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Report

Phase 1 Geoenvironmental Study

Project: Land off Fullwood Drive
Golcar, Huddersfield
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Date: October 2017

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DOCUMENT CONTROL SHEET

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FOR AND ON BEHALF OF JNP GROUP

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1 INTRODUCTION

1.1.1 jnp group were instructed by Acumen Designers and Architects Ltd on behalf of Mr C Ainley to undertake a desk study of a site known as Land off Fullwood Drive, Golcar, Huddersfield, W. Yorkshire (hereinafter referred to as 'the site'). This report is subject to the limitations presented in Appendix A.

1.1.2 It is understood that the site was allotments and the partially demolished outbuilding on site will be fully demolished and redeveloped with a number of new residential properties with private gardens.

1.1.3 Any comments given are based on the understanding that the proposed redevelopment will be as detailed above.

1.2 Objectives

1.2.1 The scope of work comprised desk study research. This report contains details of the site, development of an initial conceptual model and a preliminary risk assessment with regard to contaminated land issues.

1.3 Methodology

1.3.1 This report has been compiled in accordance with the guidance given in the Environment Agency / Department of Environment, Food, and Rural Affairs (DEFRA) Contaminated Land Report 11 'Model Procedures for the Management of Land Contamination' (Environment Agency. 2004) and the Environment Agency's three reports entitled 'Guiding Principles for Land Contamination' (Environment Agency. 2010).

2 SITE DESCRIPTION

2.1.1 The site is located off Fullwood Drive, 0.16 miles from the village of Golcar within the town of Huddersfield, West Yorkshire. The centre of the site is located at National Grid Reference 409642 415642. The site covers an area of approximately 0.42 hectares.

2.1.2 The site walkover was undertaken on 10/10/2017. The majority of the site is largely overgrown with brambles and self seeded tree's making access into the site difficult. Access was gained via a shallow wall from the public pathway on the north west boundary of the site (photo 1). The site is set on a steep hillside.

2.1.3 The site is indicated on the location plan as allotment gardens, with evidence of the remains of former outbuildings that once stood on the site. Badger setts are evident on the north west side of the site which also shows evidence of fly tipping and incinerator waste debris.

Photo 1: From the north eastern side of the site adjacent to the public pathway



Photo 2: Indicating the remains of the brick outbuilding in the middle of the site



Photo 3: Assumed badger setts on site adjacent to public pathway along western boundary





2.1.4 The surrounding land uses are summarised in the following table.

Table 2.1: Surrounding Land Use

Direction	Land Use
North	Residential
East	Overgrown land, residential beyond
South	Steeply sloping overgrown wooded area
West	Public footpath, overgrown land beyond



3 GEOLOGY, HYDROLOGY AND HYDROGEOLOGY

3.1 Geology

- 3.1.1 The geology of the site has been determined by reference to the 1:50,000 scale British Geological Survey (BGS) online GeolIndex Tool (<http://mapapps2.bgs.ac.uk/geoindex/home.html>) and the 1:10,000 BGS maps contained in the Groundsure Report (Appendix X).
- 3.1.2 No artificial or Made Ground is indicated to be present underlying the site. There is also no superficial deposits underlying the site.
- 3.1.3 The bedrock geology is indicated to be the Millstone Grit Group to the north side of the site which is described by the BGS as “*Fine- to very coarse-grained feldspathic sandstones, interbedded with grey siltstones and mudstones, with subordinate marine shaly mudstone, claystone, coals and seatearths.*” This is underlain by the Guiseley Grit, which is described by the BGS as “*Coarse-grained, massively bedded sandstone, somewhat finer and flaggy in its lower part*”, and which outcrops across the south western half of the site. There are no faults denoted within 500m of the site. A coal seam outcrops 479m to the north of the site.
- 3.1.4 The following table details the risk of geological hazard potential on or underlying the site as identified in the Groundsure Report (included in Appendix B).

Table 3.1: Geological Hazards

Hazard	Risk
Shrinking or swelling clay	Very Low
Landslide ground	Low
Ground dissolution	Negligible
Compressible soils	Negligible
Collapsible soils	Very Low
Running sand	Negligible

- 3.1.5 Hence geological hazards are not considered to present a constraint to development.

