

**Community Wind Turbine
Shafton Two Gates, Barnsley**

Desk Based Contaminated Land Assessment

Phase 1 Contaminated Land
Risk Assessment

**Community Wind Turbine
Shafton Two Gates.
Barnsley**

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EXECUTIVE SUMMARY

SCOPE

Purpose of the report	Desk based contaminated land assessment.
Future Site End-use	Single wind turbine with associated substation and access road.

SITE INFORMATION

Grid Reference	440043, 408608	Site Area (approx.)	1.97 hectares
Current Site Status	The site is occupied by an open area of reclaimed industrial land (grassed with a number of trees and shrubs).		
History	The historical review indicates that the site had been occupied by fields and a highway from 1854 until 1904. From 1904 the north eastern part of the site was occupied by a railway embankment while the rest of the site remained unchanged until 1972. In 1972 the centre of the site was occupied by slurry ponds (infilled from approximately 1984). From 1982 the northern part of the site was occupied by open cast 'workings' and the central and southern parts of the site were occupied by refuse/slag heaps. From 1984 the central parts of the site were occupied by colliery works and the southern parts of the site were occupied by a 'spoil heap'. From approximately 2002 until the present day the site has been occupied by open industrial reclaimed land.		
Published Geology	Infilled ground and made ground (unknown composition and thickness) overlying the Pennine Middle Coal Measure Formation which comprises interbedded mudstone, siltstone, sandstone and coal seams. Two separate coal seams are mapped to outcrop at surface within the site boundary. The site is also affected by geological faulting. No superficial deposits are mapped.		
Hydrogeology	The bedrock geology is designated as a 'secondary A' aquifer.		
Hydrology	The nearest surface water feature is an unnamed secondary river approximately 62m east of the site.		
Potential Contamination Sources	On site sources of potential contamination include made ground, infilled ground, former colliery works and a former railway line while a number of offsite sources have also been identified which include former colliery works, infilled ground, made ground and a historic landfill.		

CONTAMINATION ASSESSMENT

Assessment	The risk assessment undertaken indicates that there is generally a low risk of contaminated land issues associated with the development. However, the assessment has identified medium risks associated with construction workers, a nearby surface watercourse and the proposed foundations of the structures. These risks can be mitigated by the use of the appropriate personnel protective equipment (PPE) appropriate construction techniques (limits surface water discharges) and soil testing prior to the design of the foundations and concrete specification.
Recommendations	It is recommended that representative soil samples are taken with follow up chemical testing for disposal classification purposes and to assess what protective measures are required for the construction workers. Concrete classification testing to BRE standards is also recommended to specify the appropriate concrete for the foundations.

1. BRIEF

The Nott Group have been instructed by Engena Limited to undertake a desk based contaminated land assessment at the proposed location of a single wind turbine and access road to the south of Ferry Moor Lane, Barnsley, South Yorkshire.

This report has been prepared for the exclusive use of the client for the purpose of assisting them in evaluating the potential risks associated with contaminated land issues at the site.

The information presented within this report is based on observations made on site, a review of available historical, geological, hydrogeological sources and other environmental information obtained for the site.

The Nott Group has endeavoured to assess all information provided to them during this assessment, but makes no guarantees or warranties as to the accuracy or completeness of this information obtained and reviewed.

The scope of this report does not include an assessment of the presence of asbestos containing materials within the buildings at the site or the identification of Japanese Knotweed, or other invasive species, on site.

1.1 PROPOSED DEVELOPMENT

The proposed development comprises the construction of a single wind turbine (total height including blades of 77m) with associated substation and access road.

2. SITE DESCRIPTION AND RECONNAISSANCE

A description of the site and the surrounding area is summarised in Table 1. A site location plan is included in Appendix A.

TABLE 1: SITE DESCRIPTION AND SURROUNDS

Data	Information	
Address	The site, referred to as 'Shafton Two Gates', is located approximately 250m south of Ferry Moor Lane, Brierley, Barnsley, South Yorkshire, S72 7BN (nearest postcode to site).	
Current Site Use and Description:	The site is occupied by an open area of reclaimed industrial land (grassed with a number of trees and shrubs).	
National Grid Reference:	440043, 408608	
Site Area:	Approximately 1.97 hectares.	
Surrounding Land Use	North	Reclaimed industrial land including a number of pond features and highway (Ferry Moor Lane) beyond.
	East	Reclaimed industrial land and a distribution depot beyond.
	South	Reclaimed industrial land.
	West	Open fields and residential beyond.

2.1 SITE WALKOVER

A site walkover was undertaken by Ed Bullivant of the Nott Group on the 6th May 2013. The weather was warm and sunny. During the walkover the following issues were noted:

- Visual inspection of the sites existing ground levels indicate the sites ground levels may have been 'raised' in the past, possibly by the placement of spoil material associated with the areas historical coal mining activities. The compositional nature of the material is not known.
- Limited vegetation was noted in places of the site indicating phytotoxic material may underlain the site which could inhibit plant growth.

3. SITE HISTORY

Historical maps dating from 1854 have been obtained and reviewed. The relevant information is summarised in the following table. The historical maps obtained have been included in Appendix B.

