

**Pearson Crescent Development,
Wombwell, Barnsley
Desk Study Report
Yorkshire Housing**

Solmek Report Number S120125

February 2012

Solmek
12 Yarm Road
Stockton-on-Tees
TS18 3NA

Tel: 01642 607083

Fax: 01642 612355

Email: south@solmek.com

WWW.SOLMEK.COM

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Contract Number: S120125
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Status	Date	Prepared by	Checked by
Final	February 2012	A Cutts Engineering Geologist	R Woods Geotechnical Engineer

Pearson Crescent Development, Wombwell, Barnsley

Desk Study Report

1 INTRODUCTION AND SCOPE OF WORKS

- 1.1 Solmek were instructed by Bernard Williams Associates on behalf of Yorkshire Housing to undertake a desk study on an area of land around Pearson Crescent, Wombwell, Barnsley, South Yorkshire. A new housing development is planned along with new access roads, gardens and allotments.
- 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 assess any potential sources of ground gas
 - to assess the 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 BS10175: 2001, “Code of Practice for the Investigation of Potentially Contaminated Land”. Selected elements of BS5930: 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 site inspection was undertaken on the 1st February 2012. A site location map is presented as Figure 1 in Appendix 1. The area of interest is located to the north west of the centre of Wombwell near Barnsley, South Yorkshire on Ordnance Survey Co-ordinates 438620E, 403960N and covers an area of approximately 1.72ha. Selected plates of the site are presented in Appendix 1.
- 3.2 The site comprises two areas of undeveloped land situated around three roads within an existing housing estate. Pearson Crescent lies along the southern and western boundaries with Wortley Avenue to the east and north. Mill Hill bisects the site centrally from Wortley Avenue. Housing is present along each of the three roads and it is the grassed open space behind the existing properties that form the site. There is a general moderate to gentle fall in slope from the south towards the north.
- 3.3 The site is located within a residential estate with housing in all directions, however a number of properties on the estate have been removed.
- 3.4 In terms of surface contamination there was no obvious evidence of fly tipping or vandalism. Service manhole covers were noted across the site.
- 3.5 A drain lies over 150m to the north of the site with The River Dove 100m further to the north. The River Dove flows in north easterly direction.

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. Table 1 presents a summary of the history of the site from 1854 to 2011. The summary focuses on the historical land uses and changes relevant to the site and the proposed end use. Distances quoted are approximate.

OS MAP	SCALE	ON SITE FEATURES	OFF SITE FEATURES
1854-1855	1:10,560	The site is an undeveloped area of inferred farmland.	The immediate surrounding land lies undeveloped. The Barnsley and Sheffield Branch Railway runs along an embankment 100m to the west with Darley Main and Old Silkstone Railway further to the north west. Aldham House Lane is present 50m to the east.
1892-1894	1:2,500 – 1:10,560	No onsite changes.	The railway line has branched off towards the north west and forms Wombwell Main Junction. Aldham Mill is depicted 200m to the north with a dam and sluice noted. Mitchell Main Colliery lies 700m to the east of the site with Swaithe Main Colliery 1km to the west. No other changes.
1905-1907	1:2,500 – 1:10,560	No onsite changes noted.	Wombwell Main Colliery lies 1km to the south. No obvious changes noted to the immediate surrounding land.
1931	1:2,500	No changes onsite.	The immediate surrounding land remains unchanged. A footpath is shown along the base of the railway embankment.
1938-1948	1:10,560	No changes onsite.	Some housing development over 800m to the south east within Wombwell. Swaithe Main Colliery no longer shown. No other changes.
1955-1956	1:10,560	Overhead power lines cross the north western half of the site (NE to SW trend). No other onsite changes.	No obvious changes noted to the immediate surrounding land. Increased housing and road development in Wombwell to the south east.

