

Lovell Partnerships

REMEDIATION STRATEGY

for

Miles Platting Area 7.5, Manchester

November 2022

REPORT No: 22LPL087/RS

- *Desk Studies and Site Walkovers*
- *Intrusive Contaminated Land Investigations*
- *Geotechnical Appraisals and Ground Investigations*
- *Landfill Gas Assessments and Remedial Design*
- *Remediation Design and Implementation*
- *Remediation Project Management and Supervision*
- *Site Abnormal Assessments (Foundations and contaminated land)*

GEOTECHNICAL - CONTAMINATED LAND - FLOOD RISK

DOCUMENT ISSUE RECORD

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1. INTRODUCTION

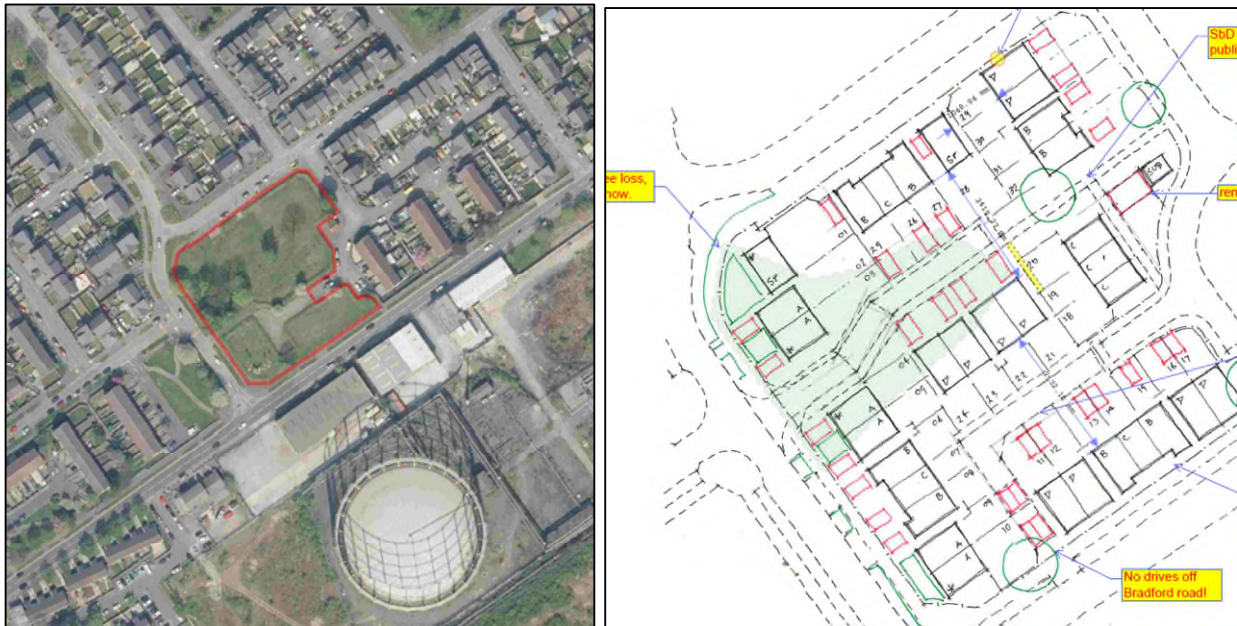
1.1 The Commission and Brief

Betts Geo (Betts) has been commissioned by Lovell Partnerships to prepare a Remediation Statement for the remediation and preparatory works of land at Miles Platting Area 7.5, Manchester.

Betts reserve the right to amend this Remedial Statement in the light of further information, such as site observations and unforeseen conditions.

1.2 Proposed Development

The proposed development at the time of issue comprises of the proposed construction of residential dwellings and associated gardens, public open spaces, new road and associated infrastructure. The site location and proposed site boundary can be seen below;



1.3 Previous Reporting

This Remediation Statement has been based upon the findings within the following previous reports;

- Desk Study and Ground Investigation Report for Miles Platting Area 7.5B, Manchester, May 2022 by Betts Geo – Report Number: 22LPL087/DSGI

2 BACKGROUND

The following sections have been summarised from the report referenced in Section 1.3.

2.1 Site Description

Site was visited on 22nd April 2022 and the following description outlines the main features identified onsite.

Site forms part of the wider parcel 7.5 and is roughly square in plan form and is currently utilised as public open space with short amenity grass and numerous trees. Sabden Close traverses the south portion of site from a spur from Stracey Street with connecting footpath to Varley Street, most of the length is blocked with bollards and sandstone blocks. Miles Platting development advertisement signs are located in the southwest corner of site with the majority of site enclosed by grassed earth bunds approx. 1m in height. A brick built electricity substation is located on the north-easter side of site with site levels being generally flat except for the enclosing bunds. Site is bounded to the South by Bradford Road, to the west by Varley Street, to the north by Sandal Street and to the east by Stracey Street and Sabden Close. The surrounding land uses are residential to the west, north and east with commercial/light industrial to the south with a gas holder frame beyond.

2.2 Surrounding Area

Surrounding land uses for the site are as follows:

- **North** – 0m - 200m N is residential housing, 300 m N is surface water (Rochdale Canal) running south west to north east, 300 - 500 m N is industrial area, 200 m N is Educational Facility
- **East** - 0m - 500m E is residential housing.
- **South** - Directly south is Bradford Road, 0 - 200 m south is a circular gas frame, 200 m S is Ashton Canal, 300 m S is River Medlock, 200 - 500 m SW is residential housing and industrial / commercial buildings
- **West** - 0m - 500m W is residential housing, directly W is an electrical substation.

2.3 Site History

The earliest available map of site is the 1848 1:10,560 map which shows site as vacant ground with Shooters Brook running through it from east to west. An extract of this map is shown overleaf:

1848 1:10,560 Map



No further major changes occur onsite until the 1891 1:500 map when the site is mainly covered by terrace housing and two roads. An extract of this map is shown below;

1891 1:500 Map



No further major changes occur onsite until the 1963-1968 1:1,250 map when there are less terrace houses on site and there is a building called Sandal Court in the northwest of site. An extract of this map is shown overleaf:

1963-1968 1:1,250 Map



No further major changes occur onsite until the 2003 1:1,250 map when Sandal Court is no longer present. An extract of this map is shown below;

2003 1:1,250 Map



No further major changes occur onsite until the 2022 1:10,000 map when all of site is shown as vacant. An extract of this map is shown overleaf:

2022:10,000 Map



No further major changes occur onsite to present.

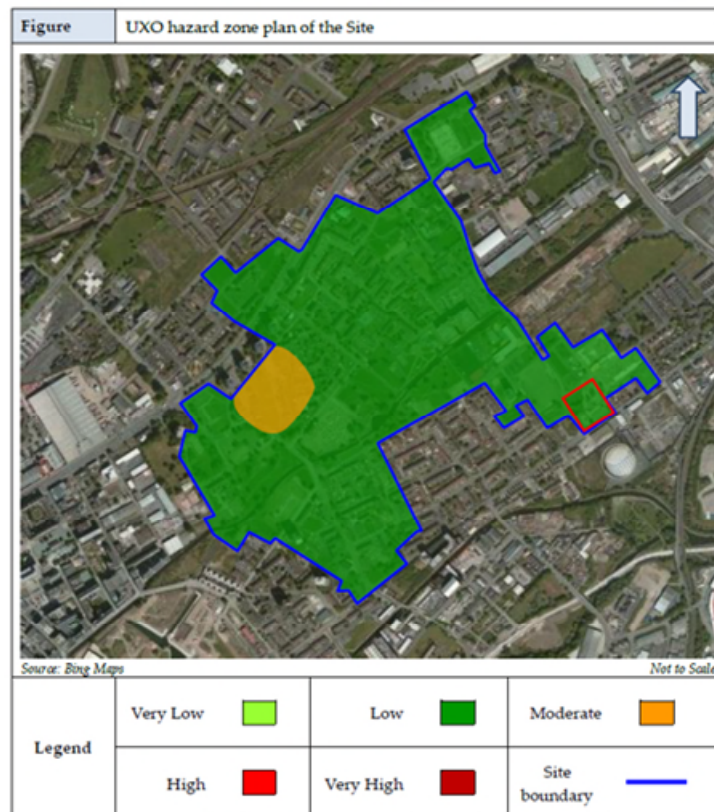
2.4 Surrounding Area

The following table below summarises the significant changes in historical uses surrounding the site:

