

**REMEDIATION METHOD STATEMENT
FORMER ST TYDFIL HOSPITAL
MERTHYR TYDFIL
ST TYDFILS DEVELOPMENTS LLP
RMS-21988-21-228
JUNE 2021**

IDOM



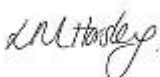
REMEDIATION METHOD STATEMENT
FORMER ST TYDFIL HOSPITAL
MERTHYR TYDFIL
ST TYDFILS DEVELOPMENTS LLP
RMS-21988-21-228
JUNE 2021

Current Document Details

Authors

Ryan Lindsay
Tim Crowe

Approved by



.....
Lisa Horsley

Issued by



.....
Tim Crowe

M:\Jobs 21000-22000\21988 Merthyr Tydfil Hospital\4.0 Project Documents\4.13
Reports\4.13.4 RMS\RMS-21988-21-228 for checking .docx

Document Revisions

Rev	Date	Author	Approved	Issued	Remarks
-	28-05-21	TPC	LMH	TPC	-

Report issued from

DERBYSHIRE Cromford Mills, Mill Lane, Matlock, Derbyshire. DE4 3RQ Tel: 01773 829988

TABLE OF CONTENTS

SECTION 1	INTRODUCTION	1
SECTION 2	SITE INFORMATION	2
2.1	CURRENT SITE CONDITIONS	2
2.2	GEOLOGY, HYDROGEOLOGY AND HYDROLOGY	2
SECTION 3	INTRUSIVE INVESTIGATIONS – SUMMARY OF POLLUTANT LINKAGES ..	2
3.1	INTRODUCTION.....	2
3.2	THE GENERAL PUBLIC AND CURRENT SITE USERS.....	3
3.3	CONSTRUCTION WORKERS	3
3.4	USERS OF THE FUTURE DEVELOPMENT	4
3.5	GROUND GAS.....	4
3.6	CONTROLLED WATERS	4
3.7	ADJACENT LAND.....	5
3.8	INFRASTRUCTURE.....	5
3.9	SUMMARY	5
SECTION 4	REMEDIATION STRATEGY	6
4.1	INTRODUCTION.....	6
4.2	CONSTRUCTION WORKERS	7
4.3	USERS OF THE FUTURE DEVELOPMENT	7
4.4	GROUND GAS.....	13
4.5	CONTROLLED WATERS	14
4.6	ADJACENT LAND.....	14
4.7	INFRASTRUCTURE	15
4.8	UNEXPECTED CONTAMINATION	15
4.9	WASTE CLASSIFICATION, OFF-SITE DISPOSAL OR RE-USE	15
SECTION 5	ASBESTOS MANAGEMENT PLAN	16
5.1	INTRODUCTION.....	16
5.2	IDENTIFICATION OF AREA AFFECTED BY ASBESTOS	17
5.3	RISK ASSESSMENT	17
5.4	GENERAL PROCEDURE FOR SERVICE TRENCHES	17
5.5	GENERAL PROCEDURE FOR PLANT DECONTAMINATION	17
5.6	GENERAL PROCEDURE FOR TEMPORARY STOCKPILES	17
5.7	ASBESTOS AWARENESS.....	18
5.8	LICENSED ASBESTOS REMOVAL CONTRACTOR (LARC)	18
5.9	PPE AND RPE	18
5.10	STAFF/RESPONSIBILITIES.....	19
5.11	GENERAL ACMS BONDED	19
5.12	FRIABLE AND FIBROUS ASBESTOS	19
5.13	CACHE PROCEDURES	21
5.14	VALIDATION FOLLOWING REMOVAL OF CACHE.....	21
5.15	WASTE HANDLING.....	22
5.16	EMERGENCY PROCEDURES	22
5.17	DUST CONTROLS	22

5.18	ASBESTOS AIR MONITORING	22
5.19	SITE HYGIENE	23
SECTION 6	MATERIALS MANAGEMENT PLAN	23
SECTION 7	VERIFICATION PLAN	23
SECTION 8	RE-USE CONSIDERATIONS	25
8.1	OFF-SITE WASTE	25
SECTION 9	ENVIRONMENTAL CONTROLS	26
9.1	INTRODUCTION	26
9.2	EMISSIONS CONTROLS	26
SECTION 10	REPORTING	26
SECTION 11	CONCLUSIONS	27
APPENDIX 1		
▪	Drawings	

