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Potential Gypsy & Traveller Site
Old Colliery Buildings, Stanton Wick, Somerset

Preliminary Land Quality Risk Assessment

SLR Ref: 402-00934-00021-002

August 2012

**Bath & North East
Somerset Council**

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1.0 INTRODUCTION

1.1 Background

SLR Consulting Ltd (SLR) was commissioned by Bath and North East Somerset Council (B&NES) in late July 2012 to undertake a Preliminary Land Quality Risk Assessment (PLQRA) of Old Colliery Buildings (Pensford Colliery), Wick Lane, Stanton Wick, Somerset BS39 4BU (the Site) (Drawing 1).

SLR understands that the PLQRA is required in connection with the potential future redevelopment of the Site by Bath and North East Somerset Council as a gypsy and traveller site.

Although this report assesses the Site in terms of its potential future use as a gypsy and traveller site, the current Site owner has planning permission until March 2014 for residential redevelopment (Bath and North East Somerset Council Planning References: 05/02227/FUL and 10/03029/REN).

The information obtained from this assessment has been used to develop a preliminary conceptual model of potential risks to human and environmental receptors. This conceptual model examines the potential *contaminant-pathway-receptor* linkages in relation to identified or potential contamination issues at the Site.

1.2 Proposed Development

The future layout of the Site is currently unknown. However, the proposals include the renovation of the former colliery buildings as amenity blocks and the construction of a permanent travellers site, which according to publications by the Showmen's Guild of Great Britain¹ and the Department of Communities & Local Government², should comprise hard surfaced pitches, a surfaced roadway, a children's play area / recreational area, limited landscaping, an amenity building, a site office and a storage and maintenance area. It is also proposed that the pitches may comprise 'garden' areas. As such, the production of fruit and vegetables cannot be discounted.

1.3 Objectives

The objective of this PLQRA is to establish if there is any evidence (from a site inspection and review of existing data) of significant subsurface contamination from past or present activities on and adjacent to the Site which could give rise to unacceptable risks given the proposed redevelopment. The report will also act as one form of initial environmental due diligence, should Bath and North East Somerset Council decide to purchase the Site or enter into a long-lease prior to redevelopment.

¹ Travelling Showpeople's Sites – A Planning Focus; Model Standard Package; The Showmen's Guild of Great Britain; Revised September 2007

² Designing Gypsy and Traveller Sites – A Good Practice Guide; Department of Communities and Local Government; May 2008

1.4 Scope of Work

The scope of work for the PLQRA was devised by SLR, it included:

- a site walk over inspection to identify and record on and off site land uses, potential areas of concern with respect to soil and groundwater contamination and potential contaminants of concern;
- a review of geological and hydrogeological data for the property;
- analysis of historical maps to establish the history of the property as well as past on and off site potentially contaminative activities;
- a review of a Coal Authority report for the Site;
- a review of a Site Investigation Report for a section of the Site;
- collection and analysis of environmental data from a proprietary database; and
- reporting.

1.5 Data Sources

This report has been produced following consultation with the sources of information summarised in Table 1-1.

**Table 1-1:
 Information Sources**

Information Type	Source
General topography and Site setting	Google Earth www.streetmap.com
Site and background information	GroundSure Historical Ordnance Survey Map Extracts EMS_173161_255440, purchased 19 th July 2012 (Appendix A). GroundSure Geolnsight Report, EMS_173161_255441, purchased 19 th July 2012 (Appendix B). GroundSure EnviroInsight Report, EMS_173161_255442, purchased 19 th July 2012 (Appendix C).
Hydrogeology and Geology	Environment Agency (EA) website. British Geological Survey (BGS) Sheet 264, Bristol, Solid & Drift Edition, 1:50,000 scale. The Coal Authority, Non-residential Coal Authority Mining Report, 51000113959001, issued 26 th June 2012 (Appendix E).
Proposed Layout	Travelling Showpeople's Sites – A Planning Focus; Model Standard Package; The Showmen's Guild of Great Britain; Revised September 2007 (extracts in Appendix F) Designing Gypsy and Traveller Sites – A Good Practice Guide; Department of Communities and Local Government; May 2008 (extracts in Appendix F)
Previous Reports	Site Investigation Report, The Old Colliery, Wick Lane, Pensford. Prepared by Sanctus Limited for Tom Smart in March 2010 (extracts in Appendix G).

2.0 SITE DETAILS, SETTING AND HISTORY

2.1 Site Vicinity Description

Table 2-1 summarises the property details. Information has been derived from Ordnance Survey (OS) mapping, the Sanctus report and a Site walkover inspection undertaken on 26th July 2012, with Site owner Tom Smart. Photographs of the Site are provided in Appendix D.

**Table 2-1:
 Site Details**

Address	Old Colliery Buildings, Wick Lane, Stanton Wick, Somerset, BS39 4BU
Site Location	The Site is located on Wick Lane, approximately 1.2km to the south of Pensford centre, and is situated in a mixed agricultural and historic commercial setting.
Recent Site Activities	With the exception of office use (Building 2 – see below) and limited storage, the Site buildings have been generally unused since 2005. Between 1978 and 2005 the Site was used for manufacturing pre-cast concrete products (Dabro Precast Concrete).
Site Description	<p>The Site is broadly L-shaped and occupies an area of c.7.6ha. The Site can be divided in to two separate areas; the Old Colliery Buildings and yard area (c.0.6ha) and the Colliery Tip (c.7.0ha). Each area is discussed in turn below.</p> <p>Old Colliery Buildings and Yard Area:</p> <p>This part of the Site comprises six buildings (c.20% of the area), with associated hard standing / concrete surfacing (c.20% of the area) and permeable gravel surfacing (c. 60% of the area). The hard surfacing was generally in a poor condition and vegetation was growing in the permeable surfacing. A description of the buildings is provided below (the building references are shown on Drawing 2).</p> <p>Building 1: Likely to be constructed in the late 1970s and used for manufacturing concrete products. The building comprises breeze-block walls with a pitched cement sheet roof and lean-to (the cement sheeting is likely to contain asbestos).</p> <p>Building 2: A rendered brick building with a pitched cement sheet roof (likely to contain asbestos). The building is likely to have been constructed in the late 1970s for office use.</p> <p>Building 3: A breeze-block building with a pitched cement sheet roof (likely to contain asbestos). The former use of the building is unknown, but was constructed in the late 1970s.</p> <p>Building 4: A red-brick building with a tiled pitched roof. The building is understood to have been the fan house for the colliery. A large plinth was present inside.</p> <p>Building 5: A red-brick building with a replacement pitched tin roof. This is the largest building on Site and was most recently used for manufacturing concrete products. Building 5 has a breeze-block and pitched cement sheet roof (likely to contain asbestos) extension to the south.</p> <p>Building 6: A red-brick building with a tiled pitched roof. The building is understood to have been the blacksmith shop for the colliery. The southern section of Building 6 was not accessible during the inspection, but was reported to be used as the carpentry shop for making the cement moulds.</p> <p>No obvious signs of significant hydrocarbon staining were noted within the buildings and yard area.</p> <p>Colliery Tip:</p> <p>This part of the Site comprises a levelled / graded spoil heap which slopes upwards gently towards the east and south, with limited surface vegetation. At the southern and eastern extent of the tip the Site drops steeply down by c.25m to the boundary. The slopes comprise mixed mature and semi-mature tree species and comprise c.50% of the area. The levelled / graded section of the Site comprises the remaining 50% of the area.</p>