Date First Shown	Land Uses
1848	200 – 500 m N, E and S – coal pits, no longer labelled by 1891 50 m SW – Brick Kiln and Brick Field, no longer labelled by 1891 300 m N – chemical works, no longer labelled by 1956 200 m SW – Quakens Brook 350 – 500 m SW – Reservoir, no longer present by 1891 250 m NW – Rope Walk, no longer present by 1891
1891	300 m N – canal later labelled as Rochdale Canal – still present today but labelled as disused by 1988 100 – 450 m SE – Gas Works, gas holder locations have moved by 1934 and there is only 2 by 1956, by 1988 the gas works buildings to the east of the viaduct is no longer present 250 m E – Brick Works, becomes a pit by 1906 250 m N – surface water features, no longer present by 1906 0 – 500 m N & W – residential housing 250 m SE – railway line / viaduct
1906	200 m SW – Raising Works, no longer present by 1923 200 m N – school, still present today 0 – 250 m E – residential housing, expands to 500 m by 1923
1923	300 m NW – Woollen Mill and Victoria Mills, labelled as warehouse by 1985
1923 - present	No other significant changes

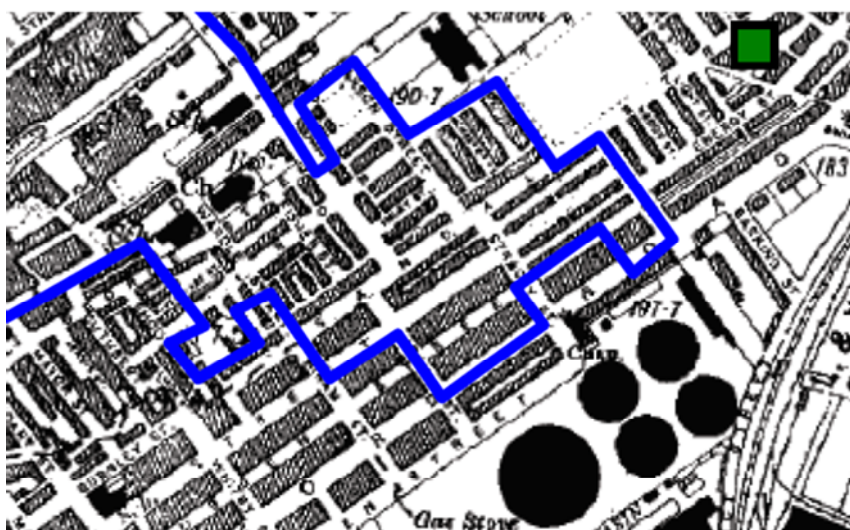
3 UNEXPLODED ORDNANCE (UXO)

Zetica Ltd were commissioned by Betts Geo Environmental to carry out a SiteSafe Unexploded Ordnance (UXO) Desk Study for an area of approximately 50.3 hectares (ha) which represented the wider Miles Platting development area.



As can be seen on the above, the Miles Platting Area 7.5B site is located within a 'Low Risk' area.

The mapping below indicates areas where bomb strikes have been recorded around the site. With the site being industrial/residential, any strikes/damage are more likely to have been recorded. It should be noted that two HE bomb strikes have been identified in close proximity to the site.



It is considered prudent to ensure that all staff have an awareness of the UXO hazard through the Site induction process and toolbox talks. This will ensure that appropriate action is taken in the event that a suspected item is uncovered.

The full report should be consulted, this is available in Appendix C within the Desk Study Report.

4 Geology

The following section details the published and available geological data available for the site and the surrounding area. All data is taken from the Groundsure report located in the Betts Geo Desk Study. This report should be referred to for full details.

4.1 Published Geology

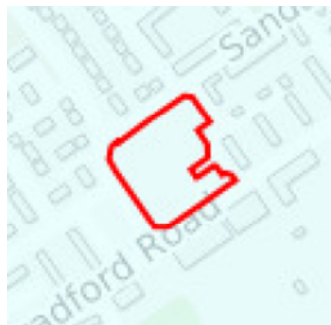
The documented geology of the site is summarised on the British Geological Survey map principally, with further site-specific details detailed below.

Geology	Artificial Ground & Land Slip	Drift	Solid
1:10,000	None Recorded*	Till, Devensian - Diamicton	99% of Site – Pennine Upper Coal Measure Formation – Mudstone, Siltstone & Sandstone , South west corner – Openshaw Sandstone – sandstone

*Due to the site's development history the presence of artificial ground cannot be discounted despite none being recorded.

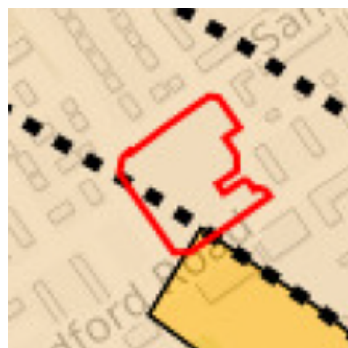
Superficial Geology

ID	Location	LEX Code	Description	Rock description
1	On site	TILLD-DMTN	Till, Devensian - Diamicton	Diamicton



Bedrock Geology

ID	Location	LEX Code	Description	Rock age
1	On site	PUCM-MDSS	Pennine Upper Coal Measures Formation - Mudstone, Siltstone And Sandstone	Westphalian D Sub-age - Bolsovian Sub-age
3	On site	OPS-SDST	Openshaw Sandstone - Sandstone	Bolsovian Sub-age



4.2 Linear Features

There is one (1 No.) recorded linear feature for on site and comprises a coal seam (dotted black line above). There are a further 2 No. coal seams within 250 m of site which are 41 m NE and 187 m NE.

4.3 Historical Borehole Records

There are 4 No. records of historic records on site, all of the logs are confidential.

4.4 Geological Features

Several ground workings have been noted on and within 250 m of site, further details are provided in the sections below.

BritPits

There is one record of BritPits within 250 m of site, an extract is provided below:

ID	Location	Details	Description
A	140m S	Name: Glenden Hall Brick Field Address: Miles Platting, MANCHESTER, Lancashire Commodity: Clay & Shale Status: Ceased	Type: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority

Surface Ground Workings

There are 34 No. records of surface workings within 250 m of site. An extract of the surface workings within 150 m can be found below:

ID	Location	Land Use	Year of mapping	Mapping scale
A	56m SE	Brick Field	1851	1:10560
1	59m S	Brick Kilns	1851	1:10560
B	86m E	Unspecified Pit	1938	1:10560
B	86m E	Unspecified Pit	1933	1:10560
A	129m S	Pond	1851	1:10560
B	129m SE	Unspecified Pit	1938	1:10560
B	129m SE	Unspecified Pit	1933	1:10560
C	136m NE	Brick Works	1891	1:10560
2	149m NE	Coal Pits	1851	1:10560

The workings form 150 – 250 m can be found in the Groundsure Report.

