New Lodge Crescent (Phase 2), Barnsley

Phase 1: Desk Study Report

Yorkshire Housing Ltd

Solmek Report Number S110508

May 2011

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New Lodge Crescent (Phase 2), Barnsley

Phase 1: Desk Study Report

1 INTRODUCTION AND SCOPE OF WORKS

1.1 Solmek were instructed by Bernard Williams Associates on behalf of Yorkshire Housing Ltd to undertake a desk study on two parcels of land located within New Lodge Crescent, Barnsley. The land is part of phase 2 of the New Lodge development area.

1.2 The following steps may be required in the investigation and remediation of potentially contaminated land:

- Phase 1: Desk Study
- Phase 2: Intrusive Investigation
- Phase 3: Remediation Statement
- Phase 4: Validation Reports

1.3 Phases 1 and 2 are generally required in the redevelopment of most sites. Phases 3 and 4 are subject to the findings of the initial stages. This report represents Phase 1 of the site investigation.

1.4 The purpose of this desk study is to evaluate the ground conditions of the site based on existing information and to plan the scope of the subsequent investigation. The objectives and planned outcomes of the desk study are:

- to assess the impact of local authority guidance on the investigation
- to identify existing features on and near the site
- to evaluate the historical and environmental setting of the site
- to assess the likelihood of finding contamination, its nature and extent
- to identify associated key contaminants
- to identify sensitive receptors and define source – pathway – receptor relationships (conceptual model)
- to identify relevant geotechnical parameters
- to identify and assess potential sources of ground gas
- to assess potential risk of shallow mining
- to make recommendations for the proposed intrusive investigation
- to identify constraints to the investigation, i.e. site access and health and safety considerations

1.5 This assessment has been undertaken with due regard to contaminated land guidance, issued by the Royal Institution of Chartered Surveyors (RICS) and BS 10175: 2001, *"Code of Practice for the Investigation of Potentially Contaminated Land"*. Selected elements of BS 5930: 1999 *"Code of Practice for Site Investigations"* have also been included.

2 REGULATORY AND PLANNING CONTEXT

2.1 The Town and Country Planning Regime is the principal means by which contamination is dealt with by the Local Authority. Contaminated land is a material planning consideration and contamination assessments are required on land that may be potentially contaminated.

2.2 The Buildings Regulations (2000) also state that *"precautions shall be taken to avoid danger to health and safety caused by substances found on or in the ground covered by the building"*. A site investigation is frequently required to satisfy the requirements of building control.

3 SITE DESCRIPTION

3.1 The preliminary site inspection, as recommended in BS 5930 and BS 10175, was undertaken on Tuesday 24th May 2011. Location maps and selected plates are presented in Appendix 1. The site is centred at the approximate Ordnance Survey Co-ordinates 434360E, 409200N.

3.2 The plot to the north is located off Beverly Road and is the location of recently demolished buildings. The area is relatively flat with a moderate slope from south down to north of approximately 2m. The plot to the south is also the location of some recently demolished housing compromising rough ground dropping in elevation from north down to south approximately 5m.

3.3 The plot to the north is covered with a mixture of bare earth, grass, gravel and small shrubs, with a small brick wall from the former housing still present along the southern and western boundaries of the site. The plot to the south is covered with similar material however it is an open site. Various heaps of garden cuttings were present to the south of the site along with an old garage in the same location.

3.4 Both plots were surrounding with residential housing in every direction. No visual signs of contamination were noted on the sites; however services were noted running through both areas.

4 SITE HISTORY

4.1 In order to determine the history of the site, previous editions of Historical Maps and Ordnance Survey Plans were inspected. Selected map extracts are presented in Appendix 2, note the area is highlighted with bold lines.

4.2 Table 1 presents a summary of the history of the area which includes plots from 1854 to 2010. The summary focuses on the historical land uses and changes relevant to the site and the proposed end use. Measurements are taken from the centre of the site and all distances quoted are approximate.

OS MAP	SCALE	ON SITE FEATURES	OFF SITE FEATURES
1854-1855	1:10,560	Both sites are located within agricultural fields.	Surrounding area comprises fields with a wooded area to the south of the site, named Standhill Wood. A building is present between the two sites named New Lodge. A colliery is present 700m to the west and a water work is located 1km south of the site. A water feature named Mill Race is located 600m southwest of the site.
1892-1893	1:2,500	Three small buildings are present on the southern edge of the north plot, south plot remains unchanged.	A railway line is present 130m west of the site running from north to south. East Gawber Hall Colliery is labelled 200m south.
1894	1:10,560	No onsite changes.	Wharncliffe Carlton Colliery now located 800m southeast.
1906	1:2,500	the three buildings are no longer present on the site.	A pump is now located next to the north plot.
1907	1:10,560	No onsite changes.	Blackerhill Quarry now labelled 700m west of the site. An old shaft it present to the south of it.