1962	1:2,500	A second set of power lines cross the south eastern half of the site (NE to SW trend). No other onsite changes.	No obvious changes noted to the surroundings, the Old Silkstone Branch railway is shown as being dismantled.
1970-1971	1:2,500	Rows of semi-detached properties are present along Pearson Crescent, Mill Hill and Wortley Avenue. These are generally located on the northern and eastern fringes of the site. The central parts of both the north western and south eastern halves are undeveloped. The power lines have been redirected around the housing estate.	A Textile Factory and Electric Switching Station located 200-250m to the north east. Playing Fields are located 200m to the east. No other changes.
1978-1980	1:2,500	No change noted to site.	Housing developed 100m to the east of the site. No other changes to the immediate surroundings.
1980-1984	1:1,250 – 1:10,000	A small Playground lies centrally within the north western half of the site. No other changes noted to site.	The two remaining collieries in the area are now no longer shown. No changes to the immediate surroundings.
1989	1:10,000	No onsite changes.	Railway adjacent to the site is now labelled as dismantled. Industrial Estate 400m to the north east. Disused tip shown 700m to the north east. No other changes.
1993	1:1,250	No onsite changes.	No obvious changes.
2000	1:10,000	Some housing removed in the south eastern half of the site and in the north western half along Mill Hill.	Disused tip now shown as fields. Further development of the Industrial Estate to the north east. No other changes.
2006	1:10,000	No changes.	No changes.
2011	1:10,000	Housing has been completely removed from the site.	A large factory 250m to the north east is no longer shown. No other obvious changes.

TABLE 1: SUMMARY OF THE SITE HISTORY

- 4.2 In summary, the site remained undeveloped until the late 1960's and early 1970's when a series of semi-detached properties were constructed along Pearson Crescent, Mill Hill and Wortley Avenue. This housing was subsequently removed between 2000 and 2011.
- 4.3 The immediate surrounding land use was initially farming land with minimal development apart from railway lines and railway embankments. The railways remained until the 1970's and 1990's before dismantling took place however the embankments are still present. The housing estate was developed between the late 1960's and early 1970's. Some of the housing had been removed or set aside for demolition. The collieries developed during the late 1800's were completely removed by the 1970's and 1980's.

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 Records of landfill sites and waste transfer, treatment and disposal sites have been examined. There are no registered sites dealing with waste within 660m. For further details see Envirocheck Report (Appendix 3).

Regulated Industries

- 5.3 There are three sites within 1km listed under Local Authority Pollution Prevention and Controls. The nearest permitted control is 502m east of the site for coating of metal and plastic.
- 5.4 There are no industrial activities registered under the IPC (Integrated Pollution Controls), IPPC (Integrated Pollution Prevention and Control), Local Authority Pollution Prevention and Control Enforcements, Prosecutions Relating to Authorised Processes, Registered Radioactive Substance, Explosive Sites, Notification of Installations Handling Hazardous Substances (NIHHS), Planning Hazardous Substance Consent Regulations or the Control of Major Accident Hazards (COMAH) Regulations within 1km of the site. For full details see Envirocheck Report (Appendix 3).

Industrial Land Use

- 5.5 The Envirocheck Report identifies current industrial land use named as contemporary trade directory entries. There are a number of entries within 1km of the site. The closest active site is 129m south of the site. This is an air conditioning equipment and systems company. For further details see the Envirocheck Report, Appendix 3.
- 5.6 There are two fuel station entries listed in the Envirocheck Report. The closest is situated 402m to the east and is shown as obsolete.

Environmentally Sensitive Areas.

- 5.7 The Envirocheck Report lists one area of adopted green belt 49m to the west of the site.
- 5.8 The Envirocheck Report highlights that the site is located within a Nitrate Vulnerable Zone.
- 5.9 No entries are shown under the headings of Environmentally Sensitive Areas, Local Nature Reserves, National Parks, Nitrate Sensitive Areas, Ramsar Sites, Areas of Outstanding Natural Beauty or Sites of Special Scientific Interest (S.S.S.I.) within 880m of the site. For full details see Envirocheck Report (Appendix 3).