SECTION 1 INTRODUCTION

- 1.1 St Tydfils Developments LLP proposes to develop an area of land located at the Former St Tydfil Hospital for residential development purposes. From a Spring Design planning drawing, the proposed development comprises 70 dwellings arranged as: eight dwellings in a single apartment block and the remainder as single and double plots with gardens.
- 1.2 IDOM Merebrook Limited (IDOM) has been commissioned by St Tydfils Developments LLP (St Tydfils) to prepare a scope of remedial works to mitigate risks to the development from ground contamination in accordance with current guidance on the management of contamination risks.
- 1.3 Desk based and intrusive investigations have previously been completed for the site by IDOM and have been reviewed in preparation of this document. It is recommended they be read in conjunction with this remediation method statement. Details of the reports have been listed below:
- i.* IDOM Merebrook Ltd, *Phase 1 Assessment*, Ref: DS-21988-19-321 Rev A, Dated August 2020; and,
 - ii.* IDOM Merebrook Ltd, *Geo-Environmental Assessment*, Ref: GEA-21988-21-80 Rev A, Dated May 2021.
- 1.4 This Remedial Method Statement provides further details regarding the remediation methods, validation techniques / requirements and environmental controls to be applied during the development works.
- 1.5 The objectives of this report are to:
- i.* Summarise the contamination present at the site and any significant pollutant linkages identified;
 - ii.* Present the details of a remedial strategy;
 - iii.* Set out the validation procedures and techniques to be employed to ensure that the remedial works are effective; and
 - iv.* Set out the required acceptance criteria for site-derived soils and imported soils which are to be used in the works.
- 1.6 This report has been prepared for St Tydfils Developments LLP for the sole purpose described above and no extended duty of care to any third party is implied or offered. Third parties making reference to the report should consult St Tydfils Developments LLP and IDOM as to the extent to which the findings may be appropriate for their use.

SECTION 2 SITE INFORMATION

2.1 CURRENT SITE CONDITIONS

- 2.1.1 The site is located approximately 150 m east of Merthyr Tydfil High Street and immediately west of the Thomastown Park Recreation Ground. The access to site is along Upper Thomas Street and along the tarmacked road on the southern side of a small public park.
- 2.1.2 The site occupies an area of approximately 2.12 hectares and during the previous visits by IDOM was found to be unoccupied with some unoccupied buildings. Several material stockpiles were identified across the site following demolition works previously undertaken on the site
- 2.1.3 Evidence of potential contamination included suspected asbestos cement fragments and fibrous materials noted lying across the surface of site, suspected lagged pipes in ducts, and a banded material suspected as being related to fuel storage tanks. In addition, Japanese knotweed was noted in two areas on the eastern site boundary.

2.2 GEOLOGY, HYDROGEOLOGY AND HYDROLOGY

- 2.2.1 Geological mapping indicates that the site hosts superficial drift deposits of Devensian Till overlaying the South Wales Lower Coal Measures. These measures comprise sequences of coal-bearing mudstones/siltstones with seatearths and sandstone units.
- 2.2.2 The superficial Devensian Till deposits on site are classified by the Environment Agency as a Secondary Aquifer with undifferentiated layers. The bedrock South Wales Lower Coal Measures is classified as a Secondary (a) Aquifer with permeable layers.
- 2.2.3 No source protection zones or groundwater abstraction licences were identified within 500 m or 1 km, respectively, of the site.
- 2.2.4 The Nant Morlais located 250 m east west of the site, flows northeast to south west, and is a tributary of the River Taff located 600 m west of the site. There are no surface water abstraction licences within 1 km of the site.

SECTION 3 INTRUSIVE INVESTIGATIONS – SUMMARY OF POLLUTANT LINKAGES

3.1 INTRODUCTION

- 3.1.1 The potential sources of contamination at the site and the implications with respect to development have been interpreted in accordance with the current government guidance on source-pathway-receptor risk assessment. A full risk assessment and conceptual site model has been included within the Geo-Environmental assessment detailed in section 1.3.

- 3.1.2 When compared to a suitable for use screening level for a residential property where there is potential for intake of homegrown produce, exceedances of metals, metalloids, PAHs and asbestos fibres were identified sporadically within the made ground on the site.
- 3.1.3 Visible asbestos containing materials were identified within the stockpiles and *in-situ* made ground on site in the form of asbestos cement, floor tiles and potential asbestos containing lagging and ducts.
- 3.1.4 Slightly elevated concentrations of carbon dioxide ground gas were identified requiring basic gas protection measures for certain structures.
- 3.1.5 These contaminants are considered for their potential to act as sources for a number of pollutant linkages.
- 3.1.6 The potential impacts of contamination sources have been considered with respect to the following receptors:
- i.* The general public and current site users;
 - ii.* Construction workers;
 - iii.* Users of future development;
 - iv.* Controlled waters (groundwater and surface water);
 - v.* Adjacent land; and,
 - vi.* Infrastructure.
- 3.1.7 In each case the existence of a pollutant linkage requires a pathway by which the receptor could be exposed to the source. A qualitative assessment of risk is considered with respect to the site in its current condition, taking account of risks identified in the previous investigation, which is summarised in the sections below.
- 3.2 **THE GENERAL PUBLIC AND CURRENT SITE USERS**
- 3.2.1 Unauthorised access to the site is possible by members of the public, however, is likely to be limited. Therefore, the risk to current users of the site is considered **Low**.
- 3.3 **CONSTRUCTION WORKERS**
- 3.3.1 Site workers undertaking construction operations could potentially be exposed to contaminated materials during soil handling (for instance in excavations *etc*). Exposure pathways could include direct ingestion, inhalation or via dermal contact.
- 3.3.2 The main risk to workers is considered to arise from dust inhalation which may include asbestos fibres as a result of deterioration of asbestos containing materials. The risk to construction workers is considered **Moderate**.

