

Remediation Strategy

Proposed Residential Development at
Parc Newydd, Britton Ferry, Neath and
Port Talbot

Prepared for:

Morganstone Construction Limited

February 2020

Job No: 14396/RS

REPORT TITLE : **Remediation Strategy:**
Proposed Residential Development at
Parc Newydd, Britton Ferry, Neath and
Port Talbot

REPORT STATUS : **Final**

JOB NUMBER : **14396/RS**

DATE : **February 2020**

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Executive Summary

Introduction	<i>Morganstone Construction Limited is proposing the residential development at Parc Newydd, Britton Ferry, Neath and Port Talbot. Terra Firma Wales Limited issued a site investigation report in 2019. The site investigation identified several contaminants within the made ground soils which pose a risk to future site users.</i>
Site History	<i>Historically the site has been undeveloped fields followed by the Salting Estate (Residential) in c. 1960.</i>
Ground Conditions	<i>The site has a mantle of made ground over boulder clay over Coal Measures bedrock</i>
Laboratory chemical testing	<i>Elevated metals/semi-metals PAH and TPH were recorded across the site. Asbestos was also encountered across the site. Several potentially volatile species were encountered beneath the former (now demolished) flats.</i>
Remedial Measures	<i>The mitigation and remedial measures to be implemented are summarised as follows:</i> <i>1. Removal of the made ground from beneath the former building footprint where it underlies the proposed new buildings.</i> <i>2. Protection of construction workers during site development through a good level of PPE and hygiene, as well as dust suppression measures if required.</i> <i>3. Capping all landscaped areas with a no-dig barrier under 0.6m of clean imported soil.</i> <i>4. Validation of all imported soils/aggregate</i> <i>5. Potable Water Supply Pipe Material Assessment performed by the provider.</i>

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SECTION 1 Introduction and Proposed Development

Morganstone Construction Limited are proposing the residential development at a site located at Parc Newydd, Britton Ferry, Neath and Port Talbot.

Morganstone Construction Limited has commissioned Terra Firma (Wales) Limited to prepare a Remediation Strategy for the site.

This report has been prepared for the sole internal reliance of Morganstone Construction Limited and their design and construction team. This report shall not be relied upon or transferred to any other parties without the express written authorisation of Terra Firma (Wales) Limited. If an unauthorised third party comes into possession of this report they rely on it at their peril and the authors owe them no duty of care and skill.

The report represents the findings and opinions of experienced geo-environmental and geo-technical consultants. Terra Firma (Wales) Limited does not provide legal advice and the advice of lawyers may also be required.

It is not within the scope of Terra Firma (Wales) Limited to:

- Provide Method Statements and Risk Assessments for the site remediation, preparation and development.
- Design, install and validate the pipes for potable water supply beneath the site.

SECTION 2 Site Summary

Terra Firma (Wales) Limited issued a Geo-environmental and Geotechnical Report for the site in December 2019 (Report No. 14396, V.4). Relevant information from this report is summarised in the following sections.

2.1 Site History

Historically the site comprised undeveloped fields until housing (the 'Saltings Estate') was erected around 1960.

2.2 Geology and Ground Conditions

The site is underlain by the rocks of the Upper Coal Measures. The site has a superficial cover of boulder clay which has a cover of made ground.

During investigations between 0.40m and 1.20m of made ground was encountered over the boulder clay.

2.3 Mining

Several thin coal seams were identified in the upper 30m during drilling and coal workings are recorded at 80m depth. There is not deemed to be a subsidence risk associated with coal mining beneath the site.

2.4 Radon and Ground Gas

No radon protection measures are required for the development.

A Gas Risk Assessment concluded there is not a significant risk from ground gas.

2.5 Human Health and Environmental Risk Assessment

As part of the geo-environmental site investigation samples of site soils were retrieved and submitted for laboratory analysis.

Exceedances within the made ground are presented in **Table 2.1**.