6 GEOLOGY, GROUNDWATER & SURFACE WATER*Geology*

- 6.1 Inspection of British Geological Survey Sheet SE30SE Wombwell (1:10,000 Series: Solid & Drift Edition) was undertaken. The solid geology underlying the site is shown as Oaks Rock of the Pennine Middle Coal Measures which comprises sandstone. No drift is shown therefore superficial deposits are likely to comprise weathered material from the sub-strata and may consist of clayey sand or sandy clay.
- 6.2 The nearest fault lies approximately 100m to the north east of the site and consists of a north west to south east trending normal fault with the downthrown side to the north east.
- 6.3 The Swinton Pottery coal seam is conjectured to outcrop approximately 100 to 150m to the south west of the site. The direction of younging and hence the projected dip of the seam indicates that it may extend beneath the site towards the north east. This seam is also superseded by the Haughton Marine Band.

Previous Investigations

- 6.4 Three small percussion boreholes were drilled on Pearson Crescent during December 2007 to depths of between 2.95 and 4.45mbgl.
- 6.5 Made ground was proven to a maximum 0.6mbgl consisting of grass over clayey topsoil with brick, sandstone and concrete. This overlies a layer of sandy gravelly clay fill locally with sandstone and brick. Completely to highly weathered sandstone was encountered below the made ground as medium dense clayey sandy gravel and gravelly sand. Competent sandstone was encountered from depths of between 2.5 and 4.0mbgl.
- 6.6 Groundwater was not encountered within the boreholes.

Geological Hazards

- 6.7 The Envirocheck Report states that no risks are posed by ground dissolution, running sand, shrinking/swelling clay or compressible ground stability hazards. Very low risk is listed for landslide and collapsible ground stability hazards. For full details see the Envirocheck Report (Appendix 3).

Radon Risk

- 6.8 In accordance with the procedure described in BRE Publication BR211 *Radon: Guidance on Protective Measures for New Dwellings*, no radon protection measures are required for new buildings on the site as it lies in an area where between 1 and 3% of homes are above the action level.

Mining and Minerals

- 6.9 The Envirocheck Report states that the site is in an area affected by coal mining. A Coal Mining Report has been obtained, dated 9th February 2012. The report indicates that there are ten worked seams beneath the site at depths of between 102 and 590mbgl, the last date of working ranging from 1909 to 1979. The shallowest seam is the Wath Wood which has a section of 89cm in the area.
- 6.10 There are no mine entries, tips or lagoons within 20m of the site. There have been no subsidence claims relating to the property over the last 10 years. The report concludes that the old workings are present but all settlement is likely to have been completed and no further workings are likely. The report is presented in Appendix 3.
- 6.11 Although the Swinton Pottery seam is conjectured to outcrop to the south west of the site, the mining surveyor suggests that the seam is indicated to be thin at that locality and is therefore unlikely to be worked.
- 6.12 The Envirocheck does not highlight BGS Recorded Mineral Sites within 500m.

Ground and Surface Water

- 6.13 The Envirocheck Report shows that the underlying solid geology beneath the site is classified as a **Secondary A Aquifer**. These can be fractured or potentially fractured rocks, which do not have a high primary permeability, or other formations of variable permeability including unconsolidated deposits. Although not producing large quantities of water for abstraction, they are important for local supplies and in supplying base flow to rivers.
- 6.14 The Envirocheck Report shows that in terms of soil classification the overlying soils have a High Leaching Potential.
- 6.15 The nearest surface water feature listed in the Envirocheck Report is shown to be 144m north west of site.