Above Ground and Underground Fuel Storage Tanks	There was no evidence of historic or current underground or above ground fuel storage tanks on Site.	
Surrounding Land Use	North	A residential property (The Winding House), beyond which is woodland and farmland.
	West	Wick Lane and a residential property (The Bath House), beyond which is farmland.
	South	A coach storage, service and maintenance depot, beyond which is farmland.
	East	Farmland and woodland, beyond which is the A37 and further farmland.

2.2 Physical Site Setting

A summary of the main physical features of the Site are given in Table 2-2. Information has been derived from GroundSure and Coal Authority Reports.

**Table 2-2:
 Summary of Physical Site Features**

Geography and Geology	Gradient	The yard area is generally flat, while the colliery tip slopes gently to the east and south. From the highest point of the colliery tip the Site slopes steeply down to the east and south
	Elevation	The yard area has an elevation of approximately 100m AOD
	Made Ground	The Site and the immediate surrounds to the north are recorded as infilled ground of very high permeability. This is likely to relate to former colliery activities on Site.
	Superficial Drift Geology	Superficial deposits are not recorded beneath the Site..
	Solid Geology	The solid geology in the east of the Site is recorded as Publow Member Sandstone, while the solid geology in the west of the Site is recorded as Publow Member Mudstone and Siltstone. The Publow Member is recorded as comprising seatearths and coal. The Publow Member is underlain at depth by Cola Measures (see mining section below).
	Radon Gas	The Site is not classed as being in a Radon Affected Area, as only 1-3% of properties held radon above the Action Level. Therefore, radon protective measures are not required for new standard build residential properties or extensions to existing ones.
	Mining, and Ground Stability Hazards	As a colliery has been present on Site, a Coal Authority Mining report has been reviewed. The full report is provided in Appendix E and a summary of the report is provided below: <ul style="list-style-type: none"> • The Site is in the likely zone of influence from workings in four seams of coal between 220m and 470m depth, and last worked in 1954; • Any movement from these ground workings should have ceased; • A mine shaft is located to the south of 'Building 3' and within 20m to the north of the Site (Drawing 1); • Both shafts were capped in 1959, but the cap of the on Site shaft was showing signs of dilapidation and was re-capped in April 2012 by the Coal Authority – evidence was present of this during the Site inspection;

Geography and Geology (cont)

- The Coal Authority is not aware of any evidence of damage arising due to geological faults or other lines of weakness that have been affected by coal mining; and
- There is no record of a mine gas emission requiring action by the Coal Authority within the boundary of the Site.

Information about the Somerset Coalfield regarding Pensford Colliery is provided in the Sanctus Report and summarised below:

- Work started at the colliery in 1908 and continued until 1958, when underground faulting made working too expensive;
- The colliery used steam for power generation;
- The Winding House (now residential) was situated to the north of the Site. The boiler plant and chimney were situated to the south of the Winding House and likely demolished pre-1962.

GroundSure suggests there are low to negligible ground stability hazards from shrinking / swelling clay, landslides, soluble rocks, collapsible rocks and running sands. There is moderate potential for compressible ground.

Hydrology	Surface Water and River Network	A pond (c.15m by 15m) is present in the southeast of the Site. Salter's Brook is culverted adjacent to the south-eastern Site Boundary. Salter's Brook flows towards the north and outside the culvert is classified as a Secondary River and a tributary of the River Chew.
	Flood Risk	The Site lies outside areas indicated to be Zone 2 & 3 Floodplains.
	Surface Water Abstractions	There are no surface water abstractions within 1km of the Site. The closest surface water abstraction is located c.1.4km northwest and relates to an abstraction from the River Chew for irrigation.
Hydrogeology	Aquifer	The Publow Member is classified as a Secondary A Aquifer. Groundwater is likely to be deep (>5m below ground level).
	Groundwater Abstractions	There are no potable groundwater abstractions within 1km of the Site. However, there is on groundwater abstraction licences, which is located c.590m southwest (up gradient) and used for general farming and domestic.
	Source Protection Zones	There are no groundwater source protection zones within 500m of the Site.

2.3 Environmental Search Data

The Environment Agency web site has been consulted with regard to groundwater abstractions, Source Protection Zones and former landfill sites. The GroundSure EnviroInsight data was also reviewed to gain publicly available environmental data for the Site and its immediate vicinity. The MAGIC website (Multi-Agency Geographic Information for the Countryside) was also consulted regarding any ecologically designated sites within 2km of the subject property.

A copy of the GroundSure information obtained by SLR is contained in Appendix C and a summary of the search information is provided below:

- Sites Determined as Contaminated Land – there are no Sites within 500m determined as Contaminated Land under Part 2A EPA 1990;
- Discharge consents – there are three consents within 500m of the Site, all are located down-gradient of the Site and relate to non water company discharge of sewage. The closest consent is located c.55m northwest of the Site, but is listed as revoked;
- Radioactive Substances Licences – there are no licences within 500m of the Site;
- EA recorded pollution incidents – there are no records on the National Incidents Recording System within 250m of the Site;
- Landfill sites – There are no current landfill sites within 1.5km of the Site, but there are five historical landfill sites within 1.5km of the Site. The closest site is located c.145m northwest (down gradient) of the Site, at Parsons Farm, Wick Lane and accepted inert and non-hazardous waste during the 1980s;
- Licensed waste management/treatment facilities – There are no records of operational or non-operational licensed waste management sites within 500m of the Site. However, anecdotal evidence suggests that vehicle dismantling activities took place on the depot adjacent to the south of the yard area. This led to a prosecution and fine for the operator in 2007;
- Ecological Designations – There are no ecologically designated sites within 2Km of the Site. A Phase I Extended Habitat Survey is provided under separate cover.