TABLE 2: HISTORICAL REVIEW OF SITE AND ADJACENT AREAS

Date	On Site Observations	Off Site Observations
1854	The site is occupied by a series of fields. Pen Hill Lane (highway) intercepts the south east of site and runs in a north east to south west orientation.	'Ferry Moor House' is located approximately 20m north west of the site and comprises of a series of buildings of various shape and size and a small pond feature. The surrounding land use is predominantly agricultural.
1891	No significant changes are shown on maps.	No significant changes are shown on maps.
1904 - 1906	The north east of the site is now shown to form part of a railway embankment which runs in an approximate north west - south east orientation.	The buildings and pond feature associated with 'Ferry Moor House' are now absent and shown to be replaced by 'Ferry Moor Farm' which comprises of a single 'L' shaped building. Sewage works are now shown approximately 500m east and 600m north east of the site boundary respectively. 'Grimethorpe colliery' is now shown approximately 700m east and south east of the site and comprises a number of railway lines and sidings and buildings of various shapes and sizes.
1931 - 1932	No significant changes are shown on maps.	The sewage works approximately 500m east of the site is shown to have increased in size and now comprises a number of reservoirs, storage tanks and a sludge bed. 'Grimethorpe colliery' is shown to have increased in size with the additional of a number of buildings of various shapes and size, railway lines and sidings and a associated brick works. 'Ferry Moor colliery' is now shown approximately 600m east of the site and comprises a tramline, railway lines, sidings and a number of building of differing shape and size.
1938	No significant changes are shown on maps.	No significant changes are shown on maps.
1948	No significant changes are shown on maps.	No significant changes are shown on maps.
1955	No significant changes are shown on maps.	A 'aerial cable' is now shown approximately 80m east of the site while a number of tanks associated with the sewage works 500m east of the site are now absent.
1961	No significant changes are shown on maps.	'Grimethorpe colliery' and 'Ferry Moor colliery' have increased in size whereby a number of sidings, railway lines and associated terminal buildings are now shown approximately 80m to 250m east and south east of the site.
1967	No significant changes are shown on maps.	No significant changes are shown on maps.
1972	The centre of the site is now shown to be occupied by slurry ponds which extend	The colliery to the east has shown to have increased in size with the additional of a number of sidings,

Date	On Site Observations	Off Site Observations
	beyond the sites eastern boundary by approximately 100m. Pen Hill Lane is now shown to be absent.	conveyer belt systems and a water tower.
1982	The slurry ponds are now shown to be absent and assumed to have been infilled. The north of the site is now labelled as 'workings' indicating possible open cast mining. The south and central regions of the site are now shown to be occupied by refuse or slag heaps.	The slurry ponds immediately east of the site are now shown to be absent and assumed to have been infilled. Immediately north, south and west of the site is now shown to be occupied by refuse or slag heaps while immediately north east of the site boundary is occupied by open cast 'workings' The sewage treatment works approximately 500m east of the site is now shown to be absent.
1984	A conveyer belt system now intercepts the centre of the site associated with the colliery works immediately adjacent to the sites eastern boundary.	A colliery works now bounds the sites eastern boundary and comprises of a number of buildings, tanks, sidings and railway lines. The open cast 'workings' immediately adjacent to the north east of the sites boundary are now absent and the area of excavation now assumed to be infilled.
1988	Southern sections of the site are now shown to be occupied by a 'spoil heap'.	The colliery works immediately east of the site has increased in size including the addition of a number of conveyor belt systems, two large storage tanks (immediately north of the site boundary) and a series of smaller tanks (immediately east and south east of the site boundary).
1992	No significant changes are shown on maps.	No significant changes are shown on maps.
2002	The site is now shown to be occupied by an open area of industrial reclaimed land.	The colliery and all associated infrastructure (including railway lines and all associated sidings) immediately east and south east of the site boundary and beyond is now shown to be absent.
2012	No significant changes are shown on maps	No significant changes are shown on maps

3.1 HISTORICAL SUMMARY

The historical review indicates that the site had been occupied by a series of fields with a highway in the south east from 1854 until 1904. From 1904 the north east of the site was shown to be occupied by a railway embankment while the rest of the site remained unchanged until 1972. In 1972 the maps indicate that the centre of the site was shown to be occupied by slurry ponds and the highway in the south east of the site absent. From 1982 the north of the site formed part of an open cast 'workings', the central and southern regions of the site were shown to be occupied by refuse/slag heaps while the slurry ponds are shown to be absent (assumed to have been infilled). From 1984 the central regions of the site formed part of the colliery works which bounded the sites entire eastern boundary while from 1988 the southern regions of the site were occupied by a 'spoil heap'. From 2002 until the present day the site is shown to be occupied by an open area of industrial reclaimed land.

Potential on and off site sources of contamination include former open cast workings and slurry ponds which have been subsequently infilled, former railway infrastructure (railway lines and sidings), former colliery works and spoil/slag heaps.

4. GEOLOGY, HYDROLOGY AND HYDROGEOLOGY

4.1 GENERAL GEOLOGY AND GROUND CONDITIONS

The geology beneath the site has been established from the British Geological Survey (BGS) 1: 50,000 scale mapping, Sheet No. 087. In addition, the hydrology and hydrogeology is summarised in the following tables.