- 6.16 There are six Discharge Consents listed in the Envirocheck Report. The nearest valid licence is held 240m to the north for final/treated effluent into a land soakaway at Aldham Water Mill.
- 6.17 Two Pollution Incidents into Controlled Waters are recorded within 400m of the site, the closest being 325m to the east. This was classified as a category 3 minor incident where oil was the pollutant, dated January 1994. The other incident was classified as a category two significant incident which occurred in September 1996, 383m north west of the site. The pollutant is listed as surcharged sewage which entered a freshwater stream/river. For full details see Envirocheck Report (Appendix 3).
- 6.18 No Water Abstraction licences are held within a 1km radius of the site.
- 6.19 The site does not lie within a Source Protection Zone.

Flooding

- 6.20 There have been no flooding incidents recorded on the site. The Envirocheck Report shows that there have been five incidents of flooding or extreme flooding within 250m of the site. The closest is listed as having occurred 168m north west of site. For full details see Envirocheck Report (Appendix 3).
- 6.21 There are no areas benefiting from flood defences or flood water storage areas within 1km of site.

7 PRELIMINARY GEOTECHNICAL ASSESSMENT

Relict Foundations and Made Ground

- 7.1 Given the history of the site, it is expected that made ground will be encountered due to the demolition of housing that has previously taken place. Given the size and nature of the former structures it may be expected that foundations of varying thickness and depth may be encountered. Made ground is expected to be deeper around these areas and around existing service runs. Made ground is likely to be shallowest further towards the centre of the site where no development has previously taken place. A Phase 2 investigation would determine the type and extent of made ground.
- 7.2 Asbestos may be present within the fill materials as the buildings previously on site were developed before all asbestos containing materials were banned.
- 7.3 As a result of the structures which have previously been on the site, buried construction wastes and active services are expected to be present on site. The housing may also contain cellars which would have been filled. The client is advised to obtain full utility drawings for the site before commencing any ground works.

Excavations and Groundwater

- 7.4 The solid geology on the site is expected to comprise sandstone. Where superficial deposits are present they are likely to comprise weathered material from the sub-strata and consist of clayey sand or sandy clay. Excavations above rock head should be easily achievable by means of a normal excavator. Given the slope of the site shallow rockhead could be encountered.
- 7.5 Based on the previous investigation at the site groundwater is unlikely to be encountered. It should be noted that groundwater levels can be affected by rainfall and seasonal variations.

Mining

- 7.6 The mining report indicates that there are ten worked seams beneath the site at depths of between 102 and 590mbgl, the last date of working ranging from 1909 to 1979. The shallowest seam is the Wath Wood which has a section of 89cm in the area.
- 7.7 There are no mine entries, tips or lagoons within 20m of the site. There have been no subsidence claims relating to the property over the last 10 years. The report concludes that the old workings are present but all settlement is likely to have been completed and no further workings are likely. The mining report didn't highlight potential unrecorded workings from shallow seams in the area.
- 7.8 The Swinton Pottery coal seam is conjectured to outcrop approximately 100 to 150m to the south west of the site. The projected dip of the seam indicates that it may extend beneath the site, however it is believed that the seam is thin at this locality and is unlikely to have been worked.

8 PRELIMINARY CONTAMINATION ASSESSMENT

- 8.1 The desk study has revealed that the site has **potentially** been exposed to contamination due to the previous housing developments on the site. There is the potential for contamination from construction/demolition wastes, comprising materials such as ash, tarmac, brick rubble, and concrete in the made ground. There is also the possibility of encountering asbestos as the structures previously built on the site were developed before the use of asbestos in construction ceased.

Development Proposals

- 8.2 The proposals are for an extensive residential development comprising semi detached properties, new access roads and soft landscaping as gardens. A series of allotments are also planned. Given the size and nature of the proposed development, it is considered highly sensitive in terms of contamination.

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 any contamination that may affect human health. 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 sites history include:

Inorganic Contaminants	Organic Contaminants
Arsenic, Boron, Cadmium, Chromium, Copper Lead, Mercury, Nickel, Zinc, Selenium, Cyanide, Soluble Sulphate.	Phenol, TPH (aromatic/aliphatic), Speciated PAH (speciated).

