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**REMEDIATION STRATEGY FOR
PROPOSED RESIDENTIAL DEVELOPMENT
DINTING VALE
GLOSSOP
DERBYSHIRE**

PREPARED FOR

WAINHOMES (NORTH WEST) LTD

JANUARY 2025

**REMEDIATION STRATEGY
21168/REM/03**

ROBERT E FRY & ASSOCIATES LTD.
45, Bridgeman Terrace
Wigan, WN1 1TT

Telephone: 01942 826020
Fax: 01942 230816
Email: mail@refa.co.uk
Company Registration No. 2436911



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Remediation Plan 21168/07
Proposed Development Plan WH/DV/PSL/01 Rev P

REMEDIATION STRATEGY

PROPOSED RESIDENTIAL DEVELOPMENT

DINTING VALE, GLOSSOP, DERBYSHIRE

1.0 INTRODUCTION

- 1.1 R.E. Fry & Associates (REFA) have been commissioned by Wainhomes (North West) Limited, Kelburn Court, Daten Park, Birchwood, Warrington, WA3 6UT to prepare a remediation strategy scheme for the required site development works at the proposed residential development located at a parcel of land off the southern side of Dinting Vale, Glossop.
- 1.2 The site has previously been the subject of a Phase I Desk Study prepared by REFA (report reference: 21168A/GEDS, dated August 2022). The study provided an environmental appraisal of the site and includes the review of the environmental setting, propriety environmental database, review of historical plans and a geological report. Historical mapping highlighted the site has remained in agricultural usage throughout its recorded history. Clays pits and ground workings have been noted to have taken place immediately adjacent to the eastern and western boundaries, with the workings towards the east having been referred as a refuse site on the 1974 to 1990 maps.
- 1.3 The site has been proposed for a residential development comprising of one hundred (100 No.) residential properties with associated road access, parking and private garden areas. A large area of POS is shown within the northern section of the site. A proposed site development plan is appended to this report for reference.
- 1.4 A subsequent phase of investigation works were undertaken by REFA within the site. A preliminary ground investigation was completed in early 2022, with further details provided in report REF/ST/21168, dated February 2022. A second phase of intrusive works were completed which included the installation of windowless sample boreholes for ground gas monitoring purposes. Further details are provided within the Phase II Geo-Environmental Investigation Report (report reference: 21168/GEIR/B, dated August 2023). The REFA investigations identified the requirement for a full remediation strategy for the site and therefore, this remediation strategy has been development in order to allow for the site's safe development. The previous investigation reports should be considered when reviewing this report.
- 1.5 The conceptual site model suggests that there is a potential for explosive and toxic gases to be generated within the site based on the following two factors:
- Historic landfill present from 1974 to 1990, adjacent to the eastern boundary.
 - Large, unspecified ground workings added to the survey from 1954 and likely coincides with the steep slope adjoining the western boundary.
- 1.6 Based on the results of the ground gas monitoring, the site can be classified as Characteristic Situation 1 (Green). However, the Phase II Geo-Environmental Report recommended that properties located along the eastern boundary will be required to adopt CS2 (Amber I) ground gas precautions a cautionary measure.

- 1.7 This remediation strategy is intended to detail the minimum works which should be carried out within the development process to ensure that the ground conditions within the site do not represent a hazard to site operatives, residential end users or members of the general public.

2.0 SITE CONDITIONS

- 2.1 The site has been subject to a programme of ground investigation works undertaken by REFA which have identified topsoil deposits over much of the site area to a maximum depth of 0.40m bgl. Two areas of made ground were identified, TP10 with a maximum depth of fill to 0.50m bgl and WS08 which extended to 2.50m. The made ground encountered within TP10 recorded an ashy, very sandy gravel with a low cobble content of brick. By contrast, WS08 recorded a thin band of topsoil over a dark grey slightly gravelly, silty sand, with of pottery, slag and occasional fragments of glass.
- 2.2 The underlying natural strata comprises of a firm brown or reddish brown, occasionally mottled grey slightly gravelly, slightly sandy silty clay. Windowless sample boreholes recorded medium dense greyish brown slightly gravelly, silty sand bands below 2.50m.

3.0 CHEMICAL ANALYSIS

- 3.1 The REFA investigations have identified elevated concentrations of arsenic, lead, asbestos and PAH compounds within the made ground and topsoil material within WS08, TP06 and TP10. Table 1 details further the exceedances recorded during the programme of chemical testing.