Table 2.1. Summary of Recorded Exceedances			
Determinant	GAC (mg/kg)	Location	Concentration (mg/kg)
EXTERNAL (Former Outdoor Areas)			
Arsenic	37	TP01, 0.20m	62
		TP02, 0.20m	48
		TP04, 0.35m	120
		TP201, 0.20m	97
		TP202, 0.30m	38
		TP205, 0.30m	67
Lead	200	TP03, 0.40m	250
		TP201, 0.20m	1,400
		TP202, 0.30m	400
Benzo(b)fluoranthene	2.6	TP203, 0.20m	7.6
Benzo(a)pyrene	2.2	TP203, 0.20m	5.8
Dibenzo(ah)anthracene	0.24	TP203, 0.20m	0.91
		TP206, 0.30m	0.60
INTERNAL (i.e. Beneath Former Floor-Slab)			
Arsenic	37	TP101, 0.30m	48
		TP102, 0.30m	64
		TP103, 0.70m	83
		TP301, 0.40m	76
Ali C8 – C10	27	TP207, 0.40m	410
Aro C10 – C12	74	TP102, 0.30m	250
Aro C12 – C16	140	TP102, 0.30m	160
Aro C16 – C21	260	TP102, 0.30m	430
		TP207, 0.40m	460
Aro C21 – C35	1100	TP102, 0.30m	1700
		TP207, 0.40m	1700
Naphthalene	2.3	TP101, 0.3m	22
		TP101, 0.7m	5.5
Benzo(a)anthracene	7.2	TP101, 0.3m	37
		TP101, 0.7m	17
		TP102, 0.30m	13
		TP103, 0.70m	7.3
Chrysene	15	TP101, 0.3m	31
		TP101, 0.7m	17
Benzo(b)fluoranthene	2.6	TP101, 0.3m	40
		TP101, 0.7m	21
		TP102, 0.30m	16
		TP103, 0.70m	13
		TP207, 0.40m	2.9
		TP302, 0.40m	5.6
Benzo(a)pyrene	2.2	TP101, 0.3m	37
		TP101, 0.7m	20
		TP102, 0.30m	17
		TP103, 0.70m	13
		TP302, 0.40m	3.7
Dibenzo(ah)anthracene	0.24	TP101, 0.3m	3.2
		TP101, 0.7m	2.0
		TP102, 0.30m	1.9
		TP103, 0.70m	1.5
		TP207, 0.40m	0.45
		TP303, 0.40m	0.32

* - Potentially volatile species highlighted in orange.

Asbestos was encountered in TP03, 0.4m as a fragment of ACM and chrysotile fibres in bitumen. Asbestos was encountered in TP202, 0.30m. Quantification revealed this to constitute 0.08% of the sample mass. Sample Locations are presented in **Drawing 01**.

2.5 Human Health and Environmental Risk Assessment (Continued)

The mitigation and remedial measures to be implemented are summarised as follows:

- 1. Protection of construction workers during site development through a good level of PPE and hygiene, as well as dust suppression measures if required.**
- 2. Removal of made ground containing potentially volatile species from beneath the footprint of new buildings and validation of removal by observation and testing during removal**
- 3. Capping of all areas with hardstanding or at least 600mm of clean soil over a no dig barrier, conforming to Generic Assessment Criteria for a Residential Setting, validated in-situ by measurement and chemical analysis**
- 4. Potable Water Supply Pipe Material Assessment to be performed by Water Provider**
- 5. Validation of all imported soils/aggregate and any site won soils proposed for re-use.**
- 6. Ensuring all off-site soil disposal is performed by a licensed haulier and taken to an appropriate licensed facility based on the European Waste Code (EWC) of the soil. If suitable soils are to be re-used elsewhere, this should be performed using an appropriate Permit or Exemption.**

These mitigation and remedial measures are covered in detail in the following sections.

SECTION 3 Proposed Mitigation During Site Construction Works

All health and safety measures and risk assessments should detail the proposed measures to be put in place to protect construction workers and neighbouring site users. This should include dust suppression if conditions required.

It is recommended that the contractor(s) work in accordance with to CIRIA Report 132: A Guide for Safe Working on Contaminated Sites.