Groundwater and surface water abstraction data was discussed in Section 2.2.

2.4 Review of Previous Environmental Report

Background

A geo-environmental investigation and assessment of The Old Colliery was undertaken in 2010 by Sanctus who were working for Mr Tom Smart, the Site owner.

The ground investigation solely focused on the area of the Site referred to in this report as the 'old colliery buildings and yard area' and was required in connection with satisfying land quality planning conditions of planning permission 05/02227/FUL (which was renewed in March 2011 – 10/03029/REN). The planning permission includes the renovation of existing colliery buildings to accommodate residential dwellings, recreational buildings and garaging.

Extracts from Sanctus' report (including an excavation location plan, excavation logs, ground gas monitoring data and soil laboratory analysis) are presented in Appendix G.

Scope of Work

Sanctus' scope of work comprised:

- reviewing a Phase I desk study undertaken by Hyder Consulting Limited in 2005 (Ref: WX90506/D1/v01)³
- excavation of fourteen trial pits to a maximum depth of 3.2m;
- excavation of four boreholes in to a maximum depth of 2.2m;
- chemical analysis of soils;
- ground gas monitoring; and
- reporting.

Ground Conditions Encountered

Made Ground was encountered in all excavation locations. The uppermost metre of ground, shallow Made Ground, either comprised demolition materials or sand with fragments of clinker, ash, coal and occasionally brick. This shallow Made Ground was underlain by Made Ground comprising varying lithologies of colliery spoil from the historic workings. The depth to the base of the Made Ground was not proven in all locations and was greatest in TP9, which terminated in Made Ground at 3.2m.

Where natural soils were encountered they were found to comprise coarse grained sandstone with lenses of soft brown clay. The top of the sandstone was encountered at depths ranging from 1.5-2.3m.

With the exception of a clay pipe containing a solid black vitreous substance in TP8, no olfactory evidence of contamination was recorded.

Groundwater

Groundwater was not encountered during the investigation. There is no information on rest groundwater levels during return monitoring visits.

³ Not available for review at the time of writing this report.

Ground Gas

Trace concentrations of methane (0.1%) were identified in boreholes BH1-3 with a methane concentration of 5% recorded in BH5, that higher concentration was discounted by Sanctus as an anomalous result.

A maximum carbon dioxide concentration of 7.3% was encountered in BH1.

Gas flow rates were found to be near neutral (0.1-0.2l/hr) in all boreholes.

Given the above, the ground gas regime on Site was determined to be Characteristic Situation 2 – Low Risk.

Note: SLR's opinion is that the choice of Characteristic Situation 2 is somewhat conservative, further assessment of the data set would likely determine the ground gas regime at the Site to be Characteristic Situation 1 – Very Low Risk.

Laboratory Analysis of Soil Samples

Ten soil samples were collected from the Made Ground within the trial pits. The samples were analysed for various metals, pH, phenols, asbestos, polycyclic aromatic hydrocarbons (PAHs) and speciated petroleum hydrocarbons with an aliphatic / aromatic split (TPH-CWG). The results are presented in Appendix G. With the exception of arsenic, concentrations of compounds of concern were either below laboratory detection limits or below the residential assessment criteria used in the report.

Sanctus' report suggested that significant pollutant linkages would exist between the elevated concentrations of arsenic on Site and future Site occupants. The main pathways identified were dermal contact and ingestion of soils and consumption of home grown fruit and vegetables.

No significant pollutant linkages were identified regarding risks to the environment.

Recommendations

The remedial strategy suggested by Sanctus involved the *'removal of 600mm of Made Ground within proposed gardens and soft landscaped areas and the use of a capping layer comprising a geomembrane overlain by suitable sub-soil and topsoil (at least 150mm)'* along with the installation of *'adequate gas protection measures for a Characteristic Situation 2 gas regime'*.

SLR Comment

Sanctus adopted a statistical approach when assessing the risk to health from arsenic. Whilst statistics are a useful tool, that approach was flawed as the consultant made no attempt to look at the concentrations spatially and did not consider depth. What Sanctus failed to mention is that arsenic concentrations seem to increase with depth: the three shallowest samples (0.3, 0.5 & 0.6m below the surface) have arsenic concentrations between 16 and 35 mg/kg (the individual results and the average of 27mg/kg are below the residential generic assessment criteria) whilst the deeper samples have concentrations ranging from 25 to 62 mg/kg (five of the seven results are over the criteria of 35mg/kg as is the average of 47mg/kg). Additionally, the evidence to date shows spatial variation – the west of their study area seems to be variably affected by arsenic whilst the east is not. SLR would want more information before suggesting the site is fit for residential use or before setting out a remedial design, but even now would comment that there is little evidence to

support Sanctus’ site-wide remedial strategy and that the evidence points to far less remediation actually being justifiable. In fact, with a decent risk assessment and development of site specific assessment criteria following the receipt of bioaccessibility test results SLR may be able to conclude that no remedial works are needed.

2.5 Site History

This section presents a summary of the Site’s history from a review of OS map extracts. The age and general type of activity and land use can often be determined from the type and layout of structures depicted on OS maps. However, specific elements of site operations cannot normally be determined from such extracts. Large scale (1:2,500 and 1:10,560) historical map extracts were reviewed for selected years between 1883 and 2012. A summary of the findings is given in Table 2-3, overleaf, and the OS maps provided by GroundSure are included in Appendix A.