3.2 BGS Borehole Records

- 3.2.1 jnp group have consulted online borehole records held by the BGS. Two borehole records are available within 250m of the site. The closest borehole (Albion Mills) located 50m south of the site penetrated deposits consistent with Millstone Grit. The second borehole, recorded at 98m north west of the site (Colne Valley Museum), proved 30m of Millstone Grit.

3.3 Background Soil Chemical Concentrations

- 3.3.1 The Groundsure Report provides an indication to the background concentrations of a number of metal contaminants commonly recorded in soils:
-  arsenic 25-35mg/kg;
 -  cadmium < 1.8mg/kg;
 -  chromium 60 - 90mg/kg;
 -  lead 100 - 200mg/kg; and
 -  nickel 15 - 30mg/kg.
- 3.3.2 Naturally elevated concentrations of arsenic and lead may be present on or in close proximity to the site.

3.4 Ground Workings, Mining History and Natural Cavities

-  There are eight records of historic surface ground workings present within 250m of the site;
 - 150m south of the site - Unspecified ground workings (1905)
 - 150m south of the site - Unspecified ground workings (1948)
 - 188m west of the site - Mill Pond (1951)
 - 190m west of the site - Pond (1978)
 - 190m west of the site - Pond (1967)
 - 194m west of the site – Mill Pond (1948)
 - 195m west of the site - Pond (1890)
 - 198m west of the site - Mill Pond (1905)
-  No historic underground workings are recorded within 1km of the site;
-  There are six records of current ground workings within 1km of the site;
 - 714m east of the site – Scar Wood – Surface mineral working for sandstone
 - Status ceased.
 - 799m south of the site – Westwood House – Surface mineral working for sandstone
 - Status ceased.
 - 978m south west of the site – Dyke End – Surface mineral working for sandstone
 - Status ceased.
 - 989m south east of the site – Hazel Grove – Surface mineral working for sandstone
 - Status ceased.
 - 991m south east of the site – Guy Edge – Surface mineral working for sandstone
 - Status ceased.
 - 992m south east of the site – Guy Edge Quarries – Surface mineral working for sandstone
 - Status ceased.
-  No coal mining is recorded within 1km of the site;
-  Non-coal mining for vein minerals is recorded on site as 'sporadic and restricted underground mining due to difficult ground conditions. Potential for difficult ground conditions are unlikely and localised and are at a level where they need not be considered'. Further vein mineral mining is recorded:-
 - 303m east of the site
 - 588m south of the site
 - 685 south east of the site



-  There are no non-coal mining cavities located within 1km of the site;
-  There are no natural cavities located within 1km of the site;
-  No brine or gypsum extraction within 1km of the site;
-  No tin or clay mining areas within 1km of the site.

3.5 Hydrology

- 3.5.1 The nearest surface water feature is located 38m to the south west of the site which is a small river flowing towards the south east into the River Colne.
- 3.5.2 River Quality data shows that a section of the Longwood Beck 1455mm north east of the site recorded a Biological Quality Grade of C (Fairly Good) from 2005-2009 and a Chemical Quality of A (Very Good) in 2009. This river is a tributary of the Colne but is not in the same catchment as the site.
- 3.5.3 The Groundsure Report lists surface water abstractions from three locations within 1km of the site, as follows:
 -  737m south east of the site, for process water and general use relating to a secondary category, from the River Colne;
 -  786m south east of the site, for process water, boiler feed and general use relating to a secondary category, from the River Colne;
 -  921m south of the site, for drinking, cooking, sanitary and washing, and general use relating to secondary category, from the River Colne.
- 3.5.4 The site does not lie in area considered at risk of flooding by the Environment Agency.

3.6 Hydrogeology

- 3.6.1 The Aquifer Maps contained in the Groundsure Report indicates that the site is underlain by a Secondary A Aquifer.
- 3.6.2 The Environment Agency define a Secondary-A Aquifer 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."
- 3.6.3 The overlying soils are classified as having a high leaching potential, although this is uncertain as a worst case vulnerability classification is assumed by the Environment Agency (EA) for urban areas.
- 3.6.4 The Groundsure Report lists groundwater abstractions from three locations within 1km of the site, as follows:
 -  863m south of the site, for drinking, cooking, sanitary, washing, abstracting via a borehole from the coal measures;
 -  997m south east of the site, for general farming and domestic, abstracting from the springs;
 -  999m south of the site, for general use relating to secondary category, abstracting via a borehole from the Millstone Grit.
- 3.6.5 The site's proximity to groundwater Source Protection Zones (SPZs) was determined by reference to the Environment Agency's website. These zones show the risk of contamination from any activities



that might cause pollution in the area. The closer the activity, the greater the risk. The maps show three main zones (inner, outer and total catchment) to a groundwater source.