Non-coal mining

There was one record for non-coal mining within 250 m of site. An extract is provided below:

ID	Location	Name	Commodity	Class	Likelihood
6	246m SW	Not available	Vein Mineral	A	Sporadic underground mining of restricted extent may have occurred. Potential for difficult ground conditions are unlikely and localised and are at a level where they need not be considered

4.5 Coal Mining

The site falls within the coal mining reporting area therefore a full Consultants Coal Mining Report was gained from The Coal Authority. Extract of main findings below, the full report can be seen in the Betts Geo Desk Study.

Past underground mining

Colliery	Seam	Mineral	Coal Authority reference	Depth (m)	Direction to working	Dipping rate of seam worked (degrees)	Dipped direction of seam worked	Extraction thickness (cm)	Year last mined
unnamed	BRADFORD THREE QUARTERS	Coal	35DB	39	Beneath Property	18.3	South West	120	1900
unnamed	YARD	Coal	35CQ	106	North-East	18.4	South-West	100	1900
unnamed	BRADFORD FOUR FEET	Coal	35CS	117	South	18.4	South-West	120	1760
unnamed	BRADFORD FOUR FEET	Coal	35CU	118	Beneath Property	18.4	South-West	120	1900
unnamed	PARKER	Coal	35BL	349	North-East	18.0	South-West	80	1935
unnamed	PARKER	Coal	35BQ	541	Beneath Property	22.5	South	80	1935
unnamed	PARKER	Coal	35BP	542	South-East	18.0	South-West	80	1935
unnamed	PARKER	Coal	35BO	561	South	18.0	South-West	80	1935
unnamed	ROGER	Coal	35AY	662	North-East	16.1	South-West	180	1961
unnamed	CROMBOUK E	Coal	359J	674	East	16.0	South-West	120	1933
unnamed	ROGER	Coal	35AT	692	East	16.9	South-West	170	1956
unnamed	ROGER	Coal	35AU	713	East	18.7	South-West	170	1956
unnamed	CROMBOUK E	Coal	359H	733	East	17.4	South-West	120	1913
unnamed	ROGER	Coal	35AV	785	East	19.4	South-West	170	1956
unnamed	ROGER	Coal	35B2	800	North-West	21.6	South	180	1965
unnamed	CROMBOUK E	Coal	359F	819	Beneath Property	21.0	South-West	120	1924
unnamed	ROGER	Coal	35AZ	836	Beneath Property	20.8	South-West	180	1957
unnamed	CROMBOUK E	Coal	359E	836	Beneath Property	16.5	South-West	120	1932
unnamed	ROGER	Coal	35B0	894	South-West	19.0	South-West	180	1961
unnamed	ROGER	Coal	35B1	967	South-East	17.5	South-West	180	1958

Probable unrecorded shallow workings

Yes.

Spine roadways at shallow depth

No spine roadway recorded at shallow depth.

Mine entries

Entry type	Reference	Grid reference	Treatment description	Mineral	Conveyancing details
Shaft	386399-014	386359 399047		Coal	

Abandoned mine plan catalogue numbers

The following abandoned mine plan catalogue numbers intersect with some, or all, of the enquiry boundary:

11471	NW643	NW1171
NW1172	0	NW1170
NW437	NW645	PO0

Our records show we have more plans than those shown above which could affect the enquiry boundary.

Please contact us on 0345 762 6848 to determine the exact abandoned mine plans you require based on your needs.

Outcrops

Seam name	Mineral	Seam workable	Distance to outcrop (m)	Direction to outcrop	Bearing of outcrop
OPENSHAW	Coal	Yes	Within	N/A	120

Geological faults, fissures and breaklines

No faults, fissures or breaklines recorded.

Opencast mines

None recorded within 500 metres of the enquiry boundary.

Coal Authority managed tips

None recorded within 500 metres of the enquiry boundary.

Please refer to the 'Summary of findings' map (on separate sheet) for details of any activity within the area of the site boundary.

Site investigations

Distance to site investigation (m)	Direction
47.6	East
10.1	North East
10.5	West
10.4	North

See Section 4 for further information.

Remediated sites

None recorded within 50 metres of the enquiry boundary.

Coal mining subsidence

The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres of the enquiry boundary, since 31 October 1994.

There is no current Stop Notice delaying the start of remedial works or repairs to the property.

The Coal Authority is not aware of any request having been made to carry out preventive works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.

Mine gas

None recorded within 500 metres of the enquiry boundary.

Mine water treatment schemes

None recorded within 500 metres of the enquiry boundary.

Future underground mining

None recorded.

Coal mining licensing

None recorded within 200 metres of the enquiry boundary.

Court orders

None recorded.

Section 46 notices

No notices have been given, under section 46 of the Coal Mining Subsidence Act 1991, stating that the land is at risk of subsidence.

Withdrawal of support notices

The property is in an area where a notice to withdraw support was given in 1955.

The property is not in an area where a notice has been given under section 41 of the Coal Industry Act 1994, cancelling the entitlement to withdraw support.

Payments to owners of former copyhold land

The property is not in an area where a relevant notice has been published under the Coal Industry Act 1975/Coal Industry Act 1994.

In summary the Coal Authority Report shows there is an outcrop on site and that shallow ground workings are probable and there is a mine shaft.

Capita Symonds Structures (Capita) carried out coal investigations across the adjacent Miles Platting parcels (7.4 and 7.5A). The report which discusses the investigation is as follows:

- Capita Symonds Structures, Drilling and Grouting Completion Report, Cells 7.4 and 7.5A, Miles Platting, 22nd December 2010, Report ref: SS/015587
- Pages 14 – 21 of Capita Symonds Structures, Phase II Geo-environmental Investigation and Assessment, Cells 7.4 and 7.5A, Miles Platting, March 2008, Report ref: SS/015587-7.4&7.5a-P1GEIA

An extract summarising each of the reports is provided below:

- 9.3.1 Evidence of mine workings, believed to be of the Charlotte Mine coal seam, was encountered beneath the southwestern sections of both sites.
- 9.3.2 From the data obtained, there is not indicated to be sufficient rock cover above the coal seams/areas of broken ground for mining-related collapses to "choke" before reaching the drift/rock interface. Therefore, in order to prevent future problems of mining-related subsidence/ground movements, treatment of these mine workings is recommended prior to re-development, to consist of consolidation drilling and grouting at both sites.
- 9.3.3 Drilling and grouting would need to be undertaken on a grid basis, with suitable spacing between grout holes (3-6m?), which would probably need to extend to depths in the order of 30m b.g.l. This treatment would be required southwest of the subcrop of the Charlotte Mine, but may not be required to northeast of it as the next named seam is the Bradford

Three-Quarters Mine coal seam (reported seam thickness 0.50m) some 40m+ below the Charlotte Mine. Given the expected depth and thickness of the Bradford Three-Quarters Mine coal seam, there is considered to be sufficient rock cover to prevent a risk of significant subsidence at the surface in the event of collapse of associated mine workings.

- 9.3.4 Therefore, the treatment programme would need to include some "exploratory" work to determine where the Charlotte Mine coal seam subcrops, and if there is a need for any such treatment to the NE of this sub-crop. Furthermore, angled drilling may be needed along parts of the site boundaries, to enable treatment for a suitable easement beyond the site boundaries. This may require permission from affected adjacent land-owners. The Coal Authority requires that permission is obtained for the treatment of mine workings/mine shafts.
- 9.3.5 In addition to the mine workings, the Coal Authority has indicated the existence of a mine shaft (reference "008" on plan in the Mining Report, included in Appendix B), located about 11-12m beyond the boundary of Site 7.5a (back of footpath adjoining Saxon Street). The location indicated on the Mining Report plan is stated to be "approximate", and there could be other mine entries. Therefore, a section of Site 7.5a in the vicinity of the indicated mine shaft needs to be investigated to determine if it is located on the site.
- 9.3.6 The mine shaft investigation would consist of the formation of rotary drillholes on a grid basis, to cover an area of about 3.5m by 30m, at 1.5m centres (presumed three rows with 21 holes in each row), along the northeastern section of Site 7.5a nearest to the indicated location of the mine shaft. As rockhead is indicated to be at depths of 18-20m b.g.l., such drillholes would need to extend to depths of about 21m (i.e. 2-3m below rockhead).
- 9.3.7 If the mine shaft is found to exist at the site, it would need to be suitably investigated to determine its depth, diameter and nature of infill, and then treated and capped prior to redevelopment of the affected area of the site.