TABLE 2: POTENTIAL PRIORITY CONTAMINANTS

- 8.4 In addition, pH and asbestos screening is also recommended.

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

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
Hazardous mines gases from Coal Measures strata (CO ₂ , CO and CH ₄)	Ingress and Accumulation into buildings from vertical and horizontal migration.	Future users of site are likely to include adults and children.
Made Ground (CO ₂ and CH ₄)		Construction workers (in particular utility workers). Allotments proposed.
Preliminary Comparison of Consequence versus Probability		
Probability	Classification	Justification
(Based on Table 8.1, CIRIA C665, 2007)	LOW LIKELIHOOD	Possible ground gas from made ground.
		No fuel stations in area.
		Coal measures strata at depth.
		No landfill sites located within 600m of the site.
Consequence	MILD	Proposed residential development.
(Based on Table 8.2, CIRIA C665, 2007)		
Consequence vs. Probability	Risk	Details
(Based on Table 8.3, CIRIA C665, 2007)	LOW RISK	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild. (Based on Table 8.4, CIRIA C665, 2007)
TABLE 3: 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 small percussive boreholes as well as a number of shallow machine dug trial pits to investigate the superficial deposits underlying the site and to carry out in-situ testing. Given the size of the site the intrusive investigation should include at least two days (between 12 and 14 boreholes) of small percussive boreholes.

9.2 The position of the boreholes will generally be confined to beneath the proposed building footprints. The trial pits can be placed in areas not covered by the boreholes.

- 9.3 Samples from the boreholes and trial pits should be subject to a series of both geotechnical and chemical contamination analysis. 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 Due to the possible presence of fill materials beneath the site gas/groundwater monitoring pipes should be installed in a minimum of three to six boreholes (in accordance with C665) to assess the shallow ground gas and water levels beneath the site. A minimum of three visits should be made initially; however, 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 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.
- 10.2 The risks posed by the geotechnical and contamination aspects of the site will be revised following site works, and any mitigating action required added.

PRELIMINARY CONTAMINATION ASSESSMENT					
SOURCES	DETAILS	RECEPTORS	PATHWAYS	DETAILS	RISK RATING
Potential contamination in the made ground from previous land use.	Possible sources include: Possible construction waste such as ash, tarmac, brick rubble and concrete.	Future residents are likely to be adults and children.	Dermal absorption	Housing, garden areas and allotments.	MOD
			Inhalation of soil/volatilised compounds		
			Ingestion of soil		
			Contact with contaminated groundwater		
	Possible asbestos. Site currently undeveloped grassed open space.	Construction workers and users of site during construction	Ground gas from vertical and horizontal migration	Ingress and Accumulation into structure.	LOW (C665)
			Dermal absorption	Contact with made ground and groundwater during ground works	LOW
			Inhalation of soil/volatilised compounds		
			Ingestion of soil		
			Contact with contaminated groundwater	Contact with dust during construction	
	Closest landfill/waste facility 600m from site.	Users of surrounding sites	Dermal absorption	Contact with wind blown dust during construction	LOW
			Inhalation of soil/volatilised compounds		
			Ingestion of soil		
		Vegetation	Uptake via roots and leaf surfaces	The proposals include gardens and allotments.	MOD-HIGH
		Groundwater	Slow seepage or leaching of contaminants	Secondary A Aquifer. Not in a Source Protection Zone.	LOW-MOD
		Surface Water	Slow seepage or leaching of contaminants	Drain 150m to the north, River Dove beyond.	LOW
			Accumulation of contaminated sediments		
		Construction Materials	Direct contact	Foundations, buried structures and services anticipated on site.	LOW