1918-1931	1:2,500	No onsite changes.	East Gawber Sewage Works has been constructed 100m southeast. A building is located 120m north of the site.
1932	1:10,560	No onsite changes.	East Gawber Hall Colliery is no longer present to the south and an Engineering Works has been constructed in the same location. Wharncliffe Carlton Colliery is no longer present to the south.
1938	1:10,560	No onsite changes.	Some residential development 80m northwest of the site.
1938-1948	1:10,560	The site is now located within a residential estate with houses present on the southern and eastern boundary of the plot to the south. Houses are present covering the entire northern plot.	Houses have been constructed covering a 250m radius of the site. Also sections of the building in between the two sites have been demolished to make room for road networks.
1955-1956	1:10,000	No onsite changes.	Housing estate has been constructed between 500m and 1.3km east of the site.
1959	1:1,250	Plot to the north now has a road running down the western boundary. Some small buildings have been constructed to the centre of the southern plot.	No obvious changes.
1959-1991	1:1,250	Garages have been constructed to the centre of the southern plot.	Community centre has been constructed 100m east of the site. Houses are now present immediately east of the site on the grounds of New Lodge.
1960-1962	1:2,500	No obvious changes.	Some houses have been demolished 40m west and works now present 150m southeast of the site.
1965-1966	1:10,000	No obvious changes.	Residential development between 250m and 1km north of the site.
1980-1984	1:10,000	No obvious changes.	Railway line to the west is labelled as dismantled and some works have been constructed 1km southeast of the site. Refuse heap now indicted 250m southwest of the site.
1990-1993	1:10,000	No obvious changes.	No obvious change
1993	1:1,250	Some garages have been removed from the centre of the southern plot.	No obvious change
2000	1:10,000	No obvious changes.	No obvious change
2006	1:10,000	No obvious changes.	No obvious change
2011	1:10,000	No obvious changes.	No obvious change
TABLE 1: SUMMARY OF THE SITE HISTORY			

4.3 In brief, the site had seen no major development until around 1938 when houses were constructed on the southern and eastern boundary of the southern plot and houses constructed on the entire northern plot with a road present along the western boundary of

the site. The centre of the northern plot has seen various small structures added possible garages/sheds not long after the constructed of the houses.

4.4 The surrounding area was initially agricultural land with a wooded area to the south of the site and a building named New Lodge present between the two plots of land. A water feature was present 600m southwest named Mill Race. Four collieries were in operation around the site the closest East Gawber Colliery opened in 1892 200m south, the mines cased production by 1932. The site has seen some industrial development a Waterworks was labelled in 1894 1km south with a Bleach Works added in the same location in 1894, Engineering Works were constructed 200m south in 1932 and finally a railway line was present between 1892 and 1980 at a location 130m west of the site running south to north. Major residential development occurred in 1938 covering 250m of the surrounding area, increasing during the 1950's to cover 500m and 1.3km east and in 1965 covering a section between 250m and 1km north of the site. There was also a refuse tip noted 250m southwest of the site in 1980.

5 ENVIRONMENTAL CONTEXT

5.1 The services of Envirocheck were used to establish the pertinent environmental records relating to the site. This information, which is presented in Appendix 3, replaces much of the information traditionally provided by the Environment Agency. Selected relevant information is summarised as follows. Measurements are taken from the centre of the site and all distances quoted are approximate.

Landfill and Waste

5.2 The Envirocheck Report lists entries under the heading Historical Landfills, BGS Recorded Landfill Sites and Local Authority Recorded Landfill Sites. No entries are listed within 400m radius of the site. The closest entry is held by Smithy Green Tip located 408m south of the site. Another entry is listed at 470m northwest of the site, however no name is given. Data was supplied by Barnsley Metropolitan Borough Council. See Envirocheck Report (Appendix 3).

5.3 Historical maps and maps available on the internet show that a large area located 250m southwest of the site is a disused tip, however The Envirocheck Report indicates that the no landfill sites lie within 700m of the site.