3.6.6 The site does not lie within or close to a Source Protection Zone.



4 SITE HISTORY

4.1.1 The history of the site and the surrounding area has been determined from historical map extracts. Copies of these extracts are included in Appendix D. The historical land uses on site and in close proximity to the site are summarised in the following table:

Table 4.1: Site History Summary

Date	On site Historical Land Use	Off site Historical Land Use
1854 1:10,560	Undeveloped land noted as Carr Top	Surrounded by fields to east, west and south with residential housing sited to the north of the site. Footpath visible running parallel with western boundary of site. Golcar railway station noted 500m south east of the site.
1891 1:10,560	No changes	Further residential housing sited directly to the north of the site. Dwellings sited south west of the site along Brook Lane noted as New York. Victoria Mills noted west of the site with mill pond. Carr House noted to the east of the site
1893 1:2,500	No changes	Albion Mill noted south of the site with mill pond
1905 1:10,560	No changes.	No changes
1907 1:2,500	No changes.	Tenters annotated south east of the site. Possibly the land used by the mills to dry the cloth.
1919 1:2,500	Building shown in middle of site	Reservoir noted to north west of site toward the top of Victoria Lane.
1932 1:2,500	No building in middle shown.	No changes
1938 1:10,560	No building in middle shown.	No changes
1948 1:10,560	No changes.	No changes
1956 1:10,560	No changes.	No changes.



Date	On site Historical Land Use	Off site Historical Land Use
1961 1:1,250 1:2,500	Land annotated as 'Allotment Gardens' with a large building positioned in the middle of the site. Smaller buildings are shown towards the north and east of the site.	Land is annotated as 'Allotment Gardens' to the west of the site with a small building shown. To the east of the site some small buildings are indicated within a field.
1963 1:2,500	No changes.	No changes.
1969 1:10,560	No changes.	No changes.
1978 1:10,000	No changes.	No changes.
1978-1982 1:1,250	No changes.	No changes.
1982 1:1,250	No changes.	Residential development 50m to the north west of the site named as Fullwood Drive
1993 1:1,250	No changes.	No changes.
2002 1:10,000	No changes.	No changes.
2010 1:10,000	No changes.	No changes.
2014 1:10,000	No buildings shown on site.	No buildings shown within allotments and fields to west and east of site.

4.2 Site History Summary

- 4.2.1 The site was a field until 1919 when a building is shown on the site, and then allocated as allotment gardens from 1962 up to 2014 when the buildings were no longer shown on site and is now in an overgrown state.
- 4.2.2 The nearby area has primarily remained unchanged since the 1890's with the only recent addition of residential housing to the west of the site on Fullwood Drive.

5 INFORMATION HELD BY STATUTORY AUTHORITIES

5.1.1 This section details any relevant information held in the registers maintained by statutory bodies as identified in the Groundsure Report (Appendix C).

5.2 Waste Management Facilities

5.2.1 The Groundsure Report does not identify any licenced waste management facilities within 500m of the study site. No landfills are recorded within 1km of the site.

5.3 Historic IPC, IPPC Part A and B Activities and Enforcements

5.3.1 The Groundsure Report indicates that:

-  There are no historic IPC authorisations within 500m of the study site;
-  There are no Part A (1) and IPPC authorised activities within 1km of the site;
-  There are no Part A (2) and Part B activity and enforcements within 500m of the site.

5.4 Pollution Incidents to Controlled Waters

5.4.1 Records held by the Environment Agency identified three pollution incidents to controlled waters within 500m of the study site, as follows:

-  326m to the south east of the site on 11th November 2003, pollutant described as asbestos. No impact to water or air with minor impact to land.
-  462m to the south east of the site on 8th March 2003, pollutant described as other oil or fuel. No impact to air and minor impact to water and land.
-  478m to the south east of the site on 10th July 2003, pollutant described as other general biodegradable material or waste. No impact to water or air although significant impact to land.