SECTION 4 Remedial Measures for the Protection of Future Site Users

4.1 General

A mantle of made ground was encountered across the site. Metals/semi-metals and High Molecular Weight (HMW) hydrocarbons were encountered across the site. In addition, beneath the former flats, the made ground was seen to contain areas of Low Molecular Weight (LMW) hydrocarbons, which can be potentially volatile.

4.2 Landscaped Areas

Some landscaped areas will be used as part of the development. All landscaped areas should consist of a minimum 0.6m of clean imported soils. A double no dig barrier should be incorporated into the base of the capping layer. The no dig barrier should consist of a hi visibility geotextile and structural geogrid.

4.2.1 Capping Soils

In accordance with publication 'Requirements for the Chemical testing of Imported Materials for Various End Uses and Validation of Cover Systems' any soils or aggregate (excluding virgin quarry stone) must be confirmed uncontaminated with respect to human health and suitable for use.

Details of the source and/or supplier or any materials should be provided.

The provider should supply a laboratory analysis report to confirm that the materials are suitable for use.

Depending on the source and available test data, it may be prudent to independently sample and analyse the materials (if practical) prior to being brought to site.

Sampling and analysis of the soils once imported will be required in addition to any taken at source.

The number of representative samples required for analysis is dependent on the volume of each source soil. For a volume between 20m³ and 250m³ four samples should be taken. For a volume greater than 250m³, 4 samples per 250m³ should be taken.

All samples should be analysed for the substances listed in **Table 4.2** below. These are soil thresholds for a residential (including plant uptake) scenario.

4.2.1 Capping Soils (Continued)

Table 4.1 Guideline Values - Imported Soils and Aggregate				
Determinant	Comparable Guideline Value (mg/kg)			Source
Arsenic	37			CIEH
Boron	290			CIEH
Cadmium	11			CIEH
Chromium III	910			CIEH
Chromium VI	6			CIEH
Copper	2400			CIEH
Lead	200			C4SL
Mercury	40			CIEH
Nickel	130			CIEH
Selenium	250			CIEH
Zinc	3700			CIEH
Cyanide	Limit of laboratory detection*			CLEA
Phenols	120			CIEH
pH (acidity)	-			-
Asbestos	Not detected			-
Speciated PAH	1% SOM	2.5% SOM	6% SOM	
Naphthalene	2.3	5.6	13	CIEH
Acenaphthylene	170	420	920	CIEH
Acenaphthene	210	510	1100	CIEH
Fluorene	170	400	860	CIEH
Phenanthrene	95	220	440	CIEH
Anthracene	2400	5400	11000	CIEH
Fluoranthene	280	560	890	CIEH
Pyrene	620	1200	2000	CIEH
Benzo(a)anthracene	7.2	11	13	CIEH
Chrysene	15	22	27	CIEH
Benzo(b)fluoranthene	2.6	3.3	3.7	CIEH
Benzo(k)fluoranthene	77	93	100	CIEH
Benzo(a)pyrene	2.2	2.7	3.0	CIEH
Indeno(123cd)pyrene	27	36	41	CIEH
Dibenzo(ah)anthracene	0.24	0.28	0.3	CIEH
Benzo(ghi)perylene	320	340	350	CIEH

- If results exceed the limit of laboratory detection then results should be compared with assessment criteria agreed with Neath Port Talbot Council