TABLE 3: SITE GEOLOGY, HYDROLOGY AND HYDROGEOLOGY

Data	Information
Solid Geology	Pennine Middle Coal Measure Formation which comprises interbedded mudstone, siltstone, sandstone and coal seams. Two separate coal seams are mapped to outcrop at surface within the site boundary.
Superficial Geology	Superficial deposits are not mapped.
Made Ground	Infilled ground and made ground is mapped across the entire site. The nature and thickness of the made ground is not known.
Closest Surface Waters	The closest surface water feature is an unnamed secondary river approximately 62m east of the site.
Surface Water Abstractions within 1000m	No surface water abstractions have been identified.
Groundwater Vulnerability	The bedrock geology is designated as a 'secondary A' aquifer.
Groundwater Abstractions within 1000m	No groundwater abstractions have been identified.
Potable Water Abstractions within 1000m	No potable water abstraction has been identified.
Source Protection Zones (SPZs)	The site is not located within a source protection zone.

TABLE 4: SUMMARY OF HYDROGEOLOGICAL PROPERTIES OF THE MAIN GEOLOGICAL STRATA

Strata	Hydrogeological Significance	Classification (Environment Agency)
Solid Geology (Pennine Middle Coal Measure Formation)	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.	Secondary A aquifer

4.2 HISTORICAL SURFACE GROUND WORKING FEATURES

There are five historical surface ground working features within 250m of the site as summarised in the below table.

TABLE 5: SUMMARY OF HISTORICAL GROUND WORKING FEATURES

Distance	Direction	NGR	Use	Date
0.0m	On site	440078,408505	Slurry pond	1981
0.0m	On site	440430,407736	Refuse heap	1988
0.0m	On site	439856,408061	Open cast workings	1966
0.0m	On site	439904,408249	Refuse heap	1992
0.0m	On site	439845,408389	Refuse heap	1982
3.0m	South east	440429,407707	Refuse heap	1981
19m	South east	440092,408327	Refuse heap	1967
33m	East	440364,408645	Refuse heap	1951
245m	East	440302,408294	Cuttings	1904

4.3 HISTORICAL UNDERGROUND WORKINGS FEATURES

There are six recorded historical underground working features within 1000m of the site boundary as summarised in the following table.

TABLE 6: SUMMARY OF HISTORICAL UNDERGROUND WORKING FEATURES

Distance	Direction	Use	Date
295m	East	Unspecified workings	1988
423m	East	Unspecified mine	1967
455m	East	Colliery	1948
511m	South east	Colliery	1904
635m	South east	Colliery	1948
857m	East	Colliery	1981

4.4 CURRENT GROUND WORKINGS

There are six British Geological Survey (BGS) current ground workings within 1000m of the site boundary as summarised within the following table.

TABLE 7: SUMMARY OF CURRENT GROUND WORKINGS INFORMATION AS SUPPLIED BY BGS

Distance	Direction	Commodity Produced	Pit Name	Type of Working	Status
373m	East	Coal - surface mined	Ferry Moor revised reclamation scheme	A surface mineral working	Ceased
385m	West	Coal - surface mined	Ferry Moor revised OCCS	A surface mineral working	Ceased
644m	East	Coal - deep mined	Ferrymoor colliery	Working is wholly underground	Ceased
875m	South east	Coal - deep mined	Grimethorpe Colliery	Working is wholly underground	Ceased
892m	North west	Coal - deep mined	South Hiendley Upper Cudworth	Working is wholly underground	Ceased
959m	North west	Sandstone	Cudworth quarry	A surface mineral working	Ceased

4.5 MINING AND EXTRACTION

A review of the available information obtained indicates the following extraction, coal mining and associated activities:

- The site is located within the specified search distance of identified mining area.
- There are no recorded non – coal mining cavities within 1000m of the site boundary.
- There are no recorded natural cavities within 1000m of the site boundary.
- There is no recorded clay or tin mining areas within 1000m of the site boundary.
- There are no recorded brine or gypsum extraction areas within 1000m of the site boundary.

There are eight historical mining areas within 1000m of the site boundary as summarised in the below table.

TABLE 8 SUMMARY OF HISTORICAL UNDERGROUND WORKING FEATURES

Distance	Direction	Details	Date
0.0m	On site	Opencast workings	1966
295m	East	Unspecified workings	1988
366m	South east	Opencast workings	1967
423m	East	Unspecified mine	1967
455m	East	Colliery	1948
511m	South east	Colliery	1904

Distance	Direction	Details	Date
635m	South east	Colliery	1948
857m	East	Colliery	1981

There are six non - coal mining areas within 1000m of the site boundary as summarised in the following table.