5.4 The Envirocheck Report indicated that no Licensed Waste Management Facilities are present within 850m radius of the site. The closest entry is for Mapplewell Auto Service located 878m west of the site.

5.5 The report indicated that no Registered Waste Transfer Sites are present within 700m radius of the site. The closest entry is for Engineering Services Dlo located 740m south of the site dealing with inert waste.

Regulated Industries

5.6 No entries are included within the Envirocheck Report under the headings of Local Authority Pollution Prevention, Control of Major Accident Hazards Sites (COMAH), Planning Hazardous Substance Consents, Registered Radioactive Substance and Controls/Enforcements or Notification of Installations Handling Hazardous Substances (NIHHS).

5.7 The report lists no Local Authority Pollution and Controls in place within 150m radius of the site. The closes entry is for Wakefield Dry Cleaners located 168m northeast of the site.

Industrial Land Use

5.8 The Envirocheck Report identifies current industrial land use and lists such land use within the contemporary trade directory. Many entries are included within the Envirocheck Report; the closest active entry is located 116m southeast of the site named Knt Cleaning. For full details of all entries see the Envirocheck Report (Appendix 3).

5.9 One fuel station entry is highlighted in the Envirocheck Report. The entry named Station Garage is located 444m northwest of the site; however it is labelled as obsolete.

Environmentally Sensitive Areas

5.10 No entries are shown under the headings of Environmentally Sensitive Areas, Sites of Special Scientific Interest (S.S.S.I), Ramsar Sites or Areas of Outstanding Natural Beauty. For full details see the Envirocheck Report (Appendix 3).

5.11 The Envirocheck Report indicates that there is an area of Adopted Green Belt located 196m west of the site.

5.12 The Envirocheck report states that the site lies within a nitrate vulnerable zone.

6 GEOLOGY, GROUNDWATER AND SURFACE WATER

Geology

6.1 Inspection of British Geological Survey Sheet SE30NW (1:10,000 Series: Solid and Drift Edition) was undertaken. The solid geology underlying is hown to be Woolley Edge Rock of the Pennine Middles Coal Measures of Upper Carboniferous Age, likely to comprise Sandstone. The drift deposits are not indicted on the southern plot therefore drift deposits are likely to be shallow and comprise weathered rock were present Glacial Til is located near the northern boundary of the northern plot.

6.2 An area of backfilled open case mine is present 150m west of the site. Also the Meltonfield coal seam is shown to outcrop 200m to the south west and dip beneath the site.

6.3 The Envirocheck Report lists BGS Recorded Mineral Sites. No entries are present within 250m radius of the site. Three entries are present under the heading "East Gawber Hall Colliery" located between 297 and 309m south/southeast of the site, which mined deep coal seams. Another site located 426m west named Denaby Old Colliery extracted coal from a deep mine.

Geological Hazards

6.4 The Envirocheck Report states that no risks are posed by collapsible/compressible ground and ground dissolution stability hazards. A very low risk is posed by landslide stability hazard and running sand stability hazards. A low risk is given for shrinking/swelling clay ground stability hazards. For full details see the Envirocheck Report (Appendix 3).

Radon Risk

6.5. In accordance with the procedure described in BRE Publication BR211 *Radon: Guidance on Protective Measures for New Dwellings*, Basic radon protection measures are required for new buildings on the site as it lies in an area where between 5-10% of homes are above the action level.

Mining Situation

6.6 The Envirocheck Report indicates that the site is located within an area which is affected by coal mining. A coal mining search report was sourced from David Bellis Consulting Surveyors dated, 18th May 2011 and is presented in Appendix 4. The report highlights that the site is situated in an area of Middle Coal Measures, shales and mudstones.

6.7 The mining report indicates that there are three known worked seams at depths ranging from 179 to 373mbgl. The shallowest seam is the Barnsley Seam subjacent to the site and has a worked cross section of 180cm and the last date of working is shown as 1900. There are no tips, lagoons, shafts or adits in the vicinity of site.

6.8 In relation to opencast mining, the site is not within the boundary of an opencast mine where coal has been removed in the past, or within 200m of a currently operating opencast coal mine. No evidence of any coal mining related subsistence claims in relation to the property were noted within the past 10 years

6.9 The report states that possible unrecorded ancient workings may be present for which no accurate plans or recorded exist.

6.10 Rotary drilling on phase 1 of the New lodge Development was carried out in January 2009 to depths of 30mbgl. No coal seams voids were noted.