Table 1: Chemical Exceedances			
Contaminant	Location	Values	Assessment Criteria (mg/kg)
Arsenic	WS08 at 0.20m	107.9	37 ³
Lead	TP06 at 0.20m	284	200 ¹
	WS08 at 0.20m	292	
Asbestos	WS08 at 0.20m	Present	-
Benzo(a)pyrene	TP10 at 0.45m	13.69	5.0 ²
Benzo(b)fluoranthene	TP10 at 0.45m	14.40	3.7
Dibenz(ah)anthracene	TP10 at 0.45m	1.76	0.30
¹ DEFRA : SP1010 : Category 4 Screening Levels ² Atkins Atrisk SSV residential with home grown produce (6.0% SOM) ³ LQM and CIEH S4UL's for Human Health Risk Assessment (Registration No. S4UL 3265) residential with home grown produce (6.0% SOM) ⁴ BRE Special Digest 1:2005 DS-1 (units in g/l)			
			ND – None Detected

- 3.2 Asbestos screening has identified the presence of free fibres of chrysotile present within WS08 at 0.20m.
- 3.3 The presence of elevated concentrations of arsenic, lead, asbestos and PAH compounds represent a long-term hazard to the residential end user of the site and a programme of remediation is required.

4.0 PROPOSED REMEDIATION MEASURES

- 4.1 The contractor will maintain an accurate record of the materials excavated and removed from the site as part of any site preparation works including details of where the materials are disposed of e.g. waste transfer notes. This information will be supplied to the engineer and will form part of the validation report.
- 4.2 The previous ground investigation has identified exceedances of the assessment criteria in relation to various metals, asbestos and PAH compounds, and these exceedances are attributed to isolated pockets of Made Ground, apart from TP06 in which recorded elevated levels within the topsoil material. It is therefore recommended that a 3m by 3m area is excavated down within the location of TP06 and expose the underlying natura clay strata. Once removed, the topsoil strata within the side walls and base of excavation will need chemical testing to prove no further exceedance exist. Within the area of TP10, the Made Ground will require delineating and removing to expose the underlying clay strata. The base and sides of the excavation will also require testing to confirm the area is now free of contamination. Once completed, clean inert subsoil and topsoil can be placed where necessary within the area.
- 4.3 Within the area of WS08, Made Ground was recorded to a maximum depth of 2.50m and was found to contain elevated arsenic and lead levels. This position is currently within an area of proposed public open space. It is recommended to delineate this area to establish the extent of the Made Ground and apply a 'clean' 600mm cover system with a geotextile membrane at the base of the capping due to the depth of the Made Ground present within this area.
- 4.4 The works are to be monitored by an independent engineer who will ensure that the following verification procedures are adopted:-
- Liaison with the appointed groundwork contractor, inspection and general monitoring of the works;
 - The investigations have identified elevated concentrations of lead, and PAH compounds within the made ground strata surrounding TP10, and the topsoil material surrounding TP06. As such, the material is deemed unsuitable for retention within a residential development and further delineation and hotspot remediation is required to confirm the exact area of unsuitable strata. The plots affected by the contamination surrounding TP06 will be the front gardens of plots 36 and 37, whilst the plots affected by TP10 will be plots 13, 14 and 15. Affected plots should be reviewed onsite when the contamination has been fully delineated.
 - Within the area of WS08, elevated concentrations of arsenic and asbestos were encountered. It is proposed to delineate the area of Made Ground and apply a 600mm clean cover system comprising of a minimum 150mm topsoil and 450mm subsoil material with a geomembrane at the base. WS08 lies within an area of POS, and the full extent should be reviewed when undertaking the remediation works.
 - This data will be supplemented by field and laboratory testing undertake by the engineer during the remediation works. All test data obtained will be collated buy the engineer for inclusion in the validation report.
 - Excavation of the contaminated material should be undertaken to allow a minimum capping layer at a depth of at least 600mm bgl within the area of WS08 and a high visibility geotextile membrane placed at the base of the excavation..