5.5 Discharge Consents

5.5.1 The Groundsure Report identifies four licensed discharge consents within 500m of the site, summarised as follows:

-  105 m to the west of the site, issued in October 1998 to discharge sewage – storm water overflow into River Colne. The status of this licence is new consent.
-  177 m to the south east of the site, issued in November 1997 to discharge sewage – storm water overflow into River Colne. The status of this licence is new consent.
-  323 m to the south east of the site, issued in November 1997 to discharge sewage – storm water overflow into River Colne. The status of this licence is new consent.
-  343 m to the south east of the site, issued in October 1998 to discharge sewage – storm water overflow into River Colne. The status of this licence is new consent.

5.6 Fuel Sites

5.6.1 The Groundsure Report does not identify any active fuel stations within 500m of the site



5.7 Historical and Contemporary Industrial Data

5.7.1 The Groundsure Report identifies potentially contaminative industrial sites within 250m of the site. The nearest are summarised as follows:

-  Unspecified Mills (1890-1993) 94m – 105m west of the site;
-  Unspecified Mills (1890-1993) 140m – 162m north east of the site;
-  Chimney (1967-1978) 179m west of the site;
-  Mill Pond (1905-1951) 188m – 198m west of the site;
-  Electricity substation located 55m south of the site categorised as Infrastructure and Facilities, with an activity of Electrical Features;
-  Chimney located 62m south of the site categorised as Industrial Features with an activity of chimneys;
-  Electricity substation located 74m north west of the site categorised as Infrastructure and Facilities, with an activity of Electrical Features;
-  IFG Drake Ltd located 177m west of the site categorised as Industrial Features, with an activity of Rubber, Silicones and Plastics;
-  Tank located 188m west of the site categorised as Industrial Features;
-  Unspecified Works located 213m north of the site, categorised as Industrial Feature;
-  Hepworth Framework located 236m from north boundary, categorised as Industrial Products, with an activity of Office and Shop Equipment.

5.8 Radon

5.8.1 The Groundsure Report states that the Health Protection Agency identified less than 1% of homes above the action level. Reference to BRE211 'Radon: guidance on protective measures for new dwellings' indicates that the site does not lie within an area where geological information indicates that basic radon protection may be required. Therefore no radon protection measures are considered necessary.

5.9 Environmentally Sensitive Areas

5.9.1 The sensitive land use map within the Groundsure Report indicates:

-  There are four areas of green belt within 2km of the site, at the following locations; 35m to the south-west of the site; 463m to the south east of the site; 905m to the north of the site and 1102m to the south east of the site.



6 UK CONTAMINATED LAND LEGISLATIVE FRAMEWORK

6.1 Legislation on Contaminated Land

- 6.1.1 Given that the site is being assessed with the potential for future development, the most applicable appraisal relates to the requirements of the Planning Regime as described in the newly drafted National Planning Policy Framework. In order to proceed with an assessment of contamination issues it is essential that we comply with UK guidance as detailed within the Environment Agency's published reports 'Model Procedures for the Management of Land Contamination' (Environment Agency. 2004) and 'Guiding Principles for Land Contamination' (Environment Agency. 2010).
- 6.1.2 Part IIA of the Environmental Protection Act, 1990, which was enacted by Section 57 of the Environment Act 1995 and the associated Contaminated Land (England) Regulations 2000 (SI 2000/227) was introduced on 1 April 2000. It created a new statutory regime for the identification and remediation of land where contamination poses an unacceptable risk to human health and the environment. The guidance was subject to a review by DEFRA in 2012 and a revision was published.
- 6.1.3 Part IIA provides a statutory definition of contaminated land:
"any land which appears to the Local Authority in whose area it is situated to be in such a condition by reason of substances in, on or under the land, that significant harm is being caused, or that there is a significant possibility of significant harm being caused, or that pollution of controlled waters is being or is likely to be caused".
- 6.1.4 Controlled waters are considered to be all groundwaters, inland surface waters and estuarine and coastal waters.
- 6.1.5 To determine whether land falls under the Part IIA definition of contaminated land the site should be evaluated in the context of a risk based framework. The assessment of contaminated land is typically a two-phase process, which is initially based on a qualitative assessment of the likelihood of complete pollution linkages, with a quantitative element that seeks to determine the degree and the significance of the harm. Land is only defined as 'Contaminated Land' if a "significant pollutant linkage" is present.
- 6.1.6 A pollutant linkage must comprise the following:
Source - a contaminant at a concentration capable of causing adverse health or environmental effects.
Receptor - there must be a receptor (e.g. human, controlled waters, ecological or property) present, which may be at risk of harm or impact from the source.
Pathway - there must be an exposure pathway through which the receptor comes into contact with the contamination source.
- 6.1.7 Each of these elements can exist independently but they create risk only when they are linked together, so that a particular contaminant affects a particular receptor through a particular pathway.
- 6.1.8 The responsible authority then needs to consider whether the identified pollution linkage:
 is resulting in significant harm being caused to the receptor in the pollutant linkage;
 presents a significant possibility of significant harm being caused to that receptor;
 is resulting in the pollution of controlled waters, which constitute the receptor; or is likely to result in such pollution.
- 6.1.9 If a pollutant linkage is demonstrated, then the Part IIA legislation provides powers for remedial action to be enforced by the Local Authority in whose area the contaminated land is situated.