**Table 2-3:
 Site History Summary**

Map Dates	Description
1883-5	On-site: The Site comprises undeveloped agricultural land. Off-site: The surrounding land use is predominantly agricultural. Wick Lane is located adjacent to the western Site boundary and the North Somerset Railway and Salter’s Brook are located adjacent to the Southeast Site boundary, both in a general north-south orientation.
1902	On-site: No significant changes on Site. Off-site: No Significant changes in the immediate surrounds. However, the railway is labelled G.W.R. Bristol and North Somerset Line and a number of unspecified heaps, likely to be associated with surface / shallow coal workings, are present c.140m west.
1931-2	On-site: No significant changes to the south and southeast of the Site. However, Pensford Colliery is located in the north of the Site. With a spoil heap in the northeast and a yard area in the northwest of the Site. A number of buildings are present in the ‘yard area’ including the three red-brick buildings standing currently. A shaft is present in the northeast of the yard area and the eastern edge of the yard areas is occupied by a tramway / railway sidings. A chimney is present in the northwest corner of the Site adjacent to the boiler plant. Off-site: The boiler plant extends of Site to the north and is connected to the Engine House (currently the Winding House residential dwelling). The rail sidings extend through a large building and off to the north where they connect to the Bristol and North Somerset Line. A tramway is present to the west of the Site and connects Pensford Colliery to Bromley Colliery, c.1.3km to the southwest. Another shaft is present to the north of the yard area.
1956	On-site: With the exception of the spoil heap extending in to the south and southeast of the Site, there are no significant changes evident on Site. Off-site: With the exception of the spoil heap extending to the north of the Site over a tunnel, there are no significant changes to the immediate surrounds.
1960-8	On-site: The chimney, boiler plant and rail sidings / tramway are no longer present. The yard area is labelled works and the mine is labelled disused. Off-site: The large building to the north of the Site and the tramway to Bromley Colliery are no longer present. Bromley Colliery is marked disused.
1988	On-site: No significant changes on Site. Off-site: With the exception of the Bristol and North Somerset Line being marked dismantled, there are no significant changes to the immediate surrounds.

Map Dates	Description
1992	On-site: The yard area remains a works and there are two additional buildings within it. The southeast of the Site is marked as a refuse tip. The Site generally appears in its current configuration. Off-site: The land to the south of the yard area is marked depot. The surroundings generally appear in their current configuration
2002-2012	On-site: No significant changes. Off-site: No significant changes.

In summary, the Site was undeveloped until the early 1930s, when mapping indicates that Pensford Colliery (a potential contaminative land use) was present in the north of the Site. Pensford Colliery comprised two mine shafts (one on Site and one c.20m to the north of the Site), a number of works buildings, rail sidings / tramway and an associated spoil heap (in the north east of the Site). By 1956 mapping the spoil heap had extended to cover the south and south east of the Site. On 1960s mapping the Pensford Colliery was disused and the rail sidings, chimney and boiler plant were no longer present. The yard area of the colliery appears as a works. By the early 1990s the site generally appeared in its current configuration as further development had occurred at the works.

Potentially contaminative off Site land uses have included buildings (a boiler plant, engine house and rail sidings building) a tramway and rail sidings, and a spoil heap associated with Pensford Colliery, The Bristol and North Somerset Line, Bromley Colliery and more recently a Depot.

The impacts associated with off site activities of Pensford Colliery are unlikely to be any more significant than those on Site and Bromley Colliery is down gradient of the Site and not considered to be of direct significant concern. However, anecdotal evidence has suggested that the Site has historically been impacted by the activities at the adjacent Depot / end of life vehicle dismantlers adjacent to the south of the yard area (Section 2.3).

3.0 OUTLINE CONCEPTUAL MODEL AND PRELIMINARY RISK ASSESSMENT

3.1 Land Quality Risk Assessment

The normal procedure for assessing land dictates that potential contaminants, pathways and receptors should be considered within the context of pollutant linkages. An evaluation of the risks associated with each linkage should drive decisions regarding the status of the land as contaminated, uncontaminated or requiring further investigation.

The information summarised in the previous sections has been used to identify the likely contaminant sources, receptors and pathways present at the Site. The elements of the conceptual model built in the table that follows, are used in Sections 3.3, 3.4 and 3.5 to consider the potential pollutant linkages, their significance and acceptability.

The 2012⁴ statutory guidance for Part 2A of the Environmental Protection Act 1990 (EPA 1990), defines a contaminant, a pathway and a receptor as follows:

- **Contaminant:** “a substance which is in, on or under the land and which has the potential to cause harm to a relevant receptor, or to cause significant pollution of controlled waters”;
- **Pathway:** “one or more routes or means by, or through, which a receptor: (a) is being exposed to, or affected by, a contaminant; or (b) could be exposed or affected”, and
- **Receptor:** “something that could be adversely affected by a contaminant, for example a person, an organism, an ecosystem, property, or controlled waters”.

When considering the contaminants, receptors and pathways relevant to this Site, SLR has been mindful of the proposed use of the Site as a traveller site with limited soft landscaped areas including ‘gardens’ – production of vegetables and fruit cannot be discounted.

3.2 Preliminary Conceptual Site Model

The information summarised in the previous sections has been used to identify the likely contaminant sources, receptors and pathways present at the Site. The elements of the conceptual model built into Outline Conceptual Site Model Table 3-1, overleaf, has been used to consider the potential pollutant linkages (PPL), these appear to be:

Harm to Human Health

- PPL1** Residents / visitors exposed to Made Ground 1: weathered colliery spoil
- PPL2** Residents / visitors exposed to Made Ground 2: in vicinity of Buildings 1, 5 and 6
- PPL3** Residents / visitors exposed to Hazardous Building Materials
- PPL4** Residents / visitors exposed to contaminants from off-site - former vehicle breakers
- PPL5** Neighbours exposed to Made Ground 1: weathered colliery spoil
- PPL6** Neighbours exposed to Made Ground 2: in vicinity of Buildings 1, 5 and 6

Damage to Property

- PPL7** Buildings / Services exposed to Made Ground 1: weathered colliery spoil
- PPL8** Buildings / Services exposed to Made Ground 2: in vicinity of Buildings 1, 5 and 6
- PPL9** Buildings / Services exposed to Capped Shaft near Building 3
- PPL10** Buildings / Services exposed to Off Site Source 1 - Former vehicle breaking yard
- PPL11** Landscape Planting exposed to Made Ground 1: weathered colliery spoil
- PPL12** Landscape Planting exposed to Made Ground 2: in vicinity of Buildings 1, 5 and 6

⁴ April 2012 - publication of the latest Contaminated Land Statutory Guidance by Defra.