- Any imported topsoil or subsoil to the site will require a programme of chemical testing to determine the suitability of this material for use within a residential environment to ensure that it satisfies the requirements of this land use as described in tables 1 and 2 below;
- It is the contractor's responsibility to assess any materials proposed for importation to the site and ensure that they meet the criteria set out later in this document. This may include laboratory testing or the review of investigation data and laboratory testing carried out by others. Any laboratory testing shall clearly demonstrate that the soils tested are uncontaminated and suitable for use in residential garden areas as prescribed in tables 2 and 3 below;
- Where the site works identify any suspicious or unusual ground conditions these must be reported to the engineer for further inspection, sampling and assessment to determine their suitability for retention within the site area. Where unusual or suspicious ground conditions are encountered these will be referenced within the final validation report.

4.5 Where garden levels are to be raised, if required, natural clean uncontaminated site arising material can be utilised for these purposes, or where unavailable, clean inert material may be imported to the site from a certified source. Where any materials are imported, it will be necessary for these materials to be sampled and tested in accordance with the procedures detailed below to confirm their suitability for use within a residential environment.

4.6 A watching brief should be maintained throughout all groundworks and should be conducted by the client and groundworker on site. If any unsuspected ground or contamination is identified, then the consulting engineer and the appropriate regulatory authorities should be notified so appropriate remediation measures can be in place if required. Written confirmation will be required from the client and groundworker that no unforeseen contaminations has been identified during the groundworks.

4.7 Details of the remediation measures are shown upon appended Drawing number 21168/06A for reference.

5.0 VERIFICATION

5.1 The engineer will liaise with the appointed ground works contractor and inspect the site during the works and upon completion.

5.2 Representative samples of the underlying natural strata will be analysed by an appropriately certified laboratory using UKAS and MCERTS accredited testing procedures for selected chemical determinands based upon public guidance and the results of the ground investigation works. The range of determinands to be assessed and their assessment criteria are shown in table 4. The purposes of the tests are to demonstrate that the Made Ground within the vicinity of TP10 has been removed and the underlying strata is not contaminated. Within the area of TP06, the tests will aim to confirm the underlying strata is free from contamination and the topsoil within the side walls is also free from contamination.

5.3 Within the vicinity of WS08, topsoil will be placed at a minimum thickness of 150mm with 450mm minimum subsoil thickness with a high visibility geotextile membrane at the base of the

capping. Validation of the surface capping will be undertaken by trial hole excavation. Trial holes will be required to ensure that suitable thickness of a clean capping layer has been provided to a depth of at least 600mm for the rear gardens and 450mm for the front gardens and landscaped areas.

- 5.4 No topsoil is to be imported to the site until it has been tested for contamination and assessed for its suitability for the proposed development. Following analysis and prior to importation of any topsoil to the site, validity evidence shall be submitted to and approved in writing by the Local Planning Authority.
- 5.5 Representative samples of the materials generated or imported to the site will be subject to sampling frequencies in line with YALPAG document version 4.1 and dated June 2021 and chemical analyses summarised within tables 2 – 3 .

Table 2: Site Generated Material Sampling Frequency and Analysis		
Material	Sampling Frequency	Analysis Suite
Recycled Aggregate (6F2)	1 sample per 1000m ³	A – B – C – D
Made Ground Fill Material	1 sample per 500m ³	A – B – C – D
Natural General Fill Material	1 sample per 1000m ³	A – B – C – D
Topsoil (capping material)	1 sample per 50m ³	A – B – C
Sub-soil (capping material)	1 sample per 250m ³	A – B – C
A – Heavy Metals and inorganics Suite B – Speciated PAH C – Asbestos Screen (quantification required if fibres are present) D – TPH (CWG) C5 – C44 bandings inc BTEX MTBE		

Table 3: Imported Material Sampling Frequency and Analysis		
Material	Sampling Frequency	Analysis Suite
Recycled Aggregate General Fill (6F2)	1 sample per 1000m ³	A – B – C – D
Brownfield General Fill Material	1 sample per 500m ³	A – B – C – D
Greenfield General Fill Material	1 sample per 1000m ³	A – B – C
Brownfield Source Topsoil (Garden Soils)	1 sample per 50m ³ (minimum of 6)	A – B – C – D
Brownfield Source Sub-soil (Garden Soils)	1 sample per 50m ³ (minimum of 6)	A – B – C – D
Greenfield Source Topsoil (Garden Soils)	1 sample per 100m ³ (minimum of 3)	A – B – C
Greenfield Source Sub-soil (Garden Soils)	1 sample per 100m ³ (minimum of 3)	A – B – C

Virgin Quarried Material (Stone Only)	1 sample per 2000m ³	A
A – Heavy Metals and inorganics Suite B – Speciated PAH C – Asbestos Screen (quantification required if fibres are present) D – TPH (CWG) C5 – C44 bandings inc BTEX MTBE		

5.6 Samples recovered from the remediation works will be analysed by an appropriately certified laboratory using UKAS and MCERTS accredited testing procedures for selected chemical determinands based upon public guidance and the results of the ground investigation works. The range of determinands to be assessed and their assessment criteria are shown in table 4.

