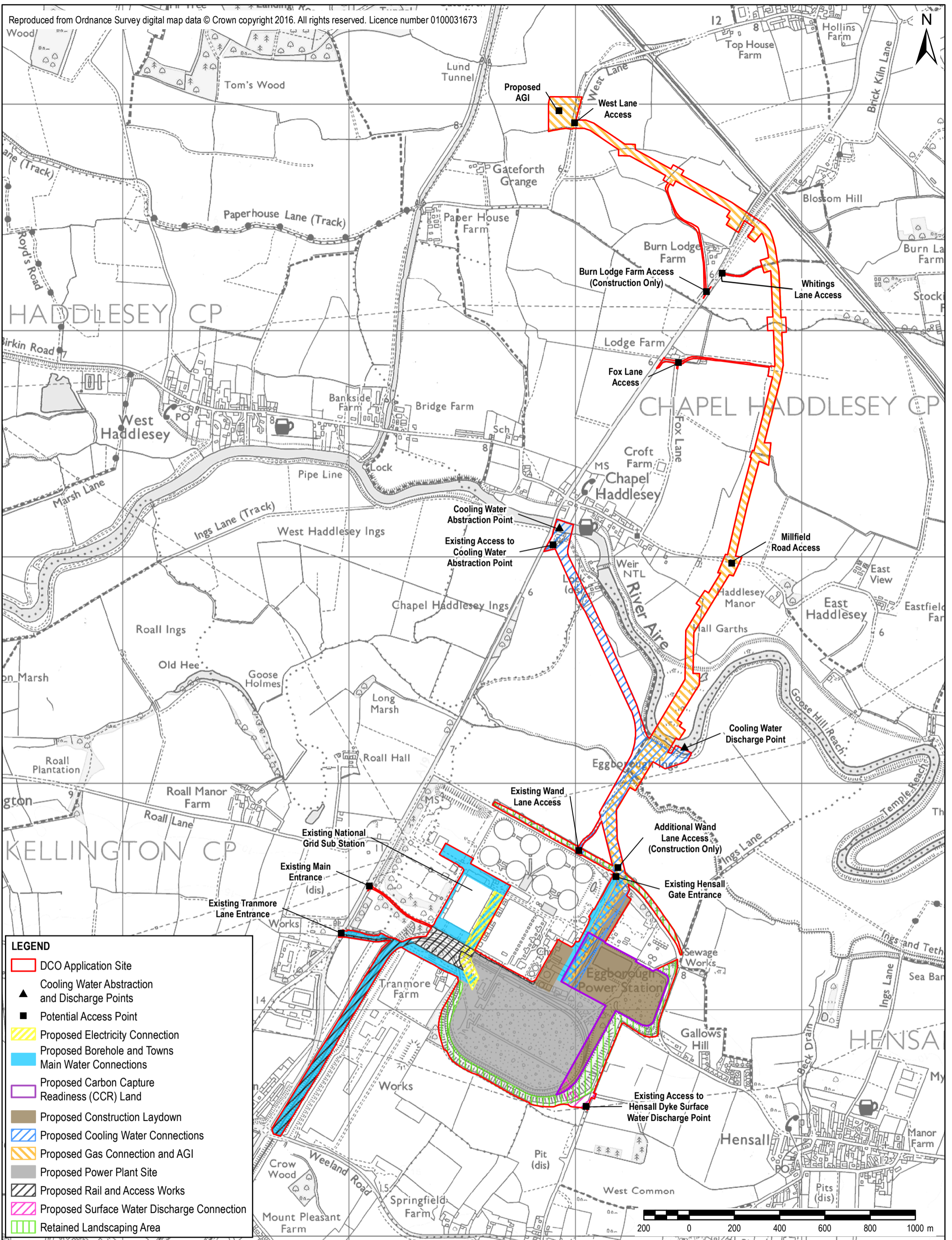
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Drawing Title SITE LOCATION PLAN		Drawn JW	Checked AK	Approved AC	AECOM
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		Drawing Number FIGURE 1.1	Rev 01	THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.	