6.11 The mining report concludes that it is unlikely that coal will be worked in the foreseeable future and that although old workings are present all settlement is likely to have completed long ago. For full details see the coal mining search report (Appendix 4).

Ground and Surface Water

6.12 The Envirocheck Report shows that the underlying solid geology beneath the site is classified as a Secondary A Aquifer. These are 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.

6.13 The Envirocheck states that the nearest surface water feature is shown as being 216m southwest of site.

6.14 The Envirocheck Report lists no entries for Discharge Consents within 80m radius of the site. The closest entry is for Yorkshire Water Services Ltd for sewage discharge at a location 81m north of the site.

6.15 Five pollution incidents to controlled waters are recorded within the Envirocheck Report. The most relevant event was recorded in March 1991, 722m northwest of the site. The incident involved diesel entering the fresh water stream/river and was classified as a category 3 (minor incident). For full details see Envirocheck Report (Appendix 3).

6.16 There are no water abstractions listed within 1km of the site.

6.17 The Envirocheck Report included no entries for the following headings: Prosecutions Relating to Controlled Water within 1km radius of the site. For full details see Envirocheck Report (Appendix 3).

Flooding

6.18 The Envirocheck Report states that the area is not at risk of flooding or extreme flooding from rivers or sea without defences, however an area 198m west of the site is at risk.

6.19 No flood water storage or flood defences are located on or near to the site.

7 PRELIMINARY GEOTECHNICAL ASSESSMENT

Relict Foundations and Made Ground

7.1 Evidence compiled from the site inspection and historical map extracts reveal that the sites were once developed with residential housing; however they have recently been demolished. Therefore made ground and relict foundations are expected on the site. A phase 2 will determine the extent and depths of made ground below the proposed houses.

Excavations and Groundwater

7.2 The solid geology underlying the site is likely to be interbedded sandstone of the Middles Coal Measures of Upper Carboniferous Age. The drift deposits are generally not indicted on the map therefore drift deposits are likely to be shallow and comprise weathered rock were present. Glacial till may be present in the far north of the plot. Excavation should easily be achieved with an excavator, however a breaker maybe required if boreholes are above areas of hard standing.

7.3 Groundwater is unlikely to be encountered at shallow depths during an intrusive investigation. It should be noted that groundwater levels can be affected by rainfall and seasonal variations.

Mining

7.4 The mining report indicates that there are three known worked seams at depths ranging from 179 to 373mbgl. The shallowest seam is the Barnsley Seam subjacent to the site and has a worked cross section of 180cm and the last date of working is shown as 1900. There are no tips, lagoons, shafts or adits in the vicinity of site.

7.5 In relation to opencast mining, the site is not within the boundary of an opencast mine where coal has been removed in the past, or within 200m of a currently operating opencast coal mine. No evidence of any coal mining related subsistence claims in relation to the property were noted within the past 10 years

7.6 The report states that possible unrecorded ancient workings may be present for which no accurate plans or recorded exist.

7.7 The mining report concludes that it is unlikely that coal will be worked in the foreseeable future and that although old workings are present all settlement is likely to have completed long ago. For full details see the coal mining search report.

7.8 Rotary drilling on phase 1 of the New lodge Development was carried out in January 2009 to depths of 30mbgl. No coal seams voids were noted.

8 PRELIMINARY CONTAMINATION ASSESSMENT

8.1 The desk study has revealed that the site has **potentially** been exposed to contamination from the made ground which is present from the recently demolished housing on both plots of land; Made Ground may contain construction/demolition waste materials such as ash, brick rubble and concrete with the possibility of asbestos.

Development Proposals

8.2 The proposed development is for the construction of residential housing with soft landscaping as gardens to the front and rear of the property.

Potential Priority Contaminants

8.3 It is recommended that a screen of potential priority contaminants should be tested for during a site investigation to confirm whether there is contamination present in concentrations that may adversely affect human health, vegetation or utility supplies. The testing should be based on guidance in CLR Report 8 "*Potential Contaminants for the assessment of Land*". The potential priority contaminants based on the site's history includes:

Inorganic Contaminants	Organic Contaminants
Arsenic, Boron, Cadmium, Chromium (total and VI), Copper Lead, Mercury, Nickel, Zinc, Selenium, Cyanide, Soluble Sulphate.	Phenol, TPH (banded with aromatic/aliphatic splits), Speciated PAH (USEPA recommended 16 species).