Pollution of Controlled Waters

PPL11 Controlled Waters exposed to Made Ground 1: weathered colliery spoil

PPL12 Controlled Waters exposed to Made Ground 2: in vicinity of Buildings 1, 5 and 6

PPL13 Controlled Waters exposed to Off Site Source 1 - Former vehicle breaking yard

Table 3-1 Conceptual Site Model

Source / AOC⁵	Conceptualisation
<p>Made Ground 1: weathered colliery spoil</p> <p><i>Spoil - heavy metals, arsenic, PAH and BTEX and acidic</i></p> <p><i>Spoil – combustible materials</i></p> <p><i>Spoil - physically unstable</i></p> <p><i>Soil Gas – hazardous gases inc. methane</i></p> <p><i>Spoil Leachate - iron hydroxide and sulphuric acid</i></p>	<p>A large part of the site's area is taken up with a colliery spoil heap. It is unclear but the heap, which hasn't been investigated, may contain naturally occurring contaminants (heavy metals, arsenic, PAH and BTEX⁶) and may be very acidic.</p> <p>Depending on its condition and thickness the spoil may also be unstable, a geotechnical constraint, and there may also be combustible materials and traces of hazardous gas.</p> <p>The lack of vegetation noted points to oxidation of iron pyrite (a cover could limit this). The oxidation of iron pyrite causes problems as the resulting compounds are iron, sulphates and hydrogen, which brings about low pH toxic soils, water contamination and heat. Only those plant species able to cope with ecological extremes can survive. Water courses and aquatic habitats can be affected by acidic waters, sometimes called acid mine drainage, that is identifiable by its yellow-orange depositions and sulphurous odour – due to the presence of iron hydroxide and sulphuric acid.</p>
<p>Made Ground 2: in vicinity of Buildings 1, 5 and 6 (the smithy)</p> <p><i>Soil - heavy metals, arsenic & PAH</i></p> <p><i>Soil – combustible materials</i></p> <p><i>Soil - physically unstable</i></p> <p><i>Soil Gas – hazardous gases inc. methane</i></p> <p><i>Soil Leachate - heavy metals, arsenic & PAH</i></p>	<p>Made Ground was encountered in all excavation locations. The uppermost metre of ground either comprised demolition materials or sand with fragments of clinker, ash, coal and occasionally brick. One could expect heavy metals, arsenic and PAH compounds. Sanctus found higher concentrations of arsenic around Buildings 1, 5 and 6 with higher concentrations towards 1m depth, PAH compounds were not significantly elevated.</p> <p>The made ground is 1.5 to over 3m thick, and little is known about its stability / strength.</p> <p>There is potential for hazardous gases, but work by Sanctus has shown it presents a low hazard.</p>
<p>Hazardous Building Materials</p> <p><i>Possible asbestos in cement boarding</i></p>	<p>The possible presence of asbestos in building materials simply means there is a potential source of asbestos on site.</p>
<p>Capped Shaft near Building 3</p> <p><i>Shaft – physical hazard</i></p>	<p>The shaft, which has been recently worked on by the Coal Authority, is a development constraint and presents a physical hazard.</p>
<p>Off Site - Former vehicle breaking yard</p> <p><i>Liquids - oils, acids and fuels</i></p>	<p>Anecdotal evidence has suggested that a small part of the Site has historically been impacted by contaminants crossing the boundary from the adjacent depot / end of life vehicle dismantlers (to the south of the yard area). SLR surmise these to be oils, acids and fuels.</p>

⁵ AOC – Area of Concern

⁶ PAH – polycyclic aromatic hydrocarbons. BTEX – benzene, toluene, ethylbenzene & xylene.

Receptor	Description
Future site users	Future residents and visitors to the site.
Neighbours	The site has residential properties to the immediate north and west (residential receptors), and a coach storage & service depot to the immediate south (commercial receptors). Beyond that is woodland and farmland.
Property (Buildings / Services)	Future new buildings onsite, new service corridors at shallow depth
Property (Flora / Fauna)	Crops will not be grown on Site. Landscape planting will be needed.
Groundwater	The Publow Member is classified as a Secondary A Aquifer. There are no potable or private groundwater abstractions within 500m of the Site.
Surface waters	A pond (c.15m by 15m) is present in the southeast of the Site. Salter's Brook is culverted adjacent to the southeastern Site Boundary. Salter's Brook flows towards the north and outside the culvert is classified as a Secondary River and a tributary of the River Chew.
Ecosystems	There are no ecologically designated sites within 2km of the Site. A Phase I Extended Habitat Survey is provided under separate cover.
Potential Pollutant Linkages by Receptor	Assessment
PPL1 Residents / visitors exposed to Made Ground 1: weathered colliery spoil	There are health risks associated with exposure to heavy metals, arsenic, PAH and BTEX which are potentially present in the spoil. There are various exposure pathways: dermal contact, ingestion and inhalation. Ingestion of fruits and vegetables grown within this part of the Site is also a potential exposure pathway, should 'gardens' be provided with the pitches.
PPL2 Residents / visitors exposed to Made Ground 2: in vicinity of Buildings 1, 5 and 6 (the smithy).	There are health risks associated with exposure to heavy metals, arsenic & PAH which are potentially present in the spoil. There are various exposure pathways: dermal contact, ingestion and inhalation.
PPL3 Residents / visitors exposed to Hazardous Building Materials	There are health risks associated with inhalation of asbestos fibres which can be released when cement boarding is broken.
PPL4 Residents / visitors exposed to contaminants from off -site - former vehicle breaking yard	There are health risks associated with exposure to oils, acids and fuels. There are various exposure pathways: dermal contact, ingestion and inhalation (of vapours).
PPL5 Neighbours exposed to Made Ground 1: weathered colliery spoil	There are health risks associated with exposure to heavy metals, arsenic, PAH and BTEX which are potentially present in the spoil. There are various exposure pathways: dermal contact, ingestion and inhalation.
PPL6 Neighbours exposed to Made Ground 2: in vicinity of Buildings 1, 5 and 6 (the smithy)	There are health risks associated with exposure to heavy metals, arsenic & PAH which are potentially present in the spoil. There are various exposure pathways: dermal contact, ingestion and inhalation.
PPL7 Buildings / Services exposed to Made Ground 1: weathered colliery spoil	There is the potential for damage from: <ul style="list-style-type: none"> • exposure to sulphates and acids. • combustible materials; • differential settlement of fill; and • hazardous / explosive gases inc. methane. The damage could come about via various pathways.
PPL8 Buildings / Services exposed to Made Ground 2: in vicinity of Buildings 1, 5 and 6 (the smithy)	Ditto