Drilling and Grouting Completion Report

- 5.4 MINESHAFT INVESTIGATION
- 5.4.1 All 63 drillholes encountered the drift-rock interface at a consistent depth (about 13m bgl). On this basis, there is no evidence that the mine entry is located within the subject site area.
- 5.4.2 Therefore, as the mine entry is indicated to lie outside of the subject site, no further action is to be taken to locate/treat it, to provide protection to development at the subject site.
- 5.4.3 It would be the responsibility of the Coal Authority to remediate the former coal mine entry, if it were to collapse/subside at some stage in the future.

5.5 DRILLING AND GROUTING

- 5.5.1 A grid of some 177 drillholes was formed across the site for the investigation/treatment of workings within the Charlotte Mine coal seam. Within this grid, the drift-rock interface was typically encountered at depths of 19-21m bgl. Within the Westphalian strata, one or locally two horizons of coal/workings were encountered; these are conjectured to represent the Charlotte Mine coal seam. Above both horizons of coal/workings, the overlying roof strata comprised mudstone and/or siltstone (but with little/no recorded sandstone horizons).
- 5.5.2 Evidence of coal extraction was encountered in parts (soft ground or similar) but no voids, flush loss, or substantial thicknesses of broken ground were encountered/recorded during drillhole formation.
- 5.5.3 The apparent absence of open voids/open workings associated with the Charlotte Mine seam beneath the site was confirmed by the lack of substantial grout takes, during the grouting operations; not one hole was found to have grout takes in excess of 0.125 tonnes, roughly equivalent to each drillhole's volume.
- 5.5.4 Grout sample tests have confirmed the injected grout to have reached the required minimum strength.

5.6 CONCLUSIONS

- 5.6.1 The works undertaken have confirmed that the Charlotte Mine coal seam has been mined beneath the site, but there is no evidence of residual voids or open workings, and grout takes have been very low. This has essentially confirmed the lack of substantial residual mining voids, and the activities will have stabilised/consolidated the site further, with the result that risk of shallow-mining related subsidence upon the proposed development can be discounted.
- 5.6.2 The investigation works have not identified/encountered the recorded mine entry within the subject site area. Therefore, as it is indicated to lie outside of the subject site, no further action is to be taken to locate/treat it, to protect the proposed redevelopment.

A report has previously been produced by Betts Geo for an adjacent site at Varley Street, Miles Platting. The report reference is provided below:

- Betts Geo, Ground Investigation Report, Area 7 – Varley Street, Miles Platting, December 2013, Report No. 13LPL017/GI

38 boreholes were drilled to a maximum depth of 30m across the site (see annotated sketch provided by Van Elle.

Drilling records were maintained throughout the process and in summary comprised:

- Overburden comprising of firm to stiff clays with sand and gravel bands to depths of up to 22m
- No Solid Coal or workings were encountered in any of the boreholes
- No broken ground or voids were encountered

As such it was considered that the site is at a negligible risk from shallow coal mining and no precautionary measures are required.

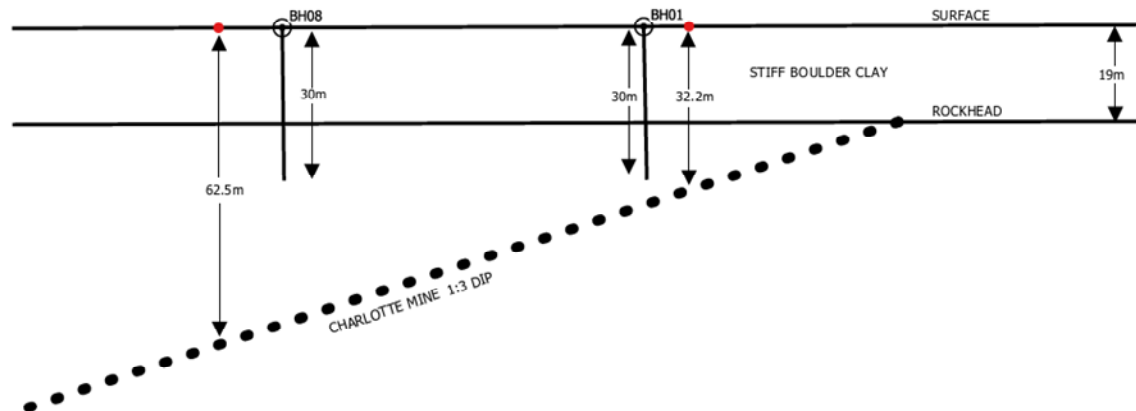
Van Elle produced the following documents in which the below extract has been taken from:

- Ref Van Elle Job no 134810 Factual Report: Varley Street, Manchester 28.2.2014
- Ref Van Elle Drilling / Grout Logs dated 7th and 20th of January 2014

An extract of the exploratory hole location plan has been provided below. The drawing shows details of the areas previously drilled and grouted as per the Capita reports above. The Miles Platting Area 7.5B is outlined on the drawing extract.



The Charlotte Mine seam is relatively thin at 600mm thick according to published geological information and is recorded to dip to the south west at an angle of 16-18 degrees, as such getting deeper beneath the site from east to west.



All of the previous reports from adjacent sites (up dip / shallower anticipated coal) have been investigated extensively by a significant amount of closely spaced boreholes with grout takes purely being filling the hole annulus (no evidence of workings or voids).

Boreholes drilling adjacent to the northern boundary (NKC BH1 and BH8 as part of the Betts Varley Street report) showed stiff clay from 9.5-12.5m a stiff clay to rockhead at 20.5 and 22m begl and continued to prove rockhead to a depth of 30m. In these holes no coal or evidence of workings was identified.

Given the depth of stiff clay overburden, depth of rock and lack of any workings despite the extensive work undertaken the risk from coal workings on site is deemed to be low.

Anticipated coal seam is interpolated to be between 32m and 62.5m beneath the site.

Unless excessive pile lengths are anticipated no additional work is required. Piling contractors should be made aware of this and pile design adjusted accordingly.

5 GROUND INVESTIGATION SUMMARY

5.1 Fieldwork Scope

The fieldwork was carried out on the 22nd April 2022 and comprised the following:

- 11 No. window samples which were only excavated as hand dug pits to depths of between 0.15 and 0.8 m bgl due to the presence of obstructions and services
- 8 No. shallow hand pits on the grassed enclosure bunds around the perimeter of the site
- Chemical analysis (Metals, PAH's, asbestos and TPH's) of 14 No. samples (8 No. samples from the bunds and 6 No. samples from the window samples).

Further investigation was undertaken on 16th to 18th May 2022 and comprised the following:

- 3 No. cable percussive boreholes extending to between 5.0mbgl (CP1 & CP2) and 15mbgl (CP3).
- Chemical analysis (Metals, PAH's, asbestos and TPH's) of 6 No. samples.
- Geotechnical analyses (Atterberg, pH and 2:1 sulphate) of 6 No. samples.