PRELIMINARY GEOTECHNICAL ASSESSMENT		
FACTOR	ON SITE DESCRIPTION	RISK RATING
MADE GROUND	Made ground is expected to include construction materials such as brick rubble, tarmac, ash, concrete and possible asbestos.	LOW-MOD
NATURAL SOILS	Superficial deposits are expected to comprise weathered sandstone as sandy clays and/or clayey sands.	LOW
SOLID GEOLOGY	Sandstone (Oaks Rock) Middle Coal Measures.	LOW
MINING	The mining report identifies worked coal seams over 100mbgl. No unrecorded shallow workings. Thin Swinton Pottery seam outcrops to the south west.	LOW
RADON PROTECTION	No radon protection measures required	LOW
SUBSIDENCE /GROUND STABILITY	No risks are posed by ground dissolution, running sand, shrinking/swelling clay or compressible ground stability hazards. Very low risk is listed for landslide and collapsible ground stability hazards.	LOW
FLOODING SUCEPTIBILITY	No previous flooding incidents. There are no flood storage areas or flood defences located within 1km of site.	LOW
TABLE 4: PRELIMINARY CONCEPTUAL MODEL AND RISK ASSESSMENT		

11 CONCLUSIONS & 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 site comprises two areas of undeveloped land situated around three roads within an existing housing estate. Pearson Crescent lies along the southern and western boundaries with Wortley Avenue to the east and north. Mill Hill bisects the site centrally from Wortley Avenue. Housing is present along each of the three roads and it is the grassed open space behind the existing properties that form the site. There is a general moderate to gentle fall in slope from the south towards the north.
- 11.3 The site is located within a residential estate with housing in all directions, however a number of properties on the estate have been removed.
- 11.4 A drain lies over 150m to the north of the site with The River Dove 100m further to the north. The River Dove flows in north easterly direction.

Historical

- 11.5 The site remained undeveloped until the late 1960's and early 1970's when a series of semi-detached properties were constructed along Pearson Crescent, Mill Hill and Wortley Avenue. This housing was subsequently removed between 2000 and 2011.
- 11.6 The immediate surrounding land use was initially farming land with minimal development apart from railway lines and railway embankments. The railways remained until the 1970's and 1990's however the embankments are still present. The housing estate was developed between the late 1960's and early 1970's. Some of the housing had been removed or set aside for demolition.

Potential Contaminative Activities

- 11.7 Records of landfill sites and waste transfer, treatment and disposal sites have been examined. There are no registered sites dealing with waste within 660m. No regulated industries are located within the area.
- 11.8 There are no active fuel stations in the area.

Environmental Setting

- 11.9 The solid geology underlying the site is shown as Oaks Rock of the Pennine Middle Coal Measures which comprises sandstone. No drift is shown therefore superficial deposits are likely to comprise weathered material from the sub-strata and may consist of clayey sand or sandy clay.
- 11.10 The Envirocheck Report classifies the solid geology as a **Secondary A Aquifer** and the soils on site are noted as having a potentially high leaching potential.
- 11.11 The site does not lie within a Source Protection Zone. The site lies within a Nitrate Vulnerable Zone.
- 11.12 In accordance with the procedure described in BRE Publication BR211 *Radon: Guidance on Protective Measures for New Dwellings*, no radon protection measures are required for new buildings on the site.

Flooding

- 11.13 There have been no flooding incidents recorded on the site. The Envirocheck Report shows that there have been five incidents of flooding or extreme flooding within 250m of the site. The closest is listed as having occurred 168m north west of site.
- 11.14 There are no areas benefiting from flood defences or flood water storage areas within 1km of site.

Impact of Local Authority Guidance

- 11.15 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

- 11.16 Based on the site walkover, evidence compiled from the historic maps and Envirocheck Report, contamination is possible due to the construction/demolition that has taken place on the land. Made ground is expected to contain construction wastes such as ash, brick rubble, concrete, and possibly reworked natural material from the excavation during the development of the previous houses.
- 11.17 Asbestos was identified as a potential hazard as the structures previously in place were developed before the use of asbestos in construction ceased.