TABLE 9: SUMMARY OF HISTORICAL UNDERGROUND WORKING FEATURES

Distance	Direction	Commodity	Assessment of Likelihood
0.0m	On site	Iron Ore (bedded)	Highly unlikely - Localised small scale mining may have occurred but restricted in extent
19m	West	Iron Ore	Highly unlikely - Localised small scale mining may have occurred but restricted in extent
79m	West	Iron Ore (bedded)	Highly unlikely - Localised small scale mining may have occurred but restricted in extent
180m	North west	Iron Ore (bedded)	Highly unlikely - Localised small scale mining may have occurred but restricted in extent
587m	North east	Iron Ore	Highly unlikely - Localised small scale mining may have occurred but restricted in extent
791m	West	Iron Ore (bedded)	Highly unlikely - Localised small scale mining may have occurred but restricted in extent

4.6 LANDFILLS AND WASTE SITES

A review of the available information obtained indicates the following landfill and other waste site activities:

- There are no recorded Environment Agency landfills within 1000m of the site boundary.
- There are no recorded operational landfill sites within 1000m of the site boundary.
- There are no recorded BGS/DoE non – operational landfill sites within 1500m of the site boundary.
- There are no recorded local authority landfill sites within 1500m of the site boundary.
- There are no operational waste treatment, transfer or disposal sites within 500m of the site boundary.

There are five recorded Environment Agency (EA) historic landfill sites within 1500m of the site boundary as summarised in the below table.

TABLE 10: RECORDS OF EA HISTORIC LANDFILL SITES

Distance	Direction	Details
667m	East	Site address: Acorn Way, Grimethorpe, Barnsley, South Yorkshire Waste Type: Not known Operator: Not known
950m	East	Site address: National Coal Board, New Park Spring Tip, Grimethorpe, Barnsley Waste Type: Industrial and liquid sludge Operator: Coalite and Chemical Products
1051m	South east	Site address: Carlton Main Brickworks, off Wood Lane, Grimethorpe, Barnsley, South Yorkshire Waste Type: Inert and industrial Operator: Not known
1087m	South west	Site address: Land adjacent to Rifle Range Farm, Carrs Lane, Cudworth, Barnsley, South Yorkshire Waste Type: Inert and industrial Operator: Cudworth Urban District Council
1463m	East	Site address Part of New Park Spring Tip, Wood Lane, Grimethorpe, Barnsley Waste Type: Commercial Operator: Not known

There is a single recorded non - operational landfill within 1000m of the site as summarised in the following table.

TABLE 10: RECORDS OF NON - OPERATIONAL LANDFILL SITES

Distance	Direction	Details
343m	West	Site address: Cudworth Landfill, Burton Road, Monk Bretton, Barnsley, South Yorkshire Waste Type: Inert Known restrictions: No know restrictions on source of waste

There is a single recorded non - operational waste treatment, transfer or disposal sites within 500m of the site as summarised in the below table.

TABLE 11: RECORDS OF NON - OPERATIONAL WASTE TREATMENT, TRANSFER OR DISPOSAL SITES

Distance	Direction	Details
390m	South east	Site address: Grimethorpe Works, Grimethorpe, Barnsley, South Yorkshire Waste Type: Difficult, putrescible and non hazardous Known restrictions: No know restrictions on source of waste

There are a total of five EA licensed waste sites within 1500m of the site as summarised in the below table.

TABLE 12: RECORDS OF EA LICENSED WASTE SITES

Distance	Direction	Details
759m	South east	Physical treatment facility
1047m	East	Industrial waste landfill
1072m	East	Household, commercial and industrial waste transfer station
1357m	East	Inert landfill
1488m	North	Physical treatment facility

4.7 RADON

A radon report obtained from the British Geological Survey and Health Protection Agency indicates that the site is in a radon affected area as between 1 and 3% of properties are above the action level, however, no radon protective measures are necessary.

5. REVIEW OF ENVIRONMENTAL DATABASES

Environmental information has been obtained from Groundsure. This information comprises data provided by the British Geological Survey, Environment Agency, Health Protection Agency and the Coal Authority and has been reviewed and summarised below. A full copy of this report has been enclosed in Appendix C.

5.1 INDUSTRIAL SITES HOLDING AUTHORISATIONS, PERMITS AND LICENSES

Information obtained from the Environment Agency and Local Authority indicates there are no records of Part A(1) and IPPC Authorised Activities within 500m of the site. However, a single recorded historic IPC authorisation has been identified within 500m of the site boundary and is summarised below.

TABLE 13: RECORDS OF HISTORIC IPC AUTHORISATIONS

Distance	Direction	Details
82m	West	Operator: Coalite Products Ltd Process: Carbonisation and associated processes

5.2 DESIGNATED ENVIRONMENTALLY SENSITIVE SITES

The following designated sites have been identified within 500m of the site boundary.

TABLE 14: RECORDS OF DESIGNATED ENVIRONMENTALLY SENSITIVE SITES

Distance	Direction	Details
0.0m	On site	Nitrate vulnerable zone

5.3 ENVIRONMENT AGENCY RECORDED POLLUTION INCIDENTS

There are no recorded significant pollution incidents recorded within 250m of the site boundary.

5.4 SITES DETERMINED AS CONTAMINATED LAND UNDER PART 2A

No designated contaminated sites have been identified within 500m of the site.

5.5 RECORDS OF POTENTIALLY CONTAMINATIVE INDUSTRIAL SITES

There are three recorded potentially contaminative industrial sites within 250m of the site boundary as summarised in Table 7.