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 DCO Application Site

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Drawing Title	THE SITE BOUNDARY			Drawn	JW	Checked	AK	Approved	AC
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Drawing Title PARTS OF THE SITE		Drawn JW	Checked AK	Approved KC	AECOM
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3	STACK
4	FEEDWATER PUMP BUILDING
5	ELECTRICAL BUILDING
6	GENERATOR TRANSFORMER
7	HYBRID COOLING TOWERS
8	COOLING WATER PUMPS
9	GAS RECEIVING AREA
10	WORKSHOP & STORES
11	ELECTRICAL CONTROL ROOM & ADMIN BUILDING
12	WATER TREATMENT PLANT, FIRE PUMPS & LABORATORY
13	RAW & FIRE WATER TANK
14	DEMINERALISED WATER TANKS
15	AIR INTAKE FILTER
16	GAS-INSULATED SUB STATION
17	DIESEL GENERATORS
18	GATEHOUSE
19	SURFACE WATER ATTENUATION SYSTEM (INDICATIVE LOCATION)
20	WASTE WATER TREATMENT PLANT
21	UNUSED
22	CAR PARKING
23	CLOSED CIRCUIT COOLING WATER COOLERS
24	PEAKING PLANT
25	AUXILIARY BOILER
26	BLACK START FACILITY
27	UNUSED
28	UNUSED
29	COOLING WATER DOSING
30	GAS COMPRESSORS
31	WEIGHBRIDGE
32	COOLING WATER ELECTRICAL MODULE
33	CONTINUOUS EMISSIONS MONITORING SYSTEM CONTAINER

KEY

	FOUL DRAINAGE TO WASTE WATER TREATMENT WORKS
	COOLING WATER (MAKE-UP & BLOWDOWN)
	GAS SUPPLY LINE
	TOWNS WATER & BOREHOLE WATER
	UNDERGROUND CABLE
	CONSTRUCTION LAYDOWN AREA
	CARBON CAPTURE READINESS (CCR) LAND

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Purpose of Issue
ENVIRONMENTAL STATEMENT

Client
EGGBOROUGH POWER LTD

Project Title
EGGBOROUGH CCGT DCO

Drawing Title
INDICATIVE CONCEPT LAYOUT (3 SINGLE SHAFT) FOR THE PROPOSED DEVELOPMENT WITHIN THE EXISTING COAL-FIRED POWER STATION SITE

Drawn GB	Checked JW	Approved KC	Date 22/05/2017
AECOM Internal Project No. 60506766		Scale @ A3 1:5000	

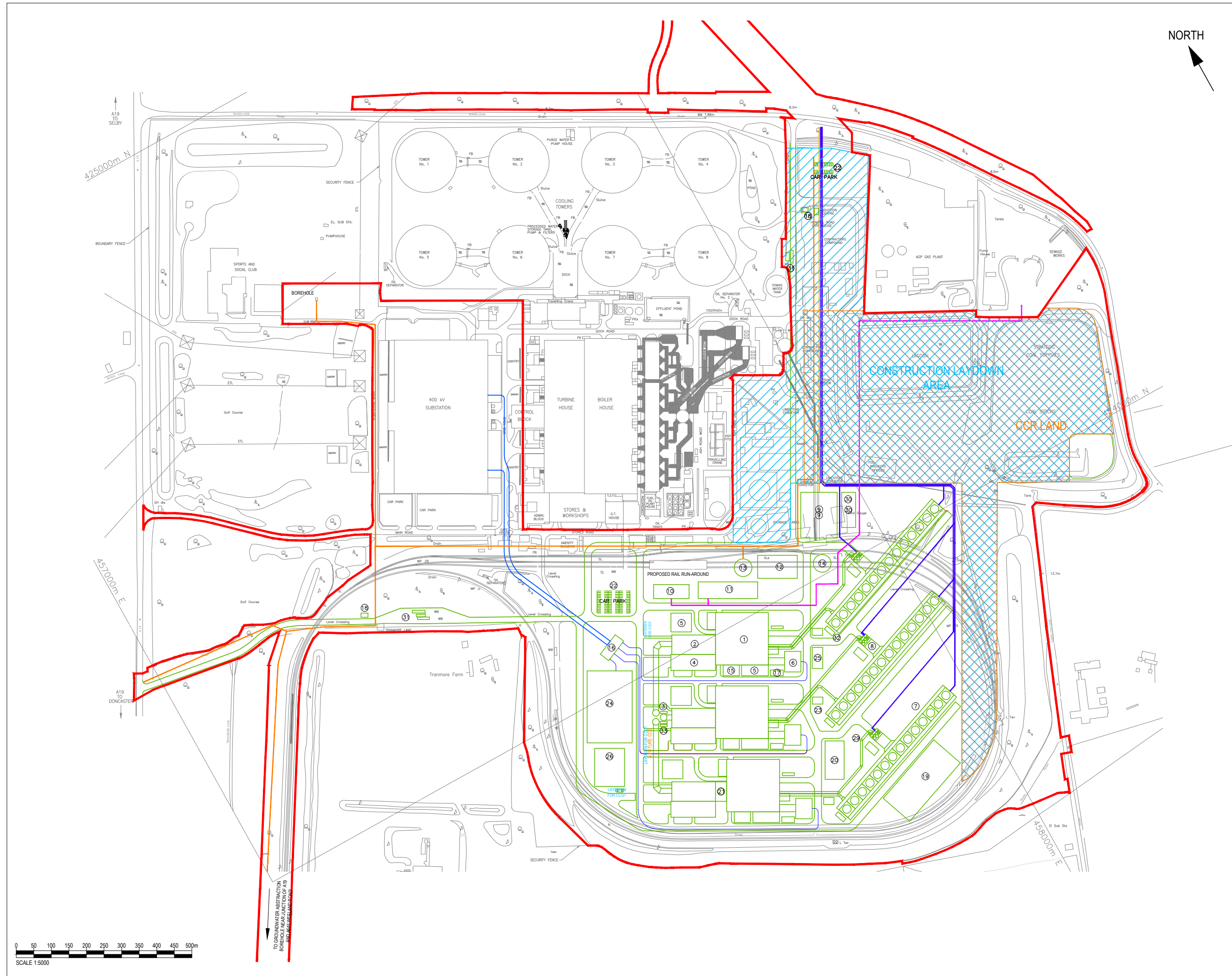
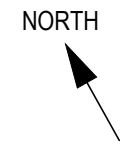
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30	GAS COMPRESSORS
31	WEIGHBRIDGE
32	COOLING WATER ELECTRICAL MODULE
33	CONTINUOUS EMISSIONS MONITORING SYSTEM CONTAINER