PPL9 Buildings / Services exposed to Capped Shaft near Building 3	There is the potential for damage from shaft collapse.
PPL10 Buildings / Services exposed to Off Site Source 1 - Former vehicle breaking yard	There is the potential for damage from exposure to oils, acids and fuel via various pathways.
PPL11 Landscape Planting exposed to Made Ground 1: weathered colliery spoil	There is the potential for damage from exposure to heavy metals and acidic conditions via plant uptake.
PPL12 Landscape Planting exposed to Made Ground 2: in vicinity of Buildings 1, 5 and 6 (the smithy)	There is the potential for damage from exposure to heavy metals via plant uptake.
PPL13 Controlled Waters exposed to Made Ground 1: weathered colliery spoil	There is a potential for pollution by iron hydroxide and sulphuric acid via various pathways.
PPL14 Controlled Waters exposed to Made Ground 2: in vicinity of Buildings 1, 5 and 6 (the smithy)	There is a potential for pollution by heavy metals, arsenic & PAH via various pathways.
PPL15 Controlled Waters exposed to Off Site Source 1 - Former vehicle breaking yard	There is a potential for pollution by oils, acids and fuels via various pathways.

3.3 Preliminary Risk Assessment

In the context of Part 2A inspection, a preliminary risk assessment must focus on whether the land meets the definition of Contaminated Land as laid out in the Environmental Protection Act 1990 (EPA 1990) and its statutory guidance. Within Part 2A of the EPA 1990, Contaminated Land is defined as:

“any land which appears to the local authority in whose area it is situated to be in such condition by reason of substances in, on or under the land, that:

-significant harm is being caused or there is a significant possibility of significant harm being caused; or

-significant pollution of Controlled Waters is being, or is likely to be, caused”.

When assessing the significance of the identified pollutant linkages against the definition of contaminated land one must also consider the information needed to complete the assessment to the required level of confidence. In this case, the types of uncertainties that affect the evaluation of the Site include, but may not be limited to:

- Lack of evidence to support suspected cases of harm;
- Lack of evidence to support suspected cases of pollution;
- Insufficient knowledge of any contaminant location and distribution;
- Insufficient characterisation of ground conditions;
- Insufficient knowledge of land use and exposure characteristics; and
- Insufficient information to validate pathways.

3.4 Potentially Unacceptable Risks

Having considered the above criteria including the uncertainties and gaps in the conceptual model, it is apparent that the Preliminary Land Quality Risk Assessment (using desk study information, a site inspection and some factual information from another consultant) has provided a reasonable level of confidence that the subject Site and immediate surrounds have got a history which includes potentially significant source of contaminants including made ground, colliery spoil, pollutants from an off-site source as well as physical constraints in the form of soft ground and a shaft. There is also the potential for asbestos to be present in building materials.

Further work is needed to establish the actually (rather than potential) chemical and physical composition of the spoil and made ground, to check for historic cross-boundary contamination from the vehicle breaking activity, check water pollution levels and determine outline foundation solutions.

Without further information including receipt of the detailed redevelopment proposal (including information relating to the presence or absence of landscaped areas and garden areas), the significance of the PPLs relating to risk to human health, property damage and pollution cannot be fully assessed.

4.0 SUMMARY AND CONCLUSIONS

The Site is broadly L-shaped and occupies an area of c.7.6ha. The Site can be divided in to two separate areas; the Old Colliery Buildings and yard area (c.0.6ha) and the Colliery Tip (c.7.0ha).

B&NES are considering the Site as a potential future gypsy and traveller site. The exact layout of the Site is currently unknown, but for the purpose of this assessment will comprise hard surfaced pitches, a surfaced roadway, a children's play area / recreational area, limited landscaping, 'garden' areas. an amenity building, a site office and a storage and maintenance area.

The Site was undeveloped until the early 1930s, when mapping indicates that Pensford Colliery was present. The Colliery included two mine shafts (one on Site), a number of works buildings, rail sidings / tramway and an associated spoil heap (in the north east of the Site). By 1956 mapping the spoil heap had extended to cover the south and south east of the Site. On 1960s mapping the Pensford Colliery was disused and the rail sidings, chimney and boiler plant were no longer present. By the early 1990s the site generally appeared in its current configuration.

Anecdotal evidence has suggested that the Site has historically been impacted by the activities at the adjacent Depot / end of life vehicle dismantlers adjacent to the south of the yard area.

This Preliminary Land Quality Risk Assessment (using desk study information, a site inspection and some factual information from another consultant) has provided a reasonable level of confidence that the subject Site and immediate surrounds have got a history which includes *potentially* significant source of contaminants including made ground, colliery spoil, pollutants from an off-site source as well as physical constraints in the form of soft ground and a shaft. There is also the potential for asbestos to be present in building materials.

Given the above, the following thirteen *potential* pollutant linkages *may* operate (depending on the form of built development which could easily break certain linkages):

Harm to Human Health

- PPL1** Residents / visitors exposed to Made Ground 1: weathered colliery spoil
- PPL2** Residents / visitors exposed to Made Ground 2: in vicinity of Buildings 1, 5 and 6
- PPL3** Residents / visitors exposed to Hazardous Building Materials
- PPL4** Residents / visitors exposed to contaminants from off-site - former vehicle breakers
- PPL5** Neighbours exposed to Made Ground 1: weathered colliery spoil
- PPL6** Neighbours exposed to Made Ground 2: in vicinity of Buildings 1, 5 and 6

Damage to Property

- PPL7** Buildings / Services exposed to Made Ground 1: weathered colliery spoil
- PPL8** Buildings / Services exposed to Made Ground 2: in vicinity of Buildings 1, 5 and 6
- PPL9** Buildings / Services exposed to Capped Shaft near Building 3
- PPL10** Buildings / Services exposed to Off Site Source 1 - Former vehicle breaking yard
- PPL11** Landscape Planting exposed to Made Ground 1: weathered colliery spoil
- PPL12** Landscape Planting exposed to Made Ground 2: in vicinity of Buildings 1, 5 and 6

Pollution of Controlled Waters

- PPL11** Controlled Waters exposed to Made Ground 1: weathered colliery spoil
- PPL12** Controlled Waters exposed to Made Ground 2: in vicinity of Buildings 1, 5 and 6
- PPL13** Controlled Waters exposed to Off Site Source 1 - Former vehicle breaking yard

The main risk driver is the potential for contaminants to exist within the Colliery Spoil which is present across a large area. The spoil, however, has not been subject to chemical analyses.