Table 4: Assessment Criteria Screening Values site generated and imported soils			
Determinand	Assessment Criteria for capping soils in gardens (mg/kg)	Assessment Criteria for capping soils utilised in landscaped areas (mg/kg)	Assessment Criteria for capping soils utilised in POS (mg/kg)
Suite A			
Arsenic	37 ³	40 ³	79 ³
Cadmium	11.0 ³	85.0 ³	120 ³
Chromium (total)	910 ³	910 ³	1500 ³
Copper	2400 ³	7100 ³	12000 ³
Lead	200 ¹	310 ¹	630 ¹
Mercury	40 ³	40 ³	120 ³
Nickel	180 ³	180 ³	230 ³
Selenium	250 ³	430 ³	1100 ⁴
Zinc	3700 ³	40000 ³	81,000 ³
Total Cyanide	34.0 ²	34.0 ²	34.0 ²
Phenol	380 ³	440 ³	440 ³
Suite B			
Acenaphthene	1100 ³	6000 ³	15000 ³
Acenaphthylene	920 ³	6000 ³	15000 ³
Anthracene	11000 ³	37000 ³	74000 ³
Benzo[a]anthracene	13.0 ³	15.0 ³	29.0 ³
Benzo[a]pyrene	5.0 ¹	5.3 ¹	10.0 ²
Benzo[b]fluoranthene	3.7 ³	4.0 ³	7.2 ³
Benzo[ghi]perylene	350 ³	360 ³	640 ³
Benzo[k]fluoranthene	100 ³	110 ³	190 ³
Chrysene	27.0 ³	32.0 ³	57.0 ³
Dibenz[ah]anthracene	0.30 ³	0.32 ³	0.58 ³
Fluoranthene	890 ³	1600 ³	3100 ³
Fluorene	860 ³	4500 ³	9900 ³
Indeno[123-cd] pyrene	41.0 ³	46.0 ³	82.0 ³
Naphthalene	13.0 ³	13.0 ³	4900 ³
Phenanthrene	440 ³	1500 ³	1300 ³
Pyrene	2000 ³	3800 ³	7400 ³
Suite C			
Asbestos Screen	ND	ND	ND
Suite D			
Aliphatic EC 5-6	160 ³	160 ³	600000 ³
Aliphatic EC >6-8	530 ³	530 ³	620000 ³
Aliphatic EC >8-10	150 ³	150 ³	13000 ³
Aliphatic EC >10-12	760 ³	770 ³	13000 ³
Aliphatic EC >12-16	4300 ³	4400 ³	13000 ³
Aliphatic EC >16-35	11000 ³	11000 ³	250000 ³
Aliphatic EC >35-44	11000 ³	11000 ³	250000 ³
Aromatic EC 5-7	300 ³	1400 ³	56000 ³
Aliphatic EC >7-8	660 ³	3900 ³	56000 ³
Aromatic EC >8-10	190 ³	270 ³	5000 ³
Aromatic EC >10-12	380 ³	1200 ³	5000 ³
Aromatic EC >12-16	660 ³	2500 ³	5000 ³
Aromatic EC >16-21	930 ³	1900 ³	3800 ³
Aromatic EC >21-35	1700 ³	1900 ³	3800 ³
Aromatic EC >35-44	1700 ³	1900 ³	3800 ³
Benzene	0.37 ³	1.4 ³	73.0 ³
Toluene	660 ³	3900 ³	56000 ³
EthylBenzene	260 ³	440 ³	25000 ³