KEY

- FOUL DRAINAGE TO WASTE WATER TREATMENT WORKS
- COOLING WATER (MAKE-UP & BLOWDOWN)
- GAS SUPPLY LINE
- TOWNS WATER & BOREHOLE WATER
- UNDERGROUND CABLE
- CONSTRUCTION LAYDOWN AREA
- CARBON CAPTURE READINESS (CCR) LAND

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Purpose of Issue
ENVIRONMENTAL STATEMENT

Client
EGGBOROUGH POWER LTD

Project Title
EGGBOROUGH CCGT DCO

Drawing Title
INDICATIVE CONCEPT LAYOUT (MULTI SHAFT + SINGLE SHAFT) FOR THE PROPOSED DEVELOPMENT WITHIN THE EXISTING COAL-FIRED POWER STATION SITE

Drawn GB	Checked JW	Approved KC	Date 17/05/2017
AECOM Internal Project No. 60506766		Scale @ A3 1:5000	

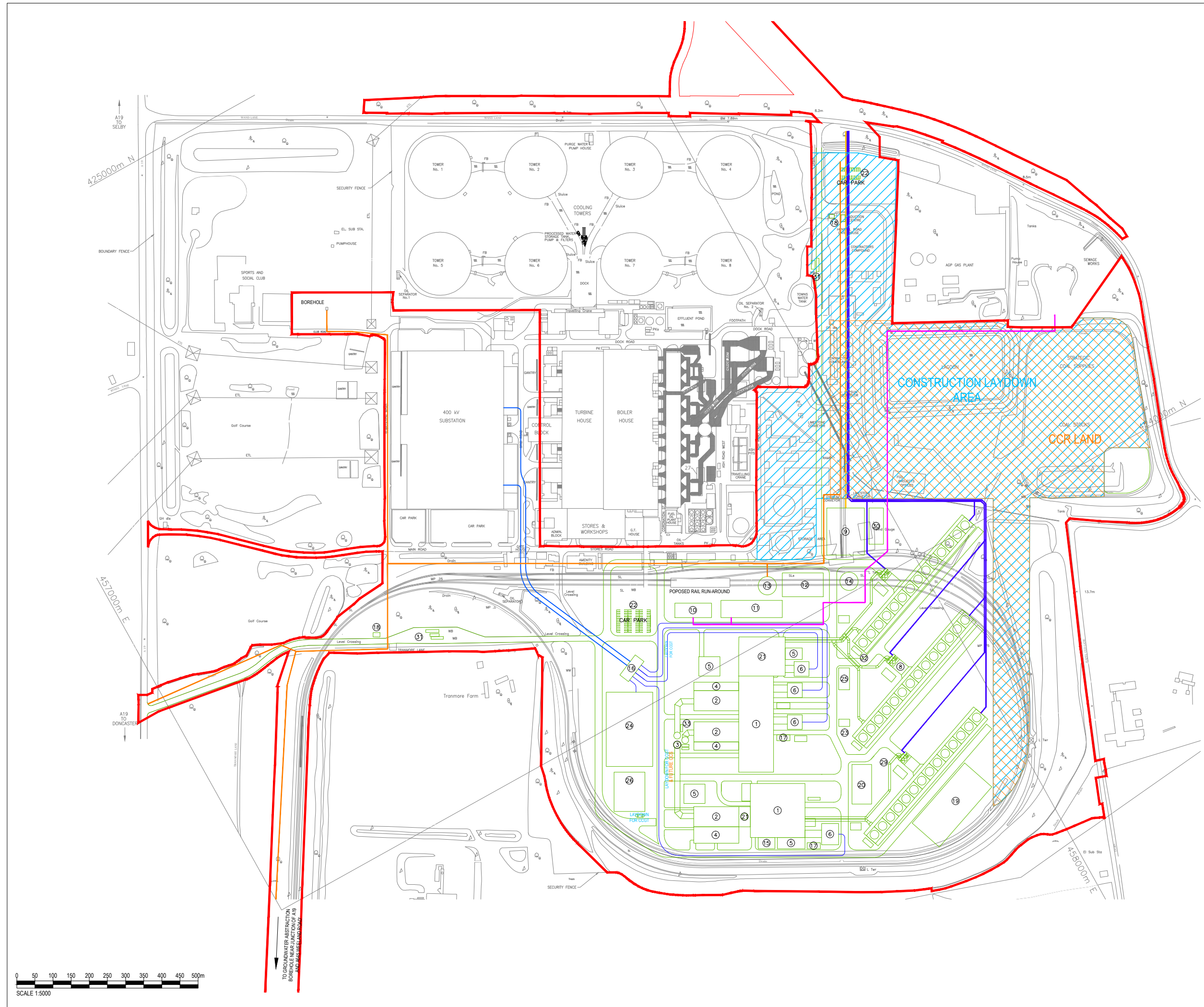
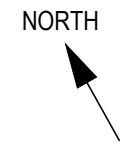
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FIGURE 4.1b

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**ANNEX B –
PHOTOGRAPHS FROM THE SITE
WALKOVER**

APPENDIX B – PHOTOGRAPHS FROM SITE WALKOVER



Photograph 1

Limestone and coal conveyors located in the coal stockyard area.



Photograph 2

Road, railway and embankment which surrounds the coal stockyard area.

APPENDIX B – PHOTOGRAPHS FROM SITE WALKOVER



Photograph 3 | Warehouses in the coal stockyard area (looking east).