A vast number of services are present on-site and the exploratory hole positions were located to avoid any known services. Prior to any intrusive works, each location was checked for services using a cable avoidance tool (CAT) and review of statutory service plans. The CAT checks showed potential services in a lot of the locations.

There was also a lot of concrete obstructions or very dense demolition rubble which meant that the window sample holes could not progress past hand pit depth.

Further investigation will be required in order to get sufficient coverage across the site.

5.2 Ground Conditions Summary

Ground conditions typically comprised of topsoil containing anthropogenic materials underlain by Made Ground overlying Glacial Till. The Made Ground is generally described as granular sands and gravels with some clayey and silty properties and the sands / gravels were noted to be of tarmac, brick, limestone, sandstone and concrete encountered to a maximum depth of 1.7mbgl. Glacial Till was encountered within all cable percussive boreholes generally described as firm brown mottled blue grey slightly sandy CLAY to a maximum depth of 3.5mbgl overlying stiff brown slightly sandy slightly gravelly CLAY becoming very stiff to hard below 10.5m proven to 15mbgl. There were a larger number of obstructions noted during the works.

Logs for the bunds have not been provided however, the material was generally described as a topsoil containing gravel of limestone, brick and concrete. The topsoil was thought to have been imported.

5.3 Visual and Olfactory Contamination

No visual and/or olfactory evidence of contamination, other than the Made Ground identified above.

5.4 Contamination of Soils

Topsoil

The bund around the site was sampled as topsoil and the sample from WS5A was also topsoil. The screening of these results against the AtRisk2017 values for residential with home grown produce shows that there are exceedances for lead and benzo(a)pyrene (BaP). The exceedances have been listed below:

- Lead (200 mg/kg): Bund sample 1 (240 mg/kg) and Bund sample 7 (518 mg/kg)
- BaP (1.51 / 2.05 mg/kg): Bund sample 4 (2.47mg/kg) and Bund sample 7 (2.56 mg/kg)

The exceedances for BaP were against the relevant thresholds for 6% Soil Organic Matter (SOM). When compared to the C4SL value of 4.95 mg/kg there are no exceedances.

Made Ground

There are exceedances for the samples of Made Ground when screening of these results against the AtRisk2017 values for residential with home grown produce. The following exceedances were noted:

- Lead (200 mg/kg): WS2 (201 mg/kg) and WS3B (388 mg/kg)
- Arsenic (32 mg/kg): WS3B (47 mg/kg)
- BaP (1.51 / 2.05 mg/kg): WS3A (2.85 mg/kg)

The exceedances for BaP were against the relevant thresholds for 1% / 6% Soil Organic Matter (SOM). When compared to the C4SL value of 4.95 mg/kg there are no exceedances.

The arsenic C4SL value is 37 mg/kg however, the result from WS3B is still above this value.

No asbestos was noted in any of the samples.

Further risk assessment is therefore required for this determinant

Natural Strata

No exceedances were identified for the determinants tested for in any of the samples taken from natural strata.

5.5 Assessment of Soil Contamination Analytical Results

Soils

There are exceedances for lead, arsenic and BaP within some of the samples from the topsoil / Made Ground and the Made Ground samples.

The lead exceedance for WS2 can be discounted as it is only a very minor exceedance of 1 mg/kg. There are also no exceedances for BaP when comparing the values to the C4SL thresholds.

The exceedances which cannot be discounted are at bund sample 1, bund sample 7 and WS3B for lead and arsenic.

If site levels allow this material is to remain in place, a 600mm cover system will be required across site. This requirement may be removed if the soil is removed. Betts are not aware at the time of reporting whether the bunds will remain on site. Due to the presence of anthropogenic materials within the bund and the exceedances mentioned above, the material would not be suitable for re-use on site as topsoil.

Groundwater and Aquifer Risk

No groundwater was encountered during the fieldwork or was minimal on follow-on monitoring therefore the risk to groundwater is deemed to be negligible and the presence of cohesive glacial till deposits will limit lateral and vertical contaminant spread.

5.6 Ground Gas Assessment

5.6.1 Summary

Six out of six (6/6) ground gas visits have been completed and the final details are summarised below.

Borehole Number	Peak Methane (%)	Peak Carbon Dioxide (%)	Lowest Oxygen (%)	Atmospheric Pressure Low (mB)	Peak Flow (l/hr)	Other gasses	MAX GSV CH ₄	MAX GSV CO ₂	No. of Visits
CP1	0.50	0.50	20.10	997 - 1019	0.1	1 CO	0.0005	0.0005	6
CP2	0.40	0.20	20.40	997 - 1019	0.1	1 CO	0.0004	0.0002	6
CP3	0.40	1.50	19.20	997 - 1019	0.2	2 CO	0.0008	0.0030	6

5.6.2 Gas Recommendations

No significant ground gas has been encountered on any of the six monitoring visits.

The recommended ground gas protection measures are therefore given below;

Site Area	Site Classification	Recommended Ground Gas Protection Measures
Whole of Site	Green / CS1	No specialist ground gas protection measures required.

6 PROPOSED REMEDIAL ACTIONS

6.1 Soil Contamination – Clean and Inert Capping

Given the lateral spread and depth of the contamination there is a requirement to install a 600mm clean and inert capping across site. The capping should comprise a minimum of 150mm of clean and inert subsoil, and a minimum of 450mm clean and inert free draining subsoil. No coarse granular materials should be present within the growing medium as per NHBC guidance.

6.2 Ground Gas Protection Measures

No significant ground gas has been encountered on any of the six monitoring visits therefore the site has been classed as Green/CS1 – no specialist ground gas protection measures required.

6.3 Groundwater and Aquifer Risk

No significant risks to groundwater as discussed in Section 5.5 above.

6.4 Imported Soils

Imported topsoil will likely be required on site. Imported topsoil being brought to site should be tested for contamination to ensure it is suitable for the proposed use, and it is generally advisable to test a minimum of three samples, or one sample per 150m³ for topsoil from a greenfield source or one sample per 50m³ for topsoil from a brownfield source so that a representative mean value can be calculated.

Imported subsoil is less likely to be needed however, any imported subsoil being brought to site should be tested for contamination to ensure that it is suitable for the proposed use, and it is generally advisable to test a minimum of three samples, or one sample per 250m³ for subsoil from a greenfield source or one sample per 100m³ for subsoil so that a representative mean value can be calculated.

6.5 Construction/Maintenance Workers

In order to reduce potential risks associated with the determinants encountered on site, the following recommendations should be adhered to during site works:

- Any proposed imported soils should be tested for contamination to ensure that they are suitable for the proposed end use as per Section 6.4 above.
- Site workers should wear gloves, boots and overalls and wash their hands before eating, drinking and smoking. Excessive dust generation should be avoided. The site manager will inspect the risk assessments of the contractors on site/inspect on a regular basis to make sure this is upheld as per HSE/CDM guidance.
- Despite no asbestos being identified during the site investigation vigilance should be adhered, and if any suspected asbestos is encountered, a suitably qualified person should be notified.
- It is recommended that during all excavations adequate ventilation should be maintained. If man entry is required, gas monitoring should be carried out as a precaution.
- Given the existence of Made Ground on site it would be prudent to maintain vigilance during site clearance and construction, in case any areas of suspected contamination are encountered.

- If areas of suspected contamination are found then a suitably qualified person should undertake appropriate sampling, testing and further risk assessment.

6.5.1 Drinking Water Supplies

A United Utilities pipeline risk assessment has been undertaken and concluded that PE Barrier Pipe Type A is required across site as the intrusive investigation identified concentrations above the PE threshold in both the bund area and four of the window sample holes. These elevations were identified above pipeline depth however sampling was not undertaken in these areas at pipeline depth.