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 proposals are for an extensive residential development comprising semi detached properties, new access roads and soft landscaping as gardens. A series of allotments are also planned. Given the size and nature of the proposed development, it is considered highly sensitive in terms of contamination.

Geotechnical Considerations

- 11.20 Given the site history it is anticipated that made ground will be encountered on all or part of the site. A Phase 2 investigation would determine the type and extent of made ground.
- 11.21 As a result of the previous development buried construction wastes and active buried services are expected to be present. The former housing may also contain cellars which would have been filled.
- 11.22 Provided there are no backfilled cellars on the site from the previous structures then foundations are likely to comprise conventional shallow strips. A raft foundation or piling option may be considered if made ground is deep or poor natural ground conditions are encountered at shallow depth. The client is advised to obtain full utility drawings for the site before commencing any ground works.

Intrusive Investigation

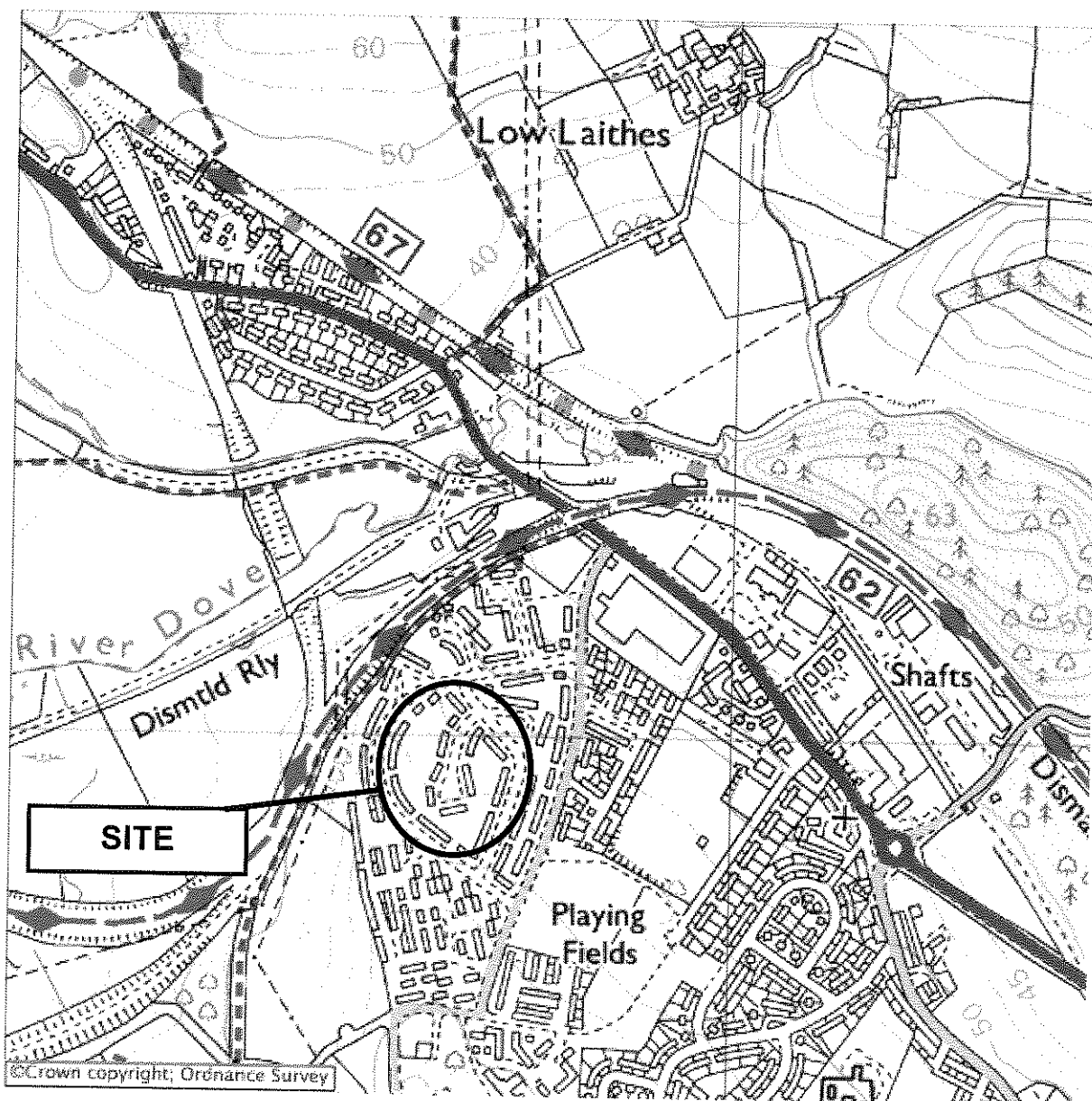
- 11.23 The investigation should comprise a series of small percussive boreholes as well as a number of shallow machine dug trial pits to investigate the superficial deposits underlying the site and to carry out in-situ testing.
- 11.24 Samples from the boreholes and trial pits should be subject to a series of both geotechnical and chemical contamination analysis. 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 Due to the possible presence of fill materials beneath the site gas/groundwater monitoring pipes should be installed in a minimum of three to six boreholes (in accordance with C665) to assess the shallow ground gas and water levels beneath the site. A minimum of three visits should be made initially; however, 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 in BS 5930 and BS 10175.