6.1.10 In addition, **jnp group** has undertaken a preliminary risk assessment based on the **probability** of receptor exposure to the identified source and the **consequences** of such exposure.

6.1.11 **Risk management**, which can include site surfacing, formal management systems, legal requirements; is then considered to provide an overall residual risk. The categories of environmental risk used by **jnp group** are given in Table 6.1 that follows.

Table 6.1: Risk Matrix

Environmental Risks		
HIGH		Issues within this category likely to provide a significant cost or liability. Further detailed investigation may be required to clarify the risk.
MEDIUM		It is possible that issues within this category may provide a cost or liability. Further investigation may be required to clarify the risk.
LOW		It is unlikely that issues within this category will provide a significant cost or liability. Basic investigation may be required to clarify the risk.
NONE		No source – pathway – receptor linkage present.



7 CONCEPTUAL MODEL AND PRELIMINARY RISK ASSESSMENT

7.1 General

7.1.1 This section uses information from field observations and historical maps to provide a conceptual model and qualitative assessment of the potential risks posed to human health and environmental receptors from potential on-site and off-site sources of contamination. The assessment is presented as a 'source-pathway-receptor' model in accordance with Part IIA of the Environmental Protection Act 1990.

7.1.2 The conceptual model has been developed assuming that the site will be redeveloped for residential housing with private gardens.

7.2 Potential Sources of Contamination

Potential On-site Sources of Contamination

-  The site remained undeveloped until approximately 1919 when small buildings were erected and the land was used for allotment gardens.
-  Evidence of waste debris and fly tipping.
-  Heavy metals, polycyclic aromatic hydrocarbons (PAHs), assumed use of pesticides and fertilizers used within the soils, asbestos from demolished buildings.

Potential Off-Site Sources of Contamination

-  There is potential for off-site sources of contamination as the adjacent land to the west of the site was also used for allotments gardens, and it presently overgrown, with evidence of fly tipping and waste debris.
-  Land directly to the north has been predominately residential and therefore the potential for off-site contamination is not considered as little has changed.
-  The chimney associated with the woollen mills site west and south of the site may be a source of particulates deposition.
-  Due to the steeply sloping terrain from the northern high point, the adjacent mills and mill ponds, **jnp group** consider the risk of land contamination from these potential sources to be low.
-  Other potential sources of contamination identified in the local area are too distant to impact the development.

7.3 Receptors

7.3.1 The site is to be redeveloped for residential housing with private gardens. In addition, the site overlies a Secondary-A Aquifer. The primary receptors, considered to be potentially at risk from any identified contamination are as follows:

Human Health

-  Construction workers during the redevelopment phase;
-  Residential end users.

Controlled Waters

-  The permeable layers beneath the site are classified as a Secondary-A Aquifer;
-  The nearest controlled surface water is 38m to the south west of the site.

Ecological

-  The site is not located within an environmentally designated sensitive area;
-  Given the site setting sensitive species are considered likely to be present at the site (subject to any ecological survey undertaken).

Property

-  From concrete sulphate attack.

7.4 Pathways

7.4.1 Potential contaminant migration pathways considered relevant to the site are:

Human Health

-  Ingestion of contaminated soils and dust particles;
-  Direct physical contact with near surface soils and contaminated dust particles;
-  Inhalation of wind blown contaminated dust;
-  Inhalation of vapours and gases, migrating vertically into the atmosphere;
-  Inhalation of vapours and gases, migrating vertically into buildings and confined spaces;
-  Consumption of vegetables cultivated in contaminated soils;
-  Consumption of soil attached to vegetables cultivated in contaminated soils.