Further sampling could be undertaken at proposed pipeline depth once the pipeline route is confirmed to see if the need for PE Barrier Pipe Type A can be reduced to PE.

6.6 Review of Conceptual Site Model

Target (Receptor)	Potential Source-Pathway Linkage	Remedial Action Required (where appropriate)	Est. Degree of Risk to Target Following Remedial Action Where Necessary
Site End Users	Inhalation of soil gases, odours or dust.	No ground gas protection required.	Low
Site End Users	Ingestion of, and skin contact with, contaminated soil.	Lead and arsenic encountered during SI works, 600mm cover system across the site due to extensive made ground.	Low
Site End Users	Ingestion of contaminants in vegetables etc. or in soils adhering to vegetables, etc	Lead and arsenic encountered during SI works, 600mm cover system across the site due to extensive made ground.	Low
Construction/ Maintenance Workers	Inhalation of soil gases, odours or dust.	PPE and appropriate handwashing facilities to be provided to ground workers. Toolbox talks and watching brief for any unforeseen contamination may be required.	Low (assumed basic PPE is used)
Construction/ Maintenance Workers	Ingestion of, and skin contact with, contaminated soil	PPE and appropriate handwashing facilities to be provided to ground workers. Toolbox talks and watching brief for any unforeseen contamination may be required.	Low (assumed basic PPE is used)
Plants	Adverse effects on growth caused by presence of phytotoxic contaminants in soil	Lead and arsenic encountered during SI works, 600mm cover system across the site due to extensive made ground.	Low
Buildings and Structures	Flow of ground gas into buildings. Asphyxiation, toxicity, explosion and fire hazards	No ground gas protection required.	N/A
Foundations	Sulphate attack of foundations	Foundations to be designed as per section 17.4.	Low
Water Supplies	Hydrocarbons penetrating plastic water supply pipes.	United Utilities pipeline risk assessment undertaken. Barrier Pipe Type A required.	Low
Groundwater	Migration of soluble contaminants into groundwater on or off site	Groundwater testing is recommended if significant contamination and there is shallow groundwater present on site.	Low
Surface Water	Migration of soluble contaminants and/or direct run-off of contaminants	Risk is anticipated to be lowered due to cohesive superficial deposits across site. Groundwater testing recommended in boreholes if significant contamination encountered and shallow groundwater.	Low

7 REMEDIATION STATEMENT

7.1 Aims

Remediation aims are:

- Remove/treat contamination issues in order to protect human health and potential environmental receptors, and render the site suitable for the proposed development.
- Satisfy planning requirements of the Local Planning Authority.
- Satisfy Environmental Protection Act 1990 Part IIa requirements of the Environment Agency.

7.2 Remediation Scope

The following remedial works are required:

- General site clearance of surface materials and vegetation.
- Excavation of former concrete/demolition rubble and removal of below ground obstructions.
- Break-up areas of hardstanding.
- Crushing of all suitable uncontaminated artificial hard material (i.e. concrete/brick etc) for re-use on site/disposal.
- Re-grade of site to specified levels.
- Installation of 600mm clean cover system.

7.3 Remedial Methodology

7.3.1 Site Set-up, Organisation and Safety

Site works will be supervised throughout by a suitably qualified Engineer, who will report to the Project Manager. Consultancy supervision may be part-time for certain activities but must be full-time during the removal of any grossly contaminated soil \ fill and any placement of fill to an engineering specification.

Site cabins and welfare facilities are to be established at a location to be agreed with the Engineer/Site Manager. All welfare facilities must be established in accordance with the relevant health & safety statutory requirements. Provision shall be provided on site for car parking for all site employees.

All site personnel will undergo a site-specific health and safety induction prior to commencement of work on site.

The Engineer/Site Manager will be informed prior to any proposed entry of a confined space or deep excavation. Entry must be restricted to suitably qualified and equipped personnel.

Works will be carried out with proper regard to current statutory requirements.

During the remediation works, all personnel on site will comply with guidance provided in the Health and Safety Executive (HSE) document "Protection of Workers and the General Public during the Redevelopment of Contaminated Land". In summary, the following shall be provided:

- Protective clothing, footwear and gloves (Personnel should be instructed in why and how they are to be used).

- Hand-washing and boot-washing facilities.
- Smoking shall be limited to designated areas.

If at any time during the works, personnel begin to feel unwell, they are to inform the Engineer or Site Manager, who will determine appropriate action.

All visitors to site must enter and register at the main Site Office.

7.3.2 Responsibilities

Prior to the commencement of any works, in agreement with the Engineer, the client will:

- Establish the boundaries of the site and the working areas.
- Undertake a dilapidation survey of site boundaries, adjacent properties and highways, via dated photographs or video footage.
- Liaise with the Local Authority regarding working hours, noise\dust\odour control, and protected trees.
- Liaise with the Local Water Company regarding any proposed discharge to sewer.
- Complete a full services search and liaise with all relevant utility companies regarding work in close proximity to their apparatus.
- Inform the Engineer/Site Manager of any risk, identified and assessed, which could impact upon the Engineer's activities.
- Prepare the necessary COSHH statements and Health & Safety Plan in accordance with CDM regulations.

The contractor will ensure that:

- They secure the full site boundary (if necessary, provide and erect herras-type fence to protect members of the public from the works).
- Personnel, plant, materials and other equipment related to the contract are confined within the boundaries of the site.
- Any live services lying within the site boundary are marked and protected, or appropriate arrangements made to truncate them.
- Good practices relating to personal hygiene are adopted.
- Suitable precautions are implemented at all times to prevent off-site migration of pollutants via airborne dust and vapours.
- Suitable precautions are taken to prevent the spread of mud and debris on public highways.
- Refuelling of mobile plant is undertaken in a designated area. Above ground oil storage tanks shall comply with the requirements of Pollution Prevention Guideline PPG2. A spill kit shall be kept on site, adjacent to the designated refuelling area.

7.3.3 Engineering Supervision and Validation

Betts Geo understand that the Engineer/Site Manager will ensure that the requirements of this Remediation Statement are complied with in a safe and orderly manner.

The responsibilities of the Engineer/Site Manager shall include, but not be limited to, the following:

- Ensuring that all site personnel are suitably qualified and given an appropriate induction at the beginning of their first day.
- Supervision of the remedial and ground preparatory works.
- Advice on the correct handling of materials and conditions encountered.
- Guidance on the appropriate protective clothing and safety equipment that is to be made available and used.
- Ensuring that personal hygiene arrangements are adequate.
- Retrieval of soil and water samples and the subsequent scheduling of appropriate laboratory analysis to enable validation of various aspects of the works, and to advise the Project Manager of progress.
- Liaison with statutory authorities as required.

The Engineer/Site Manager will maintain records of the works to include the following:

- Daily record sheets to include a summary of the day's activities.
- Date and weather conditions.
- Plant, personnel and visitors present.
- Aspects relating to Health and Safety, Environmental Control, or non-compliance with this Remediation Statement.
- Site surveys as necessary to record the locations of demolition, excavation and filling activity.
- Test results.

On satisfactory completion of all the works the Engineer/Site Manager will prepare a Validation Report. Copies of the Validation Report will be issued to the Client and the Local Authority.

The Validation Report will stand as certification that the remedial and ground preparatory works have been carried out in accordance with this Remediation Statement.

The **Validation Report** will include:

- A summary of the preparatory & remedial works undertaken, including any works associated with unforeseen ground conditions.
- Geotechnical test results associated with ground improvement or re-engineering beneath proposed highways and buildings (if required).
- Copies of any correspondence with Regulators relating to specific aspects of the remedial works.
- Waste transfer notes are to be provided as part of the validation report to show an audit trail of where soil has been deposited.