TABLE 2: POTENTIAL PRIORITY CONTAMINANTS

8.4 In addition, pH testing and asbestos tests are recommended in accordance with CLR8.

Potential Hazards from Ground Gases

8.5 Ground gases such as carbon dioxide and methane can be classed as a form of contamination. Potential sources of ground gases include:

- Made Ground
- Quarries & Infilled Ponds
- Underlying Natural Strata (alluvium, peat and chalk)
- Petrol re-fuelling sites (which also includes Volatile Organic Compounds)
- Landfill (on and off-site)
- Coal measures
- Cemeteries

8.6 Based on historical map evidence and consideration of the sites environmental setting, a preliminary comparison of *consequence* against *probability* has been made where ground gas is considered a potential threat to human health.

PRELIMINARY GROUND GAS ASSESSMENT		
Potential Sources	***Potential Pathway***	***Receptor***
Made Ground covering previous development areas of the site. (CO_2 and CH_4)	Ingress and Accumulation into buildings from vertical and horizontal migration.	Future users of site include adults and children. Construction workers (in particular utility workers).
Refuse tip located 250m southwest of the site. (CO_2 and CH_4)		
Preliminary Comparison of Consequence verses Probability		
	Classification	***Justification***
Probability *(Based on Table 8.1, CIRIA C665, 2007)*	LIKELY	Refuse tip located 250m southwest of the site.
		Majority of the made ground across the site is likely to be shallow.
		Site lies within a mining area.
Consequence *(Based on Table 8.2, CIRIA C665, 2007)*	MEDIUM	The proposed development is for the construction of residential housing
	Risk	***Details***
Consequence vs. Probability *(Based on Table 8.3, CIRIA*	MODERATE RISK	It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that nay such harm would be severe, or if any harm were to occur it is

C665, 2007)		more likely that the harm would be relatively mild. *(Based on Table 8.4, CIRIA C665, 2007)*

TABLE 3: POTENTIAL POLLUTION LINKAGES - GROUND GAS

8.7 Given the pollution linkages outlined above, it would be prudent to carry out full intrusive works to justify the above risk assumption; this would give the site a risk classification based on the recommendations given in CIRIA Report C665.

9 PHASE TWO – INTRUSIVE INVESTIGATION WORK

9.1 Based on the information collated in this desk study a Phase Two intrusive investigation is recommended. The investigation should comprise a series of boreholes, ideally within the footprint of the proposed buildings to investigate the nature of the superficial deposits underlying the site, the depth to rockhead (if encountered) and to carry out in-situ testing. In situ CBR testing should be performed where areas of hard standing are proposed.

9.2 Due to the possibility of ancient unrecorded shallow coal mining within the area it is also recommended that three rotary boreholes holes are drilled to determine if shallow worked seams are present below the site.

9.3 Representative samples of the made ground and natural strata encountered should be taken at regular intervals and at any changes in stratum. It is recommended that selected samples of the made ground undergo a limited suite of chemical contamination testing and selected natural ground samples should be subject to geotechnical testing. Testing requirements may vary depending on the thickness of the made ground encountered, the nature of the natural soils and the depth to rock head, if encountered.

9.4 Gas/groundwater monitoring pipes should be installed in at least three boreholes (in accordance with C665) to assess the shallow ground gas and water levels beneath the site. We would advise a minimum of three visits initially and if high or variable concentrations of ground gases are recorded, an extended period of monitoring may be necessary

9.5 Site investigations are designed according to the type of development, the requirements of the client, and recommendations given in BS 5930 and BS 10175.

10 PRELIMINARY CONCEPTUAL MODEL AND RISK ASSESSMENT

10.1 The conceptual model (Table 4) collates the salient aspects of the site to form a model which should enable comparison after fieldwork and testing. This model identifies the potential pollution linkages that may influence the proposed development and geotechnical considerations. The risk ratings are based on the current potential liabilities and likely potential future liabilities. This should not be used as a guide to the cost of addressing site specific ground issues. The risks posed by the geotechnical and contamination aspects of the site will be revised following site works, and the appropriate mitigating action added where required.