4.2.1 Capping Soils (Continued)

Table 4.2 (Continued) Guideline Values - Imported Soils and Aggregate				
Determinant	Comparable Guideline Value (mg/kg)			Source
<u>Aliphatic</u>	1% SOM	2.5% SOM	6% SOM	
PH C5 – C6 Ali	42	78	160	CIEH
PH C6 – C8 Ali	100	23	530	CIEH
PH C8 – C10 Ali	27	65	150	CIEH
PH C10 – C12 Ali	130	330	760	CIEH
PH C12 – C16 Ali	1100	2400	430	CIEH
PH C16 – C35 Ali*	65000	92000	110000	CIEH
PH C21 – C35 Ali*	65000	92000	110000	CIEH
PH C35 – C44 Ali	65000	92000	110000	CIEH
<u>Aromatic</u>				
PH C5 – C7 Arom	70	140	300	CIEH
PH C7 – C8 Arom	130	290	660	CIEH
PH C8 – C10 Arom	34	83	190	CIEH
PH C10 – C12 Arom	74	180	380	CIEH
PH C12 – C16 Arom	140	330	660	CIEH
PH C16 – C21 Arom	260	540	930	CIEH
PH C21 – C35 Arom	1100	1500	1700	CIEH
PH C35 – C44 Arom	1100	1500	1700	CIEH

4.3 New Housing Footprints

Beneath the footprint of the former flats (demolished by December 2019) a horizon of made ground was encountered which was seen to locally contain LMW hydrocarbons (Aliphatic TPH C8 – C10, Aromatic TPH C10 – C12 and Naphthalene). These determinants are potentially volatile and we therefore recommend that this layer of made ground be excavated out from beneath the footprint of the new housing and either placed in landscaped areas beneath a no-dig barrier and a 600mm cap of 'clean' soil, or hardstanding, or disposed off-site to an appropriate facility based on the soils European Waste Code (EWC).

The footprints of the former and proposed buildings are presented in **Drawing 02**, presented at the rear of this report.

The following sequence is recommended to address the risk from soil potentially containing Volatile Organic Compounds;

1. The areas where new buildings intercept the former building footprints should be set-out by a surveyor
2. A Geo-environmental Engineer should be in attendance to observe the excavation of the made ground from these area until boulder clay is reached. A photographic record should be kept.
3. The exposed boulder clay should be tested for TPHCWG and PAH to confirm the absence of potentially volatile species in excess of the Generic Assessment Criteria (GAC) for a residential setting.
4. The excavated soils should be segregated from other site soils.
5. If the soil is to be disposed off-site it should be classified in accordance Environment Agency Publication WM3 to derive an appropriate European Waste Code (EWC) and disposed to an appropriate licenced facility by a licensed haulier. All records pertaining to the transfer should be retained for the Validation Report.
6. If excavated soils are to be reused on-site for earthworks reference should be made to CL:AIRE Document Definition of Waste: Development Industry Code of Practice regarding procedures for Material Management.

4.4 Buried Services

All underground service trenches should be lined with a high visibility geotextile. Service trenches should then be infilled with clean material which satisfies the criteria in Table 4.1.

4.5 Management and Disposal of Excavated Materials

All excavated materials should be managed and stored appropriately in a controlled manner to ensure protection of site construction workers and neighbouring site users, and to prevent the transfer of contamination to other areas of the site.

Excavated made ground may be disposed of at landfill following classification in accordance with Environment Agency protocol detailed in 'Technical Guidance WM3 – Waste Classification - Guidance on the Classification and Assessment of Waste'.

Waste transfer and disposal must be undertaken by an authorized person. A waste transfer note must accompany each load and records should be maintained for the validation report.

If materials are deemed suitable for re-use on another development sites they should be transported under an appropriate permit or exemption.

4.6 Potable Water Supply

A Potable Water Pipe Material Assessment should be performed and pipes designed to UK Water Industry Research guidance; Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites, UKWIR Report Ref: 10/WM/03/21.

Information detailing the design, installation and validation of water pipes should be provided by the client for review by the Neath Port Talbot Pollution Control Officer prior to installation.