Table 4: Assessment Criteria Screening Values site generated and imported soils			
Determinand	Assessment Criteria for capping soils in gardens (mg/kg)	Assessment Criteria for capping soils utilised in landscaped areas (mg/kg)	Assessment Criteria for capping soils utilised in POS (mg/kg)
M/P Xylenes	320 ³	430 ³	43000 ³
O Xylene	330 ³	480 ³	43000 ³
Methyl tert-Butyl Ether	20 ²	20 ²	85500 ²
¹ DEFRA : SP1010 : Category 4 Screening Levels ² Atkins Atrisk SSV values ³ LQM and CIEH S4UL's for Human Health Risk Assessment (Registration No. S4UL 3265) ND – None Detected			

6.0 PROPOSED REMEDIATION MEASURES – GROUND GASES

- 6.1 The presence of a historic landfill adjacent to the eastern boundary, and large unspecified ground working adjoining the western boundary, the site was deemed to require the provision of further ground gas precautions. Such measures are only required on a precautionary basis and reflect the presence of historical ground workings in close proximity to the development. It has therefore been recommended within the Phase II Geo-Environmental Investigation Report to install CS2 (Amber 1) gas precautions as defined by the NHBC Report No. 4, as a precautionary measure to plots 24 – 26, 46 – 51 and 74 – 80. There will be a requirement to verify the installations of the ground gas precautions within the site by an independent engineer.
- 6.2 Following the Phase II Geo-Environmental Investigation Report, specific requirements for gas protection must be incorporated into new structures on the site.
- Low permeability gas membrane, combined CH₄ and CO₂ resistant (eg. Visqueen Gas Membrane or similar approved, which is also suitable for use as a damp proof membrane).
 - Reinforced concrete cast in-situ floor slab and underfloor venting, or
 - Beam and block, or pre-cast concrete and 2000g reinforced gas membrane and underfloor venting.
 - All joints and penetrations must be sealed.
- 6.3 The gas membrane must be installed in accordance with the manufacturer's recommendations and BRE Report 414 "Construction of Buildings on Gas Contaminated Land". The membranes are to be installed by the contractor with the membrane and ventilation to be certified as being installed correctly either by the local authority Building Control Officer, NHBC representative or a suitability qualified and experienced environmental consultant.
- 6.4 Use of photographic evidence during the installation of the gas protective measures with evidence including slab detail, venting and membrane examples. Certification documentation of the membrane installation will be required including quality assurance records and warranties.

7.0 **TIMESCALE**

- 7.1 The implementation of the Remediation Strategy is subject to approval of the Local Authority and the implementation will be undertaken in accordance with the contractor's progress and for the development as soon as feasibly possible.

8.0 **REPORTING**

- 8.1 Upon completion of the works a full and final validation report will be prepared and submitted to the local authority and other regulatory authorities in order to satisfy them that the works have been completed successfully and to allow for any appropriate planning conditions to be discharged.
- 8.2 The validation report will also be submitted to the NHBC for approval in accordance with NHBC Handbook Chapter 4.1
- 8.3 This report will include the following:-
- A description of all works undertaken;

- An accurate record of excavations and ground movements;
- Details of the disposal of any arisings from the site;
- The results of all chemical testing and contamination assessments;
- A photographic record confirming the removal of unsuitable topsoil material and the introduction of a 100mm topsoil layer to gardens as indicated upon the appended remediation plan;
- Confirmation that the works have been completed in accordance with this remediation strategy.

Signed for and on behalf of
R E FRY & ASSOCIATES LIMITED

Hollie Marengo BSc (Hons), MSc, FGS
Senior Geo-Environmental Manager

Stephen Boot B.Sc. (Hons) FGS
Senior Geo-Environmental Engineer



Revision:	By:	Date:
A	Plots 65 & 67 swapped. Footpath removed adjacent to Plot 81	RL 27.09.22
B	Complete site redesign	MB 08.02.23
C	Ongoing design changes	MB 10.03.23
D	House type updated	MB 22.03.23

Client:



Project Title:

Proposed Development

Address:

Dinting Vale, Glossop

Drawing Title:

BDC Colour Site Layout

Drawing No:

WH/DV/CSL/01

Dwn:

MB

Chk:

CC

Date:

14/06/2022

Scale:

1:500

Paper Size:

A1

Rev:

D

e-mail: enquiries@baldwindesign.net
www.baldwindesign.net

4 Wain Vale, Rivington Ward, Plain Lane, Legh, Warrington, Cheshire, WA2 7EZ.
Tel: 01925 742935

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