For reasons of practicality, detailed daily records prepared by the Engineer during the works will not be appended to the Validation Report, but copies can be viewed at Betts offices if required.

The above recommendations will take account of the actual remedial works undertaken, and may differ significantly from recommendations originally presented in the site investigation report and remedial strategy.

8 REMEDIAL WORKS (SPECIFIC OBJECTIVES)

8.1 Site Clearance

Site clearance of any fly tipped materials, bunds and any trees, bushes and shrubs that are required to be removed as part of the redevelopment of the site will be undertaken.

8.2 Excavation of Hardstanding and Foundations

It is anticipated that all the remaining foundations/obstructions encountered during the ground investigation will be broken out.

Where piled foundations terminate on a set shallower than anticipated or obstruction encountered at depth of plot drainage – the obstruction will be removed by excavator. State that allowance for pre digging piled positions has been made.

Heavy plant will be operated generally between the hours of 8:00AM and 6.00 PM Monday to Friday, and 8:00am to 1:00 PM Saturday.

Noise levels will generally be less than the 80 – 85 dB range, with occasional breaches in excess of 85 db. Periods of noise generation in excess of 85 dB are anticipated as being during the initial enabling works and slab removal stage and thereafter for short periods. All construction plant will be selected from well maintained and silenced stock.

Suitable uncontaminated reclaimed material from the demolition operation will be crushed to an appropriate specification and, if required, processed for re-use as part of any general site raise. The crushing of this material will be supervised and monitored by an appropriately qualified person, with selected samples periodically obtained and tested to confirm its suitability.

Any material that is deemed to be unsuitable for crushing and re-use will be removed from the site to licensed landfill.

Foundation/obstruction arisings will need to be carefully managed to not contaminate natural soils and should be segregated as they are dug out. Arisings are physically different and as such should be able to be segregated accordingly. Subsoils will be physically assessed upon placement within garden areas, should any suspected made ground be encountered within the subsoil material placed then additional chemical validation will be required to confirm the suitability of the material placed.

8.3 Dust, Vapour & Odour Control

It is not anticipated that dust will be a problem during any excavation and transport, however the monitoring and mitigation measures outlined below may be required if dust, vapour or odour are noticeable. Damping down of any stockpiled material may be required in order to minimize dust release.

8.3.1 Odour Monitoring

If necessary, olfactory monitoring for odour nuisance will be undertaken at the site boundary down-wind of the excavation area during all excavation works. Odour monitoring will be carried out at these locations no less than three times a day during active site works.

At each monitoring event, the odour level will be subjectively classified as none, slight, moderate, or high, where:

- a slight odour level is detectable but not particularly noticeable,
- a moderate odour level is noticeable but not offensive, and
- a high odour level is offensive.

If high odour levels are detected in the same location on more than two occasions during any three-day period, then one or more of the actions outlined below will be undertaken in order to reduce the odour levels.

Monitoring for volatiles should be carried out within excavations in the areas of hydrocarbon odours prior to man entry into excavations. Suitable PPE will need to be worn in order to protect construction workers who may enter any excavations during the works. See Section 6.3.2 below for further details.

8.3.2 Trigger Levels

Proposed action limits for requiring respirator protection in the vicinity of the excavations and for taking corrective action to mitigate against the generation of air-borne dust or volatile organic contamination are outlined below. They are based on EH40/2002, Occupational Exposure Limits, Health and Safety Executive. EH40 trigger levels for total VOCs and dust are:

VOC & Dust Trigger Levels

Determinand	Long-Term Exposure Limit (8 hour time-weighted average)	Short-term Exposure Limit (15 minute reference period)
Total VOCs	1 ppm	3 ppm
Dust	4 mg/m ³	12 mg/m ³

The long-term exposure limit for total VOCs is based on the EH40/2005 long-term exposure limit (8-hour time-weighted average) for benzene. The short-term exposure limit is set at three times the long-term exposure limit as recommended in EH40/2002.

The long-term exposure limit for dust is based on the EH40/2005 long-term exposure limit (8-hour time-weighted average) for respirable dust, which is taken from the General COSHH Approved Code of Practice, 1997. Again, the short-term exposure limit is set at three times the long-term exposure limit.

8.3.3 Mitigation

At all times during the excavation works, Best Practicable Means shall be employed to minimise dust, odour and VOC generation and their emission off site.

If dust or VOC concentrations in air exceed the long-term trigger levels in the vicinity of the excavation area, but are below the long-term trigger levels at the site boundary, then respirator protection will be required for all site personnel working in the excavation area.

Respiratory protection that conforms to the European Product Directive (CE) shall be readily available for personnel exposed to odours. Twin cartridge respirators, that conform to EN140, fitted with class A1 filters cartridges, which conform to EN141 (organic gases and vapours), shall be used. If highly odorous material is encountered on site then masks with Class A2 filters shall be used.

In addition, one or more of the following corrective actions to mitigate against the generation of air-borne dust or volatile organic contamination will immediately commence:

- Mist and water spraying to eliminate dust and/or reduce generation of volatile compounds.
- Reduction of the exposed active excavation area by backfilling or covering to reduce the generation of volatile compounds.

If dust or VOC concentrations in air exceed the long-term trigger levels at the site boundary then excavation activities will be stopped immediately and one or more of the above corrective actions will commence. Work will not begin again until the air quality at the site boundary has returned to an acceptable level and only after all reasonable actions have been taken to prevent the air quality at the site boundary from again declining to an unacceptable level.

8.4 Export to Landfill

Any material exported from site to landfill will be hauled by a registered waste carrier in accordance with the requirements of the Duty of Care Regulations, 1991 and the Landfill (England & Wales) Regulations 2002.

A transfer note shall be completed, signed and retained by the parties involved. The transfer note shall include the volume of waste, the nature of the material and a statement of its chemical composition, details of the source and destination sites, and details of the haulier.

In order to protect the general public from dust, wagons that are to be used for the haulage of the contaminated material from the site will be sheeted. In addition, the Contractor must ensure that no fluids seep from the wagons.

In order to provide the landfill facility with information regarding chemical composition of the waste, analysis results from the ground investigation and the desk study will be supplied to the site prior to removal for classification.

As of 16th July 2005, the Waste Acceptance Criteria (WAC) of the Landfill Regulations 2002 were fully implemented, which will result in the enforcement of a more stringent approach to waste assessment and its disposal to landfill.

All hazardous waste going for disposal at landfills must be classified according to the new European Waste Catalogue (EWC).

Contaminated soils are “Mirror entries” in the EWC. Waste contaminated soils may be classified as either *hazardous* or non-hazardous depending on the concentrations of “dangerous substances” in the waste soil. An assessment of the composition of the waste soil will therefore be undertaken to determine if it is hazardous waste.

The WAC set threshold concentrations for leachable components of the waste stream and landfill operators will have waste acceptance procedures in place to ensure that only compliant waste is landfilled. Most waste will need to be treated before it can be landfilled to reduce its quantity and the hazard it presents. Leaching compliance testing will be required in accordance with BS EN 12457-3:2002.

In addition the site will be operating under a Site Waste Management Plan recording both import and export of materials.

8.5 Backfill of Excavations

Excavations (to remove relict structures and contamination etc) will be “surveyed in” and backfilled as necessary to achieve the desired levels, with suitable materials and subjected to compaction specification, to be agreed with the Engineer/Site Manager.

However, where an excavation conflicts with the footprint of a proposed adopted highway, compaction in accordance with the Specification for Highway Works Table 6/1 will be undertaken.

8.6 Boundary Issues

The Client’s Designer should ensure that proposed levels tie in with the surrounding infrastructure, and ground levels of adjacent properties.