Infrastructure

-  Water supply pipework.

Controlled Waters

-  Leaching of contaminants;
-  Lateral migration of contaminated groundwater into the Longwood Beck onto River Colne;
-  Runoff of site-derived contamination into the watercourse.

7.5 Pollutant Linkages

7.5.1 A 'pollutant linkage' describes the relationship between a contaminant, a pathway and a receptor, a 'pollutant' being the contaminant in a pollutant linkage. A contaminant, pathway and receptor must all be present for a pollutant linkage to exist, which forms the basis for determination that a piece of land is Contaminated Land. Potential sources, pathways and receptors have been assessed. The following table summarises the significant pollutant linkages potentially active at the site.

Table 7.1: Potential Source-Pathway-Receptor Linkages for Human Health Risk Assessment

Source	Pathway	Receptor
Contaminated soils	Ingestion of soil	On site female child: 0 - 6 yrs old On site construction worker
	Ingestion of household dust	On site female child: 0 - 6 yrs old
	Ingestion of contaminated vegetables	On site female child: 0 - 6 yrs old
	Ingestion of soil attached to vegetables	On site female child: 0 - 6 yrs old
	Dermal contact	On site female child: 0 - 6 yrs old On site construction worker
	Dermal contact with household dust	On site female child: 0 - 6 yrs old
	Inhalation of fugitive soil dust	On site construction worker On site female child: 0 - 6 yrs old
	Inhalation of fugitive household dust	On site construction worker
	Inhalation of vapours in outdoor air	On site female child: 0 - 6 yrs old On site construction worker
	Inhalation of vapours in indoor air	On site female child: 0 - 6 yrs old
	Water supply pipework in contact with contaminated soils	On site female child: 0 - 6 yrs old

Table 7.2: Source Pathway Receptor Linkages for Controlled Waters Risk Assessment

Source	Pathway	Receptor
Contaminated soils	Leaching Mechanisms	Groundwater stored in the Millstone Grit Group/Guiseley Grit
	Runoff during construction works	Lockwood Beck/River Colne
	Lateral and vertical migration via groundwater	Lockwood Beck/River Colne

Table 7.3: Potential Source-Pathway-Receptor Linkages for Ecological Risk Assessment

Source	Pathway	Receptor
Contaminated soils	Ingestion of soil	Sensitive species
	Ingestion of contaminated vegetation	



Source	Pathway	Receptor
	Ingestion of soil attached to vegetation	
	Dermal contact	
	Inhalation of fugitive soil dust	
	Inhalation of vapours in outdoor air	
	Inhalation of vapours in underground air	

Table 7.4: Source Pathway Receptor Linkages for Buildings

Source	Pathway	Receptor
Contaminated soils	Contact with contaminated soils	Concrete in the property

7.6 Preliminary Risk Assessment

7.6.1 From the information obtained from the desk study jnp group has undertaken a preliminary risk assessment.

Table 7.5: Preliminary Risk Assessment

Issue	Risk		Justification
LAND	MEDIUM		Historic land use as allotment gardens, and present waste debris and fly tipping suggests potential sources of contamination present on site.
GROUNDWATER	MEDIUM		The site is located on productive strata (Secondary Aquifer) but is not within a SPZ
SURFACE WATER	LOW		The nearest surface water course is located 37m to the south west of the site although site elevated above nearest watercourse
ECOLOGY	MEDIUM		Badgers are assumed from the setts evident on site although further specialist investigation is required as to whether it is an active sett. As badgers are a protected species the site will be subject to a specialist mammal ecological survey.

7.6.2 The conceptual model has been refined and the plausible pollutant linkages evaluated against generic criteria in accordance with joint defra / Environment Agency publication 'Model Procedures for the Management of Land Contamination' (Environment Agency. 2004).