One small corner of the site, formed of made ground, has been subject to a ground investigation and risk assessment. That assessment incorrectly / prematurely recommends remedial work in SLR's opinion. SLR would want more information before setting out a remedial design or before suggesting the area is fit for residential use, but even now would comment that there is little evidence to support a remedial strategy for the whole of this corner area, and that the evidence points to far less remediation actually being justifiable.

Further work is needed to establish the chemical and physical composition of the spoil and made ground, to check for historic cross-boundary contamination from the vehicle breaking activity, check water pollution levels and determine outline foundation solutions.

Any future investigatory field work should be designed to enable a full assessment of the significance of the *potential* pollutant linkages relating to human health impacts, property damage and pollution. The exact form of the field work and assessment would depend on the development design (for example the presence or absence of landscaped areas and garden areas plays a role), but testing would likely comprise the combination of investigating near-surface soils (uppermost 0.8m) using hand-pits, investigating deeper soils and possibly groundwater using drilling techniques (which would also establish geotechnical properties to allow assessment of outline foundations solutions); and surface water sampling.

Predicting the outcome of a more detailed site-specific study, based on an improved knowledge of actual site conditions rather than professional opinions regarding *potential* conditions, is premature as conclusions with respect to the need for remedial action (let alone the extent, form and cost of remedial options) should be based on robust science as set out in guidance. That said SLR can, by making several assumptions, predict the most likely outcomes:

Potential Pollutant Linkage	Predictive Assessment	Predicted Outcome
PPL1 Residents / visitors exposed to Made Ground 1: weathered colliery spoil.	Exposure pathways are likely to be blocked or severely restricted by the form of the proposed development: the likely	PPL1, 2, 4, 5 & 6: expected to be of little significance due to anticipated form of development. No special remedial measures warranted to protect humans.
PPL2 Residents / visitors exposed to Made Ground 2: in vicinity of Buildings 1, 5 and 6 (the smithy).	- placement of extensive hard surfaces as roadways and development platforms;	
PPL4 Residents / visitors exposed to contaminants from off -site - former vehicle breaking yard.	- formation of limited areas of soft landscaped gardens (rather than private gardens which could be cropped); and	Remedial measures may be needed if the development allowed humans exposure to spoil / made ground or crops grown in those materials. Those measures could include hard or soft capping and provision of raised beds.
PPL5 Neighbours exposed to Made Ground 1: weathered colliery spoil.	- inclusion of vapour membranes within renovated buildings and passive ventilation beneath caravans.	
PPL6 Neighbours exposed to Made Ground 2: in vicinity of Buildings 1, 5 and 6 (the smithy).		

Potential Pollutant Linkage	Predictive Assessment	Predicted Outcome
<p>PPL3 Residents / visitors exposed to Hazardous Building Materials</p>	<p>Exposure pathways are likely to be blocked or severely restricted by standard asbestos management practises which aim to prevent release of asbestos fibres to air.</p>	<p>PPL3: expected to be of little significance due to anticipated standard management practises. No special remedial measures warranted to protect humans.</p>
<p>PPL7 Buildings / Services exposed to Made Ground 1: weathered colliery spoil.</p> <p>PPL8 Buildings / Services exposed to Made Ground 2: in vicinity of Buildings 1, 5 and 6 (the smithy).</p> <p>PPL10 Buildings / Services exposed to Off Site Source 1 - Former vehicle breaking yard.</p>	<p>If aggressive materials are present exposure pathways will need to be broken by remedial actions. Manufacturers of building products have developed materials which are resistant to chemical attack and prevent gas/vapour ingress for use on urban / brownfield sites. If conditions are aggressive / hazardous the solution will be to provide clean service corridors or use resistant materials. and to include vapour membranes within renovated buildings and passive ventilation beneath caravans.</p>	<p>PPL7 & 8: expected to be of medium significance with commonplace remedial actions warranted to protect buildings / services.</p>
<p>PPL9 Buildings / Services exposed to Capped Shaft near Building 3</p>	<p>The potential damage from shaft collapse should be avoided by the developments designers, with proposed structures avoiding that area.</p>	<p>PPL9: expected to be of little significance due to anticipated form of development. No special remedial measures warranted to protect buildings/services.</p>
<p>PPL11 Landscape Planting exposed to Made Ground 1: weathered colliery spoil.</p> <p>PPL12 Landscape Planting exposed to Made Ground 2: in vicinity of Buildings 1, 5 and 6 (the smithy).</p>	<p>If aggressive materials are present and landscape planting is required, exposure pathways will need to be broken by remedial actions. Typical actions include placement of a soil cap or improvement of the spoil / made ground with the addition of (manufactured) compost.</p>	<p>PPL11: expected to be of medium significance with commonplace remedial actions warranted to promote successful landscape planting (if landscape planting is in fact required).</p>
<p>PPL13 Controlled Waters exposed to Made Ground 1: weathered colliery spoil.</p> <p>PPL14 Controlled Waters exposed to Made Ground 2: in vicinity of Buildings 1, 5 and 6 (the smithy).</p> <p>PPL15 Controlled Waters exposed to Off Site Source 1 -Former vehicle breaking yard.</p>	<p>The condition of controlled waters is entirely uncertain. If pollutants are causing ongoing and significant damage some remedial action may be required by the EA.</p>	<p>PPL13 & 14: Outcome uncertain.</p>

The table above should be used with caution, but what seems clear is that the anticipated form of the development is likely to protect visitors and residents from ground based contaminants, and that common sense in development design should go some way to minimising hazards associated with the capped mine shafts. The risk from asbestos within building materials is expected to be of little significance due to anticipated standard management practises, and little is known of the chance for remedial works with respect to controlled waters. Beyond that, some commonplace remedial actions may be warranted to protect buildings / services and promote successful landscape planting (if landscape planting is in fact required).