Photograph 4 | Drain which surrounds the coal stockyard area.

APPENDIX B – PHOTOGRAPHS FROM SITE WALKOVER



Photograph 5 | Warehouses within the coal stockyard area (looking north).



Photograph 6 | Large excavator in the coal stockyard area.

APPENDIX B – PHOTOGRAPHS FROM SITE WALKOVER



Photograph 7 | The coal stockyard area (looking north).



Photograph 8 | Standing water in the drain surrounding the coal stockyard.

APPENDIX B – PHOTOGRAPHS FROM SITE WALKOVER



Photograph 9

Channels dug in the coal stockyard area to allow water to run into the drain.



Photograph 10

Grated drain cover in the coal stockyard area.

APPENDIX B – PHOTOGRAPHS FROM SITE WALKOVER



Photograph 11 | Pump house which pumps the water out of the drain.



Photograph 12 | A photo showing the proximity of the base of the coal stockyard to the natural deposits.

APPENDIX B – PHOTOGRAPHS FROM SITE WALKOVER



Photograph 13 | A photo showing the coal stockyard (looking south west).



Photograph 14 | Laydown area to the north of the coal stockyard.

APPENDIX B – PHOTOGRAPHS FROM SITE WALKOVER



Photograph 15 Buildings associated with the Flue Gas Desulphurisation (FGD) plant.