PRELIMINARY CONTAMINATION ASSESSMENT					
SOURCES	**DETAILS**	**RECEPTORS**	**PATHWAYS**	**DETAILS**	**RISK RATING**
Potential contamination in the made ground.	Possible sources include: Possible made ground such as ash, brick rubble and concrete on	Future residents are likely to be adults	Dermal absorption	Soft landscaping to the front and rear of the houses	LOW-MOD
			Inhalation of soil/volatised compounds		
			Ingestion of soil		
			Contact with contaminated groundwater		

	the site.		Ground gas from vertical and horizontal migration	Ingress and Accumulation into structures.	MOD (C665)
		Construction workers and users of site during construction	Dermal absorption	Contact with made ground and groundwater during ground works Contact with dust during construction	LOW-MOD
			Inhalation of soil/volatised compounds		
			Ingestion of soil		
			Contact with contaminated groundwater		
		Users of surrounding sites	Dermal absorption	Contact with wind blown dust during construction	LOW-MOD
			Inhalation of soil/volatised compounds		
			Ingestion of soil		
		Vegetation	Uptake via roots and leaf surfaces	Soft landscaping to the front and rear of the houses	LOW-MOD
		Groundwater	Slow seepage or leaching of contaminants	Secondary A Aquifer.	MOD
		Surface Water	Slow seepage or leaching of contaminants	The nearest surface water feature is 216m southwest of site.	LOW
			Accumulation of contaminated sediments		
		Construction Materials	Direct contact	Relict and active utilities and services possible.	MOD

PRELIMINARY GEOTECHNICAL ASSESSMENT		
FACTOR	**ON SITE DESCRIPTION**	**RISK RATING**
MADE GROUND	Made ground may include fill materials such as ash, brick rubble asbestos and concrete from beneath the site.	**LOW-MOD**
NATURAL SOILS	Drift deposits are likely to be shallow and made up from the weathered rock. Glacial till in far north possible.	**LOW**
SOLID GEOLOGY	Interbedded sandstone of the Middles Coal Measures	**LOW**
MINING	The mining report revealed that ancient unrecorded mining was possible.	**MOD**
GROUND GAS	Ground gas assessment is recommended.	**MOD**
RADON PROTECTION	Basic radon protection measures required.	**MOD**
SUBSIDENCE /GROUND STABILITY	A very low risk is posed by landslide stability hazard, running sand stability hazard and low risk of shrinking/swelling clay ground stability hazards	**LOW**
FLOODING SUSCEPTIBILITY	The area is not at risk of flood or extreme flooding from river or sea without defences.	**MOD**

TABLE 3: PRELIMINARY CONCEPTUAL MODEL AND RISK ASSESSMENT

11 CONCLUSIONS AND RECOMMENDATIONS

11.1 The results of the desk study are presented in this report and Solmek can comment as follows:

Existing Features on and Near the Site

11.2 The plot to the north is located off Beverly Road and is the location of recently demolished buildings. The area is relatively flat with a moderate slope from south down to north of approximately 2m. The plot to the south is also the location of some recently demolished housing compromising rough ground dropping in elevation from north down to south approximately 5m.

11.3 The plot to the north is covered with a mixture of bare earth, grass, gravel and small shrubs, with a small brick wall from the former housing still present along the southern and western boundaries of the site. The plot to the south is covered with similar material however it is an open site. Various heaps of garden cuttings were present to the south of the site along with an old garage in the same location.

Historical and Environmental Setting

11.4 In brief, the site had seen no major development until around 1938 when houses were constructed on the southern and eastern boundary of the southern plot and houses constructed on the entire northern plot with a road present along the western boundary of the site. The centre of the northern plot has seen various small structures added possible garages/sheds not long after the constructed of the houses.

11.5 The surrounding area was initially agricultural land with a wooded area to the south of the site and a building named New Lodge present between the two plots of land. A water feature was present 600m southwest named Mill Race. Four collieries were in operation around the site the closest East Gawber Colliery opened in 1892 200m south, the mines cased production by 1932. The site has seen some industrial development a Waterworks was labelled in 1894 1km south with a Bleach Works added in the same location in 1894, Engineering Works were constructed 200m south in 1932 and finally a railway line was present between 1892 and 1980 at a location 130m west of the site running south to north. Major residential development occurred in 1938 covering 250m of the surrounding area, increasing during the 1950's to cover 500m and 1.3km east and in 1965 covering a section between 250m and 1km north of the site. There was also a refuse tip noted 250m southwest of the site in 1980.