8 CONCLUSIONS & RECOMMENDATIONS

8.1 Conclusions

- 8.1.1 The desk study has identified that the geological succession below the site comprises Millstone Grit and Guiseley Grit Group. The Lockwood Beck is located 38m to the southwest but at a lower elevation. Possible badger setts were noted on site.
- 8.1.2 The desk study identifies that the site had a potentially contaminative use as allotment gardens and subsequently has been left overgrown with waste debris and fly tipping.
- 8.1.3 Based on information contained within the desk study it is the opinion of **jnp group** that the potential site conditions provide a **MEDIUM to LOW** environmental risk and hence further investigation and assessment is required.
- 8.1.4 Less than 1% of homes above the radon action level. Therefore, no radon protection measures are considered necessary.
- 8.1.5 The site is not located in an area considered to be at risk of fluvial flooding.

8.2 Recommendations

- 8.2.1 Based on the conclusions from the desk study and the intended redevelopment of the site **jnp group** recommend that the following intrusive works be undertaken:
 -  Chemical testing of the natural soils beneath the site. This testing should address possible diffuse pollution across the site from cultivation of the soils and possible point sources in proximity to the original outbuildings which were evident from the historical maps. Testing should include part of the site where the land runs perpendicular to the public pathway where fly tipping and waste debris is present and is considered the most likely source of contamination.
 -  Made Ground and natural strata should be tested for a range of contaminants including heavy metals and metalloids, PAHs, asbestos, hydrocarbons (limited analysis) and pesticide screening.
 -  Should groundwater be detected at shallow depths, samples should be obtained and analysed for a similar suite of contaminants.
 -  Should significant thicknesses of putrescible material be encountered, gas monitoring standpipes should be installed and monitored on six occasions.
 -  Geotechnical testing should be undertaken at the same time to identify volume change potential of any cohesive material, concrete classification and predicted CBR values.
 -  The methods used for the site investigation should consider the slope of the site and access issues.
- 8.2.2 **jnp group** recommend that the scope of the intrusive works is agreed with the regulatory authorities as they may have particular requirements that need to be taken into account.

Appendix A

Limitations



1 INTRODUCTION

- 1.1.1 This report is confidential and has been prepared solely for the benefit of the client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from **jnp group**; a charge may be levied against such approval. **jnp group** accepts no responsibility or liability for the consequences of this document being used for any purpose or project other than for which it was commissioned, and: this document to any third party with whom and agreement has not been executed.
- 1.1.2 Any comments given within this report are based on the understanding that the proposed works to be undertaken will be as described in the introduction and the information referred to and provided by others and will be assumed to be correct and will not have been checked by **jnp group** and **jnp group** will not accept any liability or responsibility for any inaccuracy in such information.
- 1.1.3 Any deviation from the recommendations or conclusions contained in this report should be referred to **jnp group** in writing for comment and **jnp group** reserve the right to reconsider their recommendations and conclusions contained within. **jnp group** will not accept any liability or responsibility for any changes or deviations from the recommendations noted in this report without prior consultation and our full approval.
- 1.1.4 The details contained within this report reflect the site conditions prevailing at the time of investigation. **jnp group** warrants the accuracy of this report up to and including that date. Additional information, improved practice or changes in legislation may necessitate this report having to be reviewed in whole or in part after that date. If necessary, this report should be referred back to **jnp group** for re-assessment and, if necessary, re-appraisal.
- 1.1.5 This report is only valid when used in its entirety. Any information or advice included in the report should not be relied upon until considered in the context of the whole report. Whilst this report and the opinion made herein are correct to the best of **jnp groups'** belief, **jnp group** cannot guarantee the accuracy or completeness of any information provided by third parties.
- 1.1.6 The report represents the finding and opinions of experience geotechnical and geoenvironmental engineers. **jnp group** does not provide legal advice and the advice of lawyers may also be required.
- 1.1.7 **jnp group** has provided advice and made recommendations based on the findings of the work undertaken, however this is subject to the approval / acceptance by the relevant regulatory authorities.

1.2 Objectives

- 1.2.1 The work undertaken to provide the basis of this report comprised a study of available documented information from a variety of sources (including the Client), together with (where appropriate) a brief walk over inspection of the site. The opinions given in this report have been dictated by the finite data on which they are based and are relevant only to the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, **jnp group** reserves the right to review such information and, if warranted, to modify the opinions accordingly. It should be noted that any risks identified in this report are perceived risks based on the information reviewed; actual risks can only be assessed following a physical investigation of the site.
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Appendix B

Site Location





Location plan with site outlined in red

Appendix C

Groundsure Report



Appendix D

Historic Map Extracts





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