TABLE 15: RECORDS OF POTENTIALLY CONTAMINATIVE INDUSTRIAL SITES

Distance	Direction	Details
157m	West	Pylon (electrical feature)
169m	South west	Pylon (electrical feature)
224m	South east	Spoil heap

5.6 PETROL AND FUEL SITES

There are no recorded petrol or fuel sites within 500m of the site boundary.

5.7 UNDERGROUND HIGH PRESSURE OIL AND GAS PIPELINES

There are no recorded high pressure pipelines within 500m of the site boundary.

6. DEVELOPMENT OF CONCEPTUAL MODEL

6.1 CONTAMINATED LAND BACKGROUND INFORMATION

The Environmental Protection Act 1990 Part IIA, as amended, provides a statutory definition of contaminated land. To fall within this definition it is necessary that, as a result of the condition of the land, substances may be present in, on or under the land such that:

- (a) Significant harm is being caused or there is a significant possibility of such harm being caused; or
- (b) Significant pollution of controlled waters is being caused or there is a significant possibility of such pollution being caused.

Risk from contamination is assessed by consideration of possible linkages between contaminant sources and potential receptors via pathways which is usually termed a conceptual model.

6.2 POTENTIAL SOURCES

TABLE 16: POTENTIAL CONTAMINATION SOURCES AT OR ADJACENT TO THE SUBJECT SITE

Source	Location	Activity	Potential Contaminants
On Site			
Made ground	Whole site	Deposition of colliery spoil waste	Metals, organic chemicals, hydrocarbons, asbestos, landfill gas and leachate generation and migration
Infilled ground	Northern and central regions of the site	Infilling of former slurry ponds and open cast workings with unknown material	Metals, organic chemicals, hydrocarbons, asbestos, landfill gas and leachate generation and migration
Former colliery works	Central and eastern regions of the site	Former colliery works operational until the 1990's	Metals, organic chemicals, hydrocarbons and asbestos
Former railway line	North east of site	Former railway infrastructure serving the former colliery works	Metals, organic chemicals, hydrocarbons and asbestos
Off Site			
Former colliery works	Immediately east of the site	Former colliery works operational until the 1990's	Metals, organic chemicals, hydrocarbons and asbestos
Infilled ground	Immediately north and east of site	Infilling of former slurry ponds and open cast workings with unknown material	Metals, organic chemicals, hydrocarbons, asbestos, landfill gas and leachate generation and migration
Former railway	Immediately north east of the site	Former railway infrastructure serving the former colliery works	Metals, organic chemicals, hydrocarbons and asbestos
Made ground	3m to 19m and 224m south east and 33m east of site boundary	Deposition of made ground described as 'refuse heap'	Metals, organic chemicals, hydrocarbons, asbestos, landfill gas and leachate generation and migration
Historic IPA authorisation - Coalite Products Ltd	82m west	Carbonisation and associated processes	Metals, organic chemicals and hydrocarbons
Non - operational landfill	343m west	Cudworth landfill accepting	Metals, organic chemicals,

Source	Location	Activity	Potential Contaminants
		inert waste with no known restriction on source	hydrocarbons, asbestos, landfill gas and leachate generation and migration
Non operational waste treatment, transfer and disposal site	390m south east	Former Grimethorpe works accepting difficult, putrescible and non hazardous waste. No known restrictions on source of waste	Metals, organic chemicals, hydrocarbons and asbestos

6.3 POTENTIAL RECEPTORS

Receptors that are required to be considered under Part IIA of the Environmental Protection Act 1990 are summarised in Appendix E.

The potential environmental receptors identified during this study are summarised in the following table.

TABLE 17: POTENTIAL RECEPTORS IDENTIFIED FOR THE SITE AND SURROUNDING AREAS

Category	Receptor	Location	Comments
Humans	Site end users		Maintenance staff once operational
	Construction workers		
	Existing site users		Site is open to the general public
Property (materials)	Wind turbine, substation and access road	whole site	Primarily foundations and services
Property (crops)	None identified		
Ecological systems	None identified		
Controlled waters	Secondary A aquifer	Onsite	
	Unnamed secondary river	62m east	

6.4 RISK ASSESSMENT

The risk of significant harm or pollution of controlled waters has been assessed qualitatively as low, medium or high using the criteria shown in Appendix D.

A risk estimation matrix for all pollutant linkages identified is shown below.

TABLE 18: PRELIMINARY CONTAMINATION RISK ASSESSMENT

Receptor	Sources	Risk	Justification
Human Health			
Existing site users	On site: Made ground, infilled ground, former colliery and former railway line	Low	No pathway or receptor identified
	Off site: Former colliery works, infilled ground, made ground, former railway infrastructure, historic IPA authorisation, non operational landfill and non operational waste treatment, transfer and disposal site	Low	No pathway or receptor identified
Future site users	On site: Made ground, infilled ground, former colliery and former railway line	Low	Only identified receptor is maintenance staff
	Off site: Former colliery works, infilled ground, made ground, former railway infrastructure, historic IPA authorisation, non operational landfill and non operational waste treatment, transfer and disposal site	Low	Only identified receptor is maintenance staff
Construction workers	On site: Made ground, infilled ground, former colliery and former railway line	Medium	Risk assessment and appropriate PPE to be used by site staff.
	Off site: Former colliery works, infilled ground, made ground, former railway infrastructure, historic IPA authorisation, non operational landfill and non operational waste treatment, transfer and disposal site	Medium	Use of appropriate risk assessment with PPE will reduce risk to low.
Property			
Site structures (concrete structures)	Concrete aggressive made ground	Medium	Further work warranted due to mapped made ground/infilled ground and the risk of pyrite bearing soils for foundations.
Controlled Waters			
Secondary A Aquifer (Bedrock geology)	On site: Made ground, infilled ground, former colliery and former railway line	Low	Appropriate construction techniques will prevent any impact to the underlying aquifer
	Off site: Former colliery works, infilled ground, made ground, former railway infrastructure, historic IPA authorisation, non operational landfill and non operational waste treatment, transfer and disposal site	Low	Appropriate construction techniques will prevent any impact to the underlying aquifer