Geology

11.6 Inspection of British Geological Survey Sheet SE30NW (1:10,000 Series: Solid and Drift Edition) was undertaken. The solid geology underlying is hown to be Woolley Edge Rock of the Pennine Middles Coal Measures of Upper Carboniferous Age, likely to comprise Sandstone. The drift deposits are not indicted on the southern plot therefore drift deposits are likely to be shallow and comprise weathered rock were present Glacial Til is located near the northern boundary of the northern plot.

11.7 An area of backfilled open case mine is present 150m west of the site. Also the Meltonfield coal seam is shown to outcrop 200m to the south west and dip beneath the site.

11.8 In accordance with the procedure described in BRE Publication BR211 *Radon: Guidance on Protective Measures for New Dwellings*, basic radon protection measures are required for new buildings on the site.

11.9 The site is as located within an area designated as a Secondary A Aquifer.

Flooding

11.10 The Envirocheck Report states that the area is not at risk of flood or extreme flooding from river or sea without defence.

Mining

11.11 The mining report indicates that there are three known worked seams at depths ranging from 179 to 373mbgl. The shallowest seam is the Barnsley Seam subjacent to the site and has a worked cross section of 180cm and the last date of working is shown as 1900. There are no tips, lagoons, shafts or adits in the vicinity of site.

11.12 In relation to opencast mining, the site is not within the boundary of an opencast mine where coal has been removed in the past, or within 200m of a currently operating opencast coal

mine. No evidence of any coal mining related subsistence claims in relation to the property were noted within the past 10 years

11.13 The report states that possible unrecorded ancient workings may be present for which no accurate plans or recorded exist.

11.14 The mining report concludes that it is unlikely that coal will be worked in the foreseeable future and that although old workings are present all settlement is likely to have completed long ago. For full details see the coal mining search report.

11.15 Rotary drilling on phase 1 of the New lodge Development was carried out in January 2009 to depths of 30mbgl. No coal seams voids were noted.

Impact of Local Authority Guidance

11.16 Given the potential for the land on site to be contaminated it must be assessed with regards to Part 2A of the Environmental Protection Act (1990) and the local authority contaminated land strategy. The contamination status of the site will be considered as part of the planning process to ensure the site is suitable for the proposed use.

Likelihood of Finding Contamination, its Nature and Extent and Key Contaminants

11.17 The desk study has revealed that the site has **potentially** been exposed to contamination from the made ground which is present from the recently demolished housing on both plots of land; Made Ground may contain construction/demolition waste materials such as ash, brick rubble and concrete with the possibility of asbestos.

Source – Pathway – Receptor Relationships

11.18 Pathways (as detailed in the conceptual model) may exist between the potential contamination in the made ground and human health, construction materials, vegetation and water. The site investigation will provide information to assess these pathways and the risks posed.

Proposed Development

11.19 The proposed development is for the construction of residential housing with soft landscaping as gardens to the front and rear of the property.

Geotechnical Considerations

11.20 Evidence compiled from the site inspection and historical map extracts reveal that the sites were once developed with residential housing; however they have recently been demolished. Therefore made ground and relict foundations are expected on the site. A phase 2 will determine the extent and depths of made ground below the proposed houses.

11.21 Due to the developments surrounding the site the client is advised to obtain full utility drawings for the site before commencing any ground works.

Intrusive Investigation

11.22 Based on the information collated in this desk study a Phase Two intrusive investigation is recommended. The investigation should comprise a series of boreholes, ideally within the footprint of the proposed buildings to investigate the nature of the superficial deposits underlying the site, the depth to rockhead (if encountered) and to carry out in-situ testing. In situ CBR testing should be performed where areas of hard standing are proposed.

11.23 Due to the possibility of ancient unrecorded shallow coal mining within the area it is also recommended that three rotary boreholes holes are drilled to determine if shallow worked seams are present below the site.

11.24 Representative samples of the made ground and natural strata encountered should be taken at regular intervals and at any changes in stratum. It is recommended that selected samples of the made ground undergo a limited suite of chemical contamination testing and selected natural ground samples should be subject to geotechnical testing. Testing requirements may vary depending on the thickness of the made ground encountered, the nature of the natural soils and the depth to rock head, if encountered.

11.25 Gas/groundwater monitoring pipes should be installed in at least three boreholes (in accordance with C665) to assess the shallow ground gas and water levels beneath the site. We would advise a minimum of three visits initially and if high or variable concentrations of ground gases are recorded, an extended period of monitoring may be necessary

11.26 Site investigations are designed according to the type of development, the requirements of the client, and recommendations given in BS 5930 and BS 10175.

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