Overall the abnormal costs of remedial works, i.e. cost of actions beyond standard development costs, are anticipated to be fairly low as long as the activities of future residents and visitors are restricted to (newly) hard surfaced areas and limited areas of soft landscaped gardens (rather than private gardens). In fact, the abnormal costs are likely to be a fraction of the development costs involved in renovating the former colliery buildings as amenity blocks and the construction of a permanent travellers site. That said, given the current level of knowledge and uncertainty B&NES Council should take the precautionary approach when carrying out cost / viability assessments and include an allowance against remediation. There is not a great deal of literature with respect to “ball park” remedial cost estimation but one source⁷ suggests an allowance of between £50k and £125k per hectare of contaminated land for on site treatments. B&NES’ allowance would, therefore, depend on the fraction of this 7.6ha site that is proposed for development. The unit rate quoted has been selected from many in the document and should be used as a benchmark, it should be noted that none of the rates in the guidance document allow for exceptional cases where off site treatment, landfilling or payment of landfill tax⁸ is required - cost estimates assuming off site disposal will almost certainly be higher and should, perhaps, be seen as worst-case.

It is beyond our brief, but SLR recommends that parties assessing the development potential of this site carefully consider the costs of constructing extensive hard surfaced pitches, a surfaced roadway, a children’s play area / recreational area, limited landscaping, an amenity building, a site office and a storage and maintenance area; and the costs of infrastructure improvements before considering advancement of the land quality assessment and estimation of remedial / abnormal costs. Infrastructure improvements may need to include: a suitable electrical connection (potentially a new substation), a suitable mains water connection, a foul water drainage system discharging to public sewer or on-site treatment plant with permitted surface water discharge, a sustainable surface water drainage system (perhaps including ponds) to handle the storm runoff from the extensive hard surfaced pitches and roadway, etc.

⁷ Best Practise Note 27 (revised February 2008) Contamination and Dereliction Remediation Costs, English Partnerships.

⁸ The standard higher rate is £64 per tonne from 1 April 2012 to 31 March 2013 and will increase to £72 per tonne on 1 April 2013 and £80 per tonne on 1 April 2014.

5.0 CLOSURE

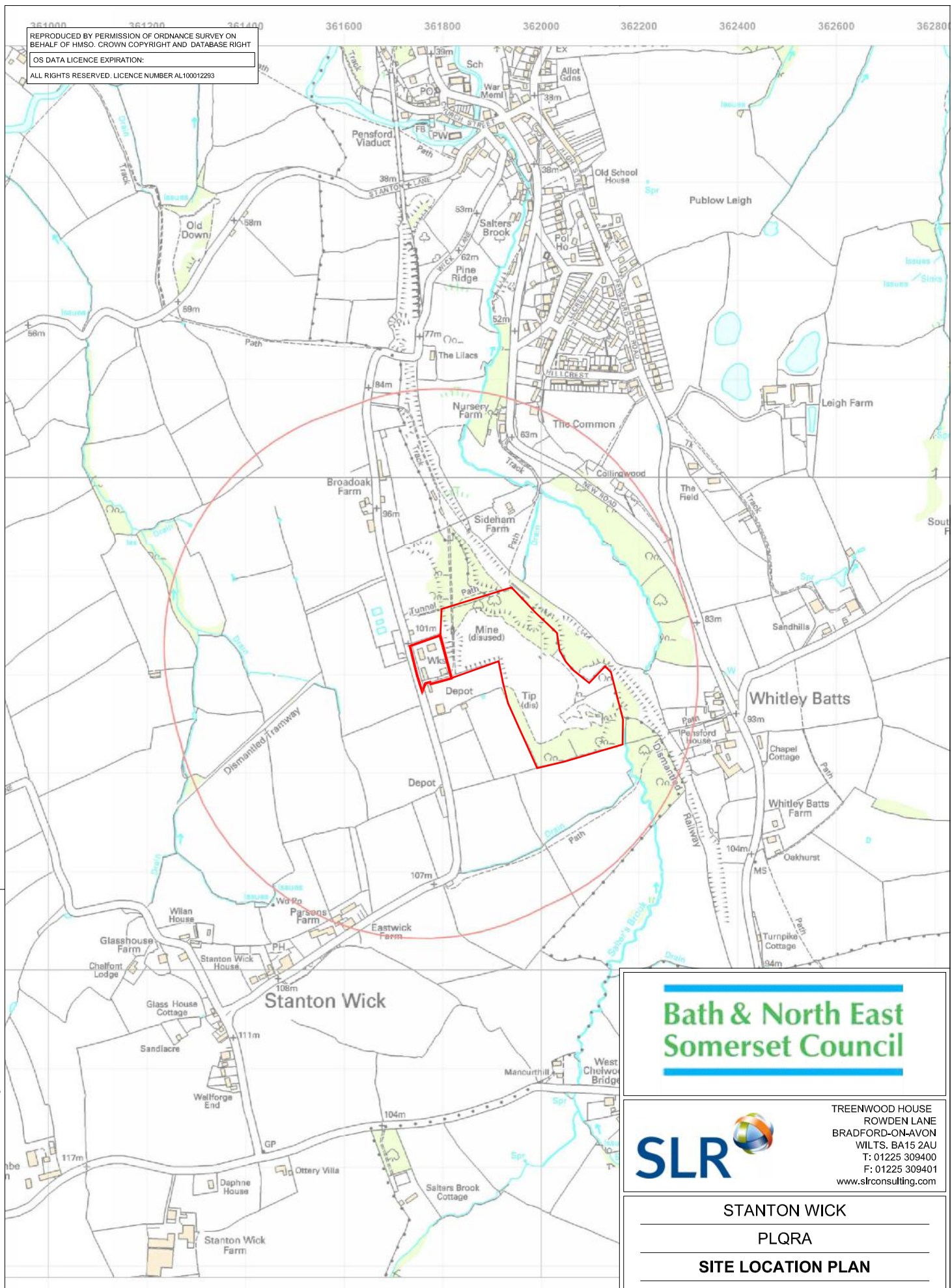
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SITE LOCATION PLAN

001

Scale 1:10000 @ A4

Date AUGUST 2012



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