Photograph 16 One of the onsite oil interceptors.

APPENDIX B – PHOTOGRAPHS FROM SITE WALKOVER



Photograph 17 | Water storage unit labelled the million gallon tank (towns water supply).



Photograph 18 | Mobile office storage air with the Air Liquide plant in the back ground.

APPENDIX B – PHOTOGRAPHS FROM SITE WALKOVER



Photograph 19

View of the cooling towers (looking north west).



Photograph 20

Water storage lagoon.

APPENDIX B – PHOTOGRAPHS FROM SITE WALKOVER



Photograph 21 | Lagoon discharge pipe likely to feed into the million gallon tank.



Photograph 22 | Drainage pump located in the laydown area to the north of the coal stockyard area.

APPENDIX B – PHOTOGRAPHS FROM SITE WALKOVER



Photograph 23 | View of the strategic coal stockyard storage area.



Photograph 24 | Concrete drain which surrounds the strategic coal stockyard area.

APPENDIX B – PHOTOGRAPHS FROM SITE WALKOVER



Photograph 25 | Vegetation which surrounds the strategic coal stockyard area.

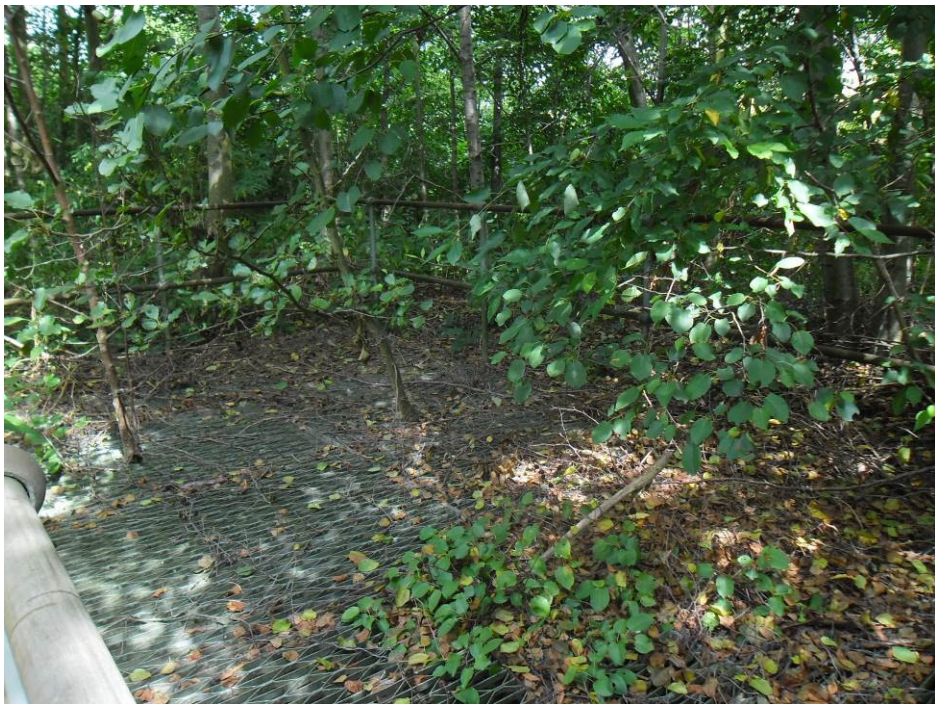


Photograph 26 | Disused cabinet with disconnected power cables.

APPENDIX B – PHOTOGRAPHS FROM SITE WALKOVER



Photograph 27 | Redundant pipes previously used to transport materials to the former Lytag plant.



Photograph 28 | Drain associated with a former wheel wash station.

APPENDIX B – PHOTOGRAPHS FROM SITE WALKOVER



Photograph 29 | View of the coal stockyard from the top of the embankment (looking north).



Photograph 30 | View of the coal stockyard in the foreground and the power plant in the back ground (looking north).

APPENDIX B – PHOTOGRAPHS FROM SITE WALKOVER



Photograph 31 | A view of the main turbine halls.



Photograph 32 | A view of the 400 KV substation building.

APPENDIX B – PHOTOGRAPHS FROM SITE WALKOVER



Photograph 33 | View of the substation connections and the pylons.



Photograph 34 | A view of the golf course.