8.7 Highways

The contractor will agree acceptable performance criteria, and an appropriate Specification for any necessary ground improvement, with the Client and the adopting authority where necessary.

The Contractor will arrange for the necessary compliance testing to be undertaken at formation level on road alignments, as required by the adopting authority and Engineer.

8.8 Control of Water

No groundwater was encountered during the intrusive works and limited water recorded within wells from the follow-on monitoring however as a matter of good practice shuttering and pumping should be available on standby for deep excavations and in periods of wet weather. Silt traps/bales of hay etc. should be used if sediment wash of is observed.

8.9 Contingency for Unknown / Unforeseen Contamination

Should any suspicious material be encountered during the remediation works, the area will be investigated further by a Betts Geo-Environmental Engineer and sampled as necessary. The Contaminated Land Officer at

the Local Authority will also be notified if the material is deemed to represent a risk to environmental receptors or public health.

Samples will be forwarded to a UKAS accredited laboratory for a suite of analytical testing deemed appropriate based upon a visual and olfactory appraisal of the material identified. Once the results of any analysis are known, the required remedial action (if any) will be determined.

8.10 Construction Workers

Due to the presence of elevated concentrations of lead and arsenic, a risk exists (in the short term) to any ground/construction workers involved in the redevelopment of the site.

A full discussion of the results of existing chemical analysis and the levels of contamination within these soils will be included within the Pre-Tender Health and Safety File. The contractor is aware of the presence of such soils and will therefore allowed for adequate Personal Protective Equipment to be provided on site.

It is recommended that full reference should be made to current guidance documents such as the HSE document "Protection of Workers and the General Public during the Redevelopment of Potentially Contaminated Land" HS (G) 66, HSE.

The results of all relevant chemical analysis will be provided to the relevant service providers in order to confirm any special precautions that may be required in respect of the installation of services and the protection of their workers.

9 METHODOLOGY / PROGRAMME AND VALIDATION REQUIREMENTS

9.1 Reuse of Topsoil and Subsoil

The use of site won topsoil is not anticipated. The reuse of the deeper natural superficial deposits of clay may be deemed suitable for reuse as subsoil subject to the material meeting physical and chemical suitability criteria for residential with home grown produce thresholds.

9.2 Imported Material

Imported topsoil (and potentially to a lesser extent subsoil) will be required across the site. Imported material should be tested for contamination to ensure that it is suitable for the proposed end use.

Any soils intended for use as part of the clean cover (including site won material) will be tested at source or stockpiled on site until approved for use by the Supervising Engineer. Topsoil testing will be carried out at a rate of 1 test per 150m³ for 'greenfield' sites, 1 test per 50m³ for brownfield sites or a minimum of 3 samples taken for statistical analysis with the results compared to CLEA/LQM 2009 threshold concentrations where appropriate.

Sample ratio for subsoils are generally accepted to be 1:250m³ for greenfield sourced material, increased to 1:100m³ for brownfield sourced material or a minimum of 3 samples taken for statistical analysis.

9.3 Cover System in Garden Areas

Entirety of Site

A 600mm cover system is suitable on this parcel. This will comprise of:

150mm Topsoil (anticipated to be imported)
450mm Subsoil (anticipated to be imported/site won)

The above is proposed to comply with NHBC Chapter 9 regulations regarding physical composition of cover (i.e. no coarse granular material within the first 300mm) and exceeds the minimum requirement of 100mm depth of topsoil – extract from Ch9 below:

*'9.2 - S5 Garden areas shall be free from obstructions beneath the surface old foundations, concrete bases and similar obstructions occurring within 300mm of the finished ground surface should be removed.
9.2 - S6 Garden areas shall be adequately prepared for cultivation construction rubbish and debris should be removed from garden and other areas around the home. Garden areas should be provided with topsoil to a thickness of not less than 100mm. The topsoil should not contain contaminants which are likely to present a hazard to users of the garden area.'*

9.4 Soil Validation Summary

- Desk study undertaken to establish source.
- Source used to determine sampling frequency/chemical analysis scheduling.
- Engineer to attend site post import or at source site and collect representative samples for assessment.

- Samples analysed and screened for end use suitability for residential with root uptake.
- Confirmation of suitability for import and/or placement.
- Import soil to site (if needed) and place in garden areas.
- Depth validation of cover provided within garden areas on a plot by plot basis.
- Soils Validation Report to be produced and submitted to the Local Authority / NHBC for approval.

9.5 Soil Validation Report

The Soils Validation Report (required for imported soils only) will include:

- Photographic records.
- Trial hole records.
- Chemical Analysis Results.
- Details of any material excavated and removed from site including copies of waste management records.

9.6 Site Certification

Once the remediation works have been undertaken, a 'completion' report will be prepared. This will comprise relevant site records and stand as certification that the appropriate remediation works have been carried out in accordance with the agreed redevelopment strategy. Reports will be submitted to the Local Authority for their approval, thereby enabling the release of the site for subsequent development.

Notes on Limitations

This report does not consider ecological impacts (e.g. bats) or botanical risks (e.g. Japanese knotweed). It is recommended that these are considered as part of the assessment of development constraints for the site.

The ground conditions described in the above reports relate only to the points of investigation and do not necessarily guarantee a continuation of the ground conditions throughout the non-inspected area of the site. Whilst such exploratory holes would usually provide a reasonable indication as to the general ground conditions, these cannot be determined with complete certainty. Betts Geo has endeavoured to assess all information provided to them, but makes no guarantees or warranties as to the accuracy or completeness of this information.

The assessment and judgements given in this report are directed by both the finite data on which they are based and the proposed works to which they are addressed. The data essentially comprised a study of available documented information from various sources (including Client Furnished reports) together with discussions with relevant authorities and other interested parties. There may also be circumstances at the site that are not documented. The information reviewed is not exhaustive and has been accepted in good faith as providing representative and true data pertaining to site conditions. If additional information becomes available which might impact our environmental conclusions, we request the opportunity to review the information, reassess the potential concerns and modify our opinion if warranted.

It should be noted that any risks identified in this report are perceived risks based on the available information. Actual risks can only be assessed following a physical investigation of the site.

The site investigation has been carried out to provide information concerning the type and degree of contamination, and ground and groundwater conditions to allow a reasonable risk assessment to be made. Betts Geo Environmental Ltd undertake to exercise all reasonable skill, care and due diligence in the exercise of the investigation with respect to sampling techniques, sample storage and report interpretation.

The assessments and judgement given in this report are directed by both the finite data on which they are based and the proposed works to which they are addressed. Data acquisition is subject to the limitations of the methods of investigation used. Exploratory holes undertaken during fieldwork investigate small a small volume of ground in relation to the size of the site and as such can only provide an indication of site conditions. There may be conditions pertaining to the site and the proposed development i.e. localised “hotspots” of contamination, which have not been disclosed by the investigations.

The findings and opinions are relevant to the dates of our site works and should not be relied upon to represent conditions at substantially later dates. Conditions at the site will change over time due to natural variations and anthropogenic activities. Groundwater, surface water and soil gas conditions should be anticipated to change with diurnal, seasonal and meteorological variations.

The opinions expressed in this report regarding any contamination are based on simple statistical analysis and comparison with available guidance values. No liability can be accepted for the retrospective effects of any changes or amendments to these values.

This report was prepared by Betts Geo Environmental Ltd for the sole and exclusive use of Lovell Partnerships. In response to particular instructions, any other parties using the information contained in this report do so at their own risk and any duty of care to those parties is excluded.

This document has been prepared for the titled project only and should any third party wish to use or rely upon the contents of the report, written approval from Betts Geo Environmental Ltd must be sought.

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