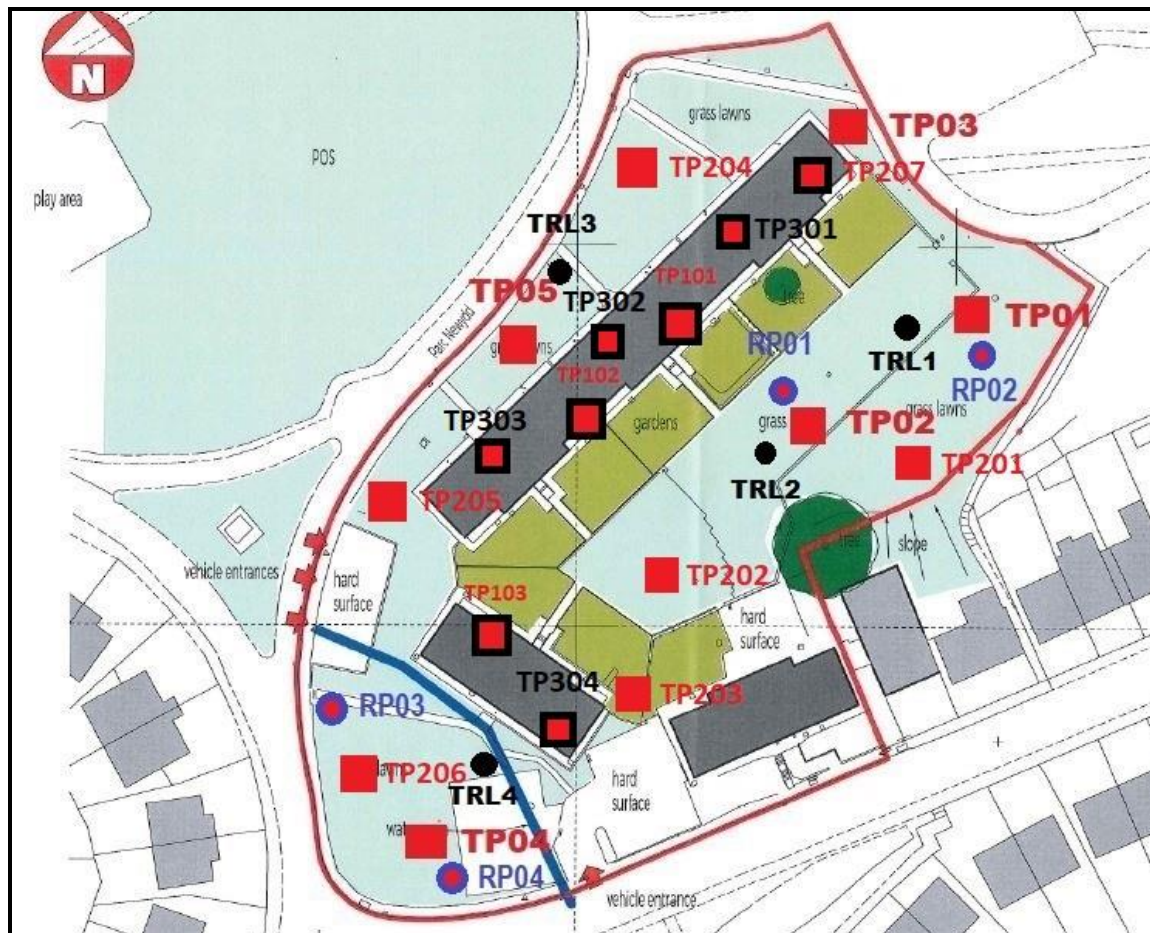
SECTION 5 Verification and Validation Works

An Environmental Consultant must verify that the remediation works have been carried out to the satisfaction of the authorities and client.

Following completion of the works, a verification report should be compiled demonstrating the completion and effectiveness of the works set out in the Remediation Strategy.

The Verification Report should include, but not be limited to, the following:

1. Confirmation of the removal, from housing footprints, of made ground containing potentially volatile species, including photographs and test results from soil validation samples
2. A record of the number of imported soil/aggregate sources and their respective volumes and records pertaining to these deliveries.
3. Details of the source, chemistry and supplier of all imported soils /aggregate
4. Chemical test certificates for imported soils/aggregate where available from the provider.
5. Chemical test data and confirmation of thickness of capping soils.
6. Transfer Notes for all off-site disposals.
7. Appropriate permits or exemptions for any materials re-used off-site.
8. A Potable Water Materials Assessment performed by the provider.

DRAWING 01. Sample Locations

DRAWING 02. Previous and Proposed Building Footprints