APPENDIX B – PHOTOGRAPHS FROM SITE WALKOVER



Photograph 35 | View of the football pitch.



Photograph 36 | Abstraction borehole number 2 pump house.

APPENDIX B – PHOTOGRAPHS FROM SITE WALKOVER



Photograph 37 | The surface water abstraction point from the River Aire.



Photograph 38 | Surface water abstraction pump house.

APPENDIX B – PHOTOGRAPHS FROM SITE WALKOVER



Photograph 39 | Nearest surface water course (Ings and Tetherings Drain).



Photograph 40 | Effluent discharge location into the River Aire

APPENDIX B – PHOTOGRAPHS FROM SITE WALKOVER



Photograph 41

A small water feature located just off the south-eastern corner of the site (stream issue at reed bed).



Photograph 42

Reed bed into which the drain water from the coal stockyard was formerly discharged.

ANNEX C – RISK ASSESSMENT PRINCIPLES

Risk Assessment Principles

Current good practice recommends that the determination of hazards due to contaminated land is based on the principle of risk assessment, as outlined in the Environment Agency guidance on Model Procedures for the Management of Land Contamination (CLR 11).

For a risk to be present, there must be a viable pollutant linkage; i.e. a mechanism whereby a source impacts on a sensitive receptor via a pathway.

Assessments of risks associated with each of these pollutant linkages are discussed in the following sections.

Using criteria broadly based on those presented in EA, Chartered Institute of Environmental Health (CIEH) and National House Building Council (NHBC) R&D Publication 66 'Guidance for the Safe Development of Housing on Land Affected by Contamination' (2008), the magnitude of the risk associated with potential contamination at the site has been assessed. To do this an estimate is made of:

- the magnitude of the potential consequence (i.e. severity); and
- the magnitude of probability (i.e. likelihood).

The severity of the risk is classified according to the criteria in **Table C1**, below:

Table C1: Summary of Potential Pollutant Linkages

SEVERITY	DEFINITION AND EXAMPLES
Severe	<ul style="list-style-type: none"> - Acute risks to human health, likely to result in "significant harm" (e.g. very high concentrations of contaminants/ground gases) - Catastrophic damage to buildings/property (e.g. by explosion, sites with high gassing potential, extensive VOC contamination) - Major pollution of controlled waters (e.g. surface watercourses or Principal aquifers/source protection zones) - Short term risk to a particular ecosystem
Medium	<ul style="list-style-type: none"> - Chronic (long-term) risk to human health likely to result in "significant harm" (e.g. elevated concentration of contaminants/ground gases) - Pollution of sensitive controlled waters (e.g. surface watercourses or Principal/ Secondary aquifers) - Significant effects on sensitive ecosystems or species
Mild	<ul style="list-style-type: none"> - Pollution of non-sensitive waters (e.g. smaller surface watercourses or non-aquifers) - Significant damage to crops, buildings, structures or services (e.g. by explosion, sites with medium gassing potential, elevated concentrations of contaminants)
Minor	<ul style="list-style-type: none"> - Non-permanent human health effects (requirement for protective equipment during site works to mitigate health effects) - Damage to non-sensitive ecosystems or species - Minor (easily repairable) damage to buildings, structures or services (e.g. by explosion, sites with low gassing potential)

The probability of the risk occurring is classified according to the criteria in **Table C2**, below:

Table C2: Likelihood of Risk Occurrence

LIKELIHOOD	EXPLANATION
High	- Contaminant linkage may be present that appears very likely in the short-term and risk is almost certain to occur in the long term, or there is evidence of harm to the receptor
Likely	- Contaminant linkage may be present, and it is probable that the risk will occur over the long term
Low	- Contaminant linkage may be present and there is a possibility of the risk occurring, although there is no certainty that it will do so.
Unlikely	- Contaminant linkage may be present but the circumstances under which harm would occur even in the long-term are improbable.

An overall evaluation of the level of risk is gained from a comparison of the severity and probability, as shown in **Table C3**, below:

Table C3: Risk Based on Comparison of Likelihood and Severity

		SEVERITY			
		SEVERE	MEDIUM	MILD	MINOR
LIKELIHOOD	HIGH	Very High	High	Moderate	Moderate/Low
	LIKELY	High	Moderate	Moderate/Low	Low
	LOW	Moderate	Moderate/Low	Low	Very Low
	UNLIKELY	Moderate/Low	Low	Very Low	Very Low

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