Mining

- 11.27 The mining report indicates that there are ten worked seams beneath the site at depths of between 102 and 590mbgl, the last date of working ranging from 1909 to 1979. The shallowest seam is the Wath Wood which has a section of 89cm in the area.
- 11.28 There are no mine entries, tips or lagoons within 20m of the site. There have been no subsidence claims relating to the property over the last 10 years. The report concludes that the old workings are present but all settlement is likely to have been completed and no further workings are likely. The mining report didn't highlight potential unrecorded workings from shallow seams in the area.
- 11.29 The Swinton Pottery coal seam is conjectured to outcrop approximately 100 to 150m to the south west of the site. The projected dip of the seam indicates that it may extend beneath the site, however it is believed that the seam is thin at this locality and is unlikely to have been worked.

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APPENDIX 1



Client:	Yorkshire Housing	
Project:	Pearson Crescent Development	
Title:	Site Location Map	
Drawing No:	Figure 1	Scale: NTS
Date	February 2012	

Title	Site Plan
Project	Pearson Crescent Development
Client	Yorkshire Housing
Date	February 2012
DRG No	Figure 2
Scale	NTS



Solmek
 12 Yarm Road
 Stockton on Tees
 Cleveland
 TS18 3NA
 Tel: +44 (0) 1642 607 083
 Fax: +44 (0) 1642 612 355
 Email: south@solmek.com
www.solmek.com





Plate 1: View north west between Mill Hill and Wortley Avenue



Plate 2: View west showing Mill Hill and rear of Pearson Crescent

Client:	Yorkshire Housing
Project:	Pearson Crescent Development, Wombwell
Title:	Plates 1 & 2
DRG No:	Figure 3
Date	February 2012



Plate 3: View north along Wortley Avenue



Plate 4: View south between Mill Hill and rear of Pearson Crescent

Client:	Yorkshire Housing
Project:	Pearson Crescent Development, Wombwell
Title:	Plates 3 & 4
DRG No:	Figure 4
Date	February 2012



Plate 5: View north along Wortley Avenue



Plate 6: View south west from Wortley Avenue towards Pearson Crescent

Client:	Yorkshire Housing
Project:	Pearson Crescent Development, Wombwell
Title:	Plates 5 & 6
DRG No:	Figure 5
Date	February 2012