Receptor	Sources	Risk	Justification
Unnamed secondary river (62m east)	On site: Made ground, infilled ground, former colliery and former railway line	Medium	Appropriate construction techniques will prevent any impact to controlled waters
	Off site: Former colliery works, infilled ground, made ground, former railway infrastructure, historic IPA authorisation, non operational landfill and non operational waste treatment, transfer and disposal site	Low	Appropriate construction techniques will prevent any impact to controlled waters

7. CONCLUSIONS AND RECOMMENDATIONS

The Nott Group have been instructed by Engena Limited to undertake a desk based contaminated land assessment at the proposed location of a single wind turbine and access road to the south of Ferry Moor Lane, Barnsley, South Yorkshire. The Nott Group has undertaken a site walkover survey, a review of available information and developed a conceptual model in accordance with the current Contaminated Land Legislation.

7.1 CONTAMINATION ASSESSMENT AND RECOMMENDATIONS

The historical review indicates that the site had been occupied by a series of fields which were intercepted by a highway 1854 until 1904. From 1904 the north east of the site was occupied by a railway embankment while the rest of the site remained unchanged until 1972. In 1972 the centre of the site occupied by slurry ponds. From 1982 the north of the site formed part of an open cast 'workings', the central and southern regions of the site were shown to be occupied by refuse/slag heaps while the slurry ponds are shown to be absent (assumed to have been infilled). From 1984 the central parts of the site formed part of the colliery works which bounded the sites entire eastern boundary while from 1988 the southern regions of the site were occupied by a 'spoil heap'. From 2002 until the present day the site is occupied by an open area of industrial reclaimed land.

On site sources of potential contamination include made ground, infilled ground, former colliery works and a former railway line while a number of offsite sources have also been identified which include former colliery works, infilled ground, made ground and a historic landfill.

The risk assessment undertaken indicates that there is generally a low risk of contaminated land issues associated with the development. However, the assessment has identified medium risks associated with construction workers, a nearby surface watercourse and the proposed foundations of the structures. These risks can be mitigated by the use of the appropriate personnel protective equipment (PPE), appropriate construction techniques (reduces surface water discharges) and soil testing prior to the design of the foundations and concrete specification.

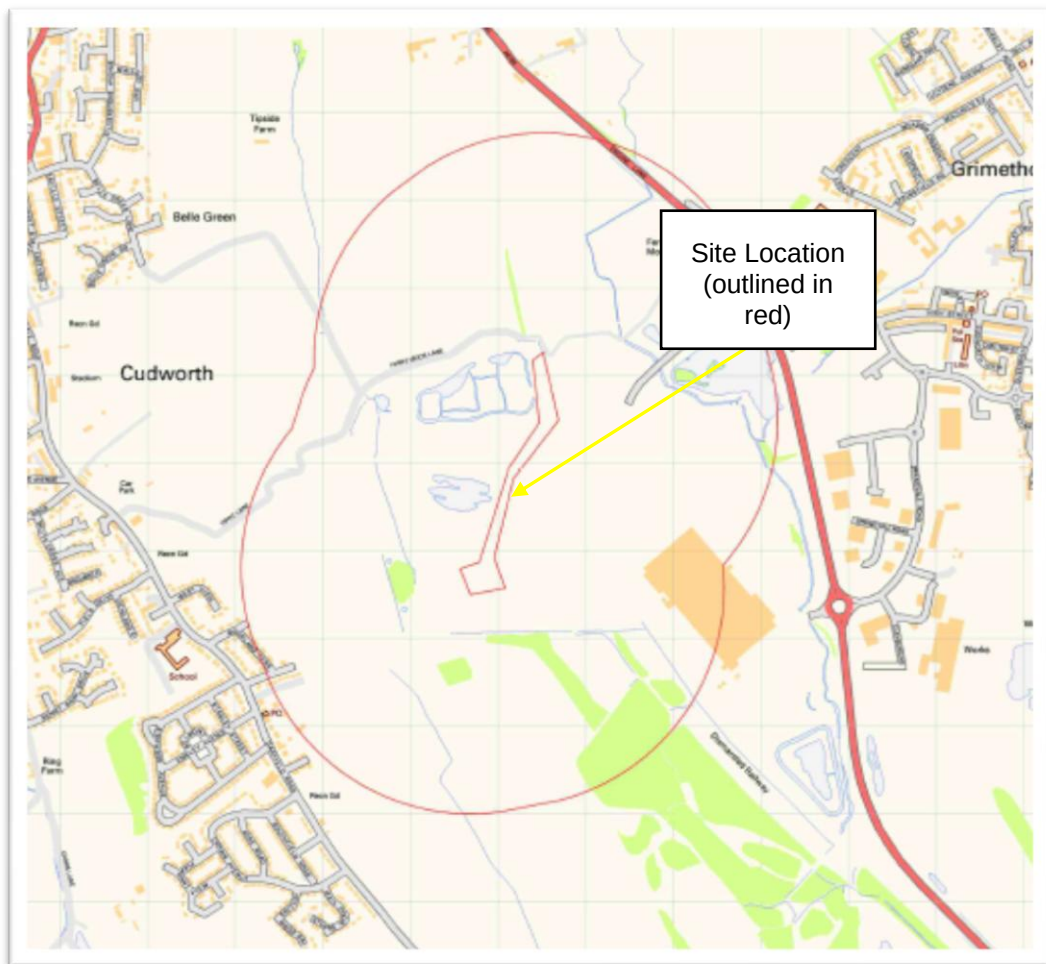
It is recommended that representative soil samples are taken with follow up chemical testing for disposal classification purposes and to assess what protective measures are required for the construction workers. Concrete classification testing to BRE standards is also recommended to specify the appropriate concrete for the foundations.

GLOSSARY

For the purpose of this report the following terms and definitions apply (see BS 10175:2001).

Accuracy	Level of agreement between true value and observed value.
Conceptual model	Textual and or schematic hypothesis of the nature and sources of contamination, potential migration pathways (including description of the ground and groundwater) and potential receptors, developed on the base of the information from the preliminary investigation and refined during subsequent phases of investigation and which is an essential part of the risk assessment process. Note 1: The conceptual model is initially derived from the information obtained by the preliminary investigation. This conceptual model is used to focus subsequent investigations, where these are considered to be necessary, in order to meet the objectives of the investigations and the risk assessment. The results of the field investigation can provide additional data that can be used to further refine the conceptual model.
Contamination	Presence of a substance which is in, on or under land, and which has <u>the potential</u> to cause significant harm or to cause significant pollution of controlled water. Note 1: There is no assumption in this definition that harm results from the presence of the contamination. Note 2: Naturally enhanced concentrations of harmful substances can fall within this definition of contamination. Note 3: Contamination may relate to soils, groundwater or ground gas.
Controlled water	Inland freshwater (any lake, pond or watercourse above the freshwater limit), water contained in underground strata and any coastal water between the limit of highest tide or the freshwater line to the three mile limit of territorial waters. Note 1: See Section 104 of The Water Resources Act 1991.
Harm	Adverse effect on the health of living organisms, or other interference with ecological systems of which they form part, and, in the case humans, including property.
Hazard	Inherently dangerous quality of a substance, procedure or event.
Pathway	Mechanism or route by which a contaminant comes into contact with, or otherwise affects, a receptor.
Precision	Level of agreement within a series of measurements of a parameter.
Receptor	Persons, living organisms, ecological systems, controlled water, atmosphere, structures and utilities that could be adversely affected by the contaminant(s).
Risk	Probability of the occurrence of, and magnitude of the consequences of, an unwanted adverse effect on a receptor.
Risk assessment	Process of establishing, to the extent possible, the existence, nature and significance of risk.
Sampling	Methods and techniques used to obtain a representative sample of the material under investigation.
Soil	Upper layer of the earth's crust composed of mineral parts, organic substance, water, air and living matter. Note 1: In accordance with BS 10175:2001 the term soil has the meaning ascribed to it through general use in civil engineering and includes topsoil and subsoil; deposits such as clays, silt, sand, gravel, cobbles, boulders and organic deposits such as peat; and material of natural or human origin (e.g. fills and deposited wastes). The term embraces all components of soil, including mineral matter, organic matter, soil gas and moisture, and living organisms.
Source	Location from which contamination is, or was, derived. Note 1: This could be the location of the highest soil or groundwater concentration of the contaminant(s).
Uncertainty	Parameter, associated with the result of a measurement that characterizes the dispersion of the values that could reasonably be attributed to the measurement.

Appendix A SITE PLAN



Site Location Plan

Not to scale

Appendix B HISTORICAL MAPS

Appendix C ENVIRONMENTAL DATABASES

Appendix D RISK RATING MATRIX

Risk rating for contaminated land qualitative risk assessment.

Risk in this context is a combination of the pollution probability, or frequency and the magnitude of the pollution.

Level of Scale and Seriousness (severity or magnitude)	Probability/Frequency		
	Most Likely	Reasonably Foreseeable	Unlikely
Severed pollution and high magnitude	High	High	Low
Moderately severe pollution and moderate magnitude	Medium	Medium	Low
Low severity of pollution and low magnitude	Low	Low	Low

Part IIA Amended Regulations 2012 Guidance

High Risk = Category 1

Medium Risk = Category 2-3

Low Risk = Category 4

Appendix E ENVIRONMENTAL RECEPTORS

Pollution to controlled waters.

'Section 78A(9) of the EPA 1990 defines the pollution of controlled waters as: "the entry into controlled waters of any poisonous, noxious or polluting matter or any solid waste matter".' (A35)

'Before determining that pollution of controlled water is being, or is likely to be, caused, the local authority should be satisfied that a substance is continuing to enter controlled waters or is likely to enter controlled waters. The local authority should regard something as being "likely" to be caused when the local authority judge it more likely than not to occur.' (A36)

'Land should **not** be designated as contaminated land where:

- (a) a substance is already present in controlled waters;
- (b) entry into controlled waters of that substance from land has ceased; and
- (c) it is not likely that further entry will take place.' (A37)

'Substances should be regarded as having entered controlled waters where:

- (a) they are dissolved or suspended in those waters; or
- if they are immiscible with water, they have direct contact with those waters on or beneath the surface of the water.' (A38)

The term 'continuing to enter' should be taken to mean any entry additional to any which has already occurred. (A39)

Reproduced from DETR (2000) Contaminated Land: Implementation of Part IIA of the Environmental Protection Act 1990 Circular 2/2000 and Scottish Executive Rural Affairs Department (2000) Circular 1/2000. Environmental Protection Act 1990: Part IIA – Contaminated Land.

Significant harm to various receptors.

Type of receptor	Description of harm to that type of receptor that is to be regarded as significant harm
Human beings	Death, disease, serious injury, genetic mutation, birth defects or the impairment of reproductive functions. For these purposes, disease is to be taken to mean an unhealthy condition of the body or a part of it and can include, for example, cancer, liver dysfunction or extensive skin ailments. Mental dysfunction is included only insofar as it is attributable to the effects of a pollutant on the body of the person concerned. In the Guidance, this description of significant harm is referred to as a 'human health effect'.
Any ecological system, or living organism forming part of such a system, within a location which is: - an area notified as an area of Special Scientific Interest under Section 28 of the Wildlife and Countryside Act 1981. - any land declared a National Nature Reserve under Section 35 of that Act - any area designated as a Marine Nature Reserve under Section 36 of that Act - an area of Special Protection of Birds, established under Section 3 of that Act - any European Site within the meaning of regulation 10 of the Conservation (Natural Habitats etc.) Regulations 1994 (i.e. Special Areas of Conservation and Special protection Areas) - any candidate Special Areas of Conservation or potential Special Protection Areas given equivalent protection - any habitat or site afforded policy protection under paragraph 13 of Planning Policy Guidance	For any protected location: Harm which results in an irreversible adverse change, or in some other substantial adverse change, in the functioning of the ecological system within any substantial part of that location; or Harm which affects any species of special interest within that location and which endangers the long-term maintenance of the population of that species at that location. In addition, in the case of a protected location, which is a European Site (or a candidate Special Area of Conservation or a potential Special Protection Area), harm which is incompatible with the favourable conservation status of natural habitats at that location or species typically found there. In determining what constitutes such harm, the local authority should have regard to the advice of English nature and to the requirements of the Conservation (Natural Habitats etc Regulations 1994. In the Guidance this description of significant harm is

Type of receptor	Description of harm to that type of receptor that is to be regarded as significant harm
Note 9 (PPG9) on nature conservation (i.e. candidate Special Areas of Conservation, potential Special protection Areas and listed Ramsar sites); or any nature reserve established under Section 21 of the National Parks and Access to the Countryside Act 1949.	referred to as an 'ecological system effect'.
Property in the form of: - crops, including timber - produce grown domestically, or on allotments, for consumption - livestock - other owned or domesticated animals; wild animals which are the subject of shooting or fishing rights.	For crops, a substantial diminution in yield or other substantial loss in their value, resulting from death, disease or other physical damage. For domestic pets, death, serious disease or serious physical damage. For other property in this category, a substantial loss in its value resulting from death, disease or other serious physical damage. The local authority should regard a substantial loss in value as occurring only when a substantial proportion of the animals or crops are dead or otherwise no longer fit for their intended purpose. Food should be regarded as being no longer fit for purpose when it fails to comply with the provisions of the Food Safety Act 1990. Where a diminution in yield or loss in value is caused by a pollutant linkage, a 20% diminution or loss should be regarded as a benchmark for what constitutes a substantial diminution or loss. In the Guidance this description of significant harm is referred to as an 'animal or crop effect'.
Property in the form of buildings. For this purpose 'building' means any structure or erection and any part of a building, including any part below ground level, but does not include plant or machinery comprised in a building.	Structural failure, substantial damage or substantial interference with any right of occupation. For this purpose, the local authority should regard substantial damage or substantial interference as occurring when any part of the building ceases to be capable of being used for the purpose for which it is or was intended. Additionally, in the case of a scheduled Ancient Monument, substantial damage should be regarded as occurring when the damage significantly impairs the historic, architectural, traditional, artistic or archaeological interest by reason of which the monument was scheduled in the Guidance this description of significant harm is referred to as a 'building effect'.

Reproduced from DETR (2000) Contaminated Land: Implementation of Part IIA of the Environmental Protection Act 1990. Circular 2/2000 and Scottish Executive Rural Affairs Department (2000) Circular 1/2000. Environmental Protection Act 1990: Part IIA – Contaminated Land.