3.4 USERS OF THE FUTURE DEVELOPMENT

- 3.4.1 Soil contamination has been identified within the made ground in excess of generic assessment criteria for a residential development with homegrown produce.
- 3.4.2 Exceedances of metals, metalloids, asbestos and PAHs found within the made ground would all present a risk to future users via the oral, dust and dermal pathways. Inhalation exposures from these contaminants are not considered likely. Uptake via consumption of home-grown produce is possible but would likely contribute a minor component of residents' exposure. However, this risk appears to be localised to small areas of the surface soil.
- 3.4.3 Without mitigation the risks to future users from solid ground contaminants is **Moderate**

3.5 GROUND GAS

- 3.5.1 The site does not lie in a radon affected area and no volatile contamination has been identified by the site investigations.
- 3.5.2 A gas risk assessment following six rounds of gas monitoring has been completed for the site. The assessment indicates that the site should be classed as Green in accordance with the NHBC guidelines for low rise residential housing with a beam and block floor and clear 150 mm ventilated sub-floor void. For alternative construction types which do not align with the NHBC assumptions (*i.e.* apartments or houses without a ventilated sub-floor void), BS8485 suggests that Characteristic Situation 2 is appropriate *i.e.* low risk but requiring basic gas protection measures.

3.6 CONTROLLED WATERS

- 3.6.1 Made ground is generally unsaturated. The risks associated with contamination from made ground soils impacting the underlying secondary A aquifer are considered to be low.
- 3.6.2 The site was found to be consistently underlain by cohesive clays which represents a substantial aquitard preventing water movement vertically downwards to the principal aquifer.
- 3.6.3 No current plausible pathways to any surface water body have been identified.
- 3.6.4 Should building design be changed to incorporate deep piling activities this assessment may change.
- 3.6.5 The risk of pollution to controlled groundwaters from on-site sources is considered to be **Negligible**.

- 3.6.6 Surface waters are not considered to be significantly connected to the site via active pathways. Taken together with the lack of significant sources of mobile contaminants, the risk to surface waters is considered **Negligible**.

3.7 **ADJACENT LAND**

- 3.7.1 The contaminants identified on the site are not considered to be of magnitude or mobility such that they would present a risk of ground migration to adjacent land. In its current condition the risk presented by the site to adjacent land is considered to be **Negligible**
- 3.7.2 Ground gas levels and borehole gas flows do not indicate a significant risk of hazardous gas migration from the site, and as such the risk to adjacent land from gas migration is considered **Negligible**.
- 3.7.3 Due to the presence of asbestos fibres within the soils and visible asbestos containing materials, the risk from fugitive fibre is considered present. The risk is expected to be active during remediation, groundworks and construction phases which could disturb soils containing fibres and disturb or cause deterioration of bulk ACMs. The risk to adjacent land is considered **Moderate**.
- 3.7.4 An asbestos management plan should be put in place by the remediation / groundworks contractor prior to commencing the works. The asbestos management plan should set out in line with the Control of Asbestos Regulations (CAR) 2012. Material should be processed using control measures to minimise the risk of fibre release.

3.8 **INFRASTRUCTURE**

- 3.8.1 Contamination with the potential to permeate polymeric services has been identified by this investigation, as hydrocarbons and PAH. It is recommended that the utility provider is consulted with respect to their requirements for water supply pipes.
- 3.8.2 Utility companies apply strict guideline levels on use of polymeric pipes and may consider all made ground unsuitable for typical plastic pipe materials to be used.

3.9 **SUMMARY**

- 3.9.1 The risks identified in section 3 above are summarised below:

Receptor	Pathway/ source	Assessed Risk	Action required
General public and current site users	Ingestion, inhalation, dermal contact from soil/ ground materials	Moderate	Yes
Construction workers	Ingestion, inhalation, dermal contact from soil/ ground materials	Moderate	Yes

Receptor	Pathway/ source	Assessed Risk	Action required
Users of future development	Ingestion, inhalation, dermal contact from soil/ ground materials	Moderate	Yes
	Hazardous gas entering building	Low	Yes – for some structures
Controlled waters	Contaminants migrating to groundwater	Negligible	No
	Contaminants migrating to Surface water	Negligible	No
Adjacent land	Solid contaminants migrating by airborne pathways to affect adjacent land or its users	Low	Yes
	Contaminants migrating within the ground to affect adjacent land or its users	Negligible	No
Infrastructure	Effects on or permeation through water services	Low to Moderate	Yes

SECTION 4 REMEDIATION STRATEGY

4.1 INTRODUCTION

- 4.1.1 Identified contamination at the site can be characterised by exceedances of metals, metalloids, asbestos and PAHs found within the made ground.
- 4.1.2 The proposed development consists of residential development with private gardens, public soft landscaping space, hardstanding and associated infrastructure.
- 4.1.3 The measures identified to be necessary for the remediation of this site are considered to be the following;
- i. A suitably verified clean-cover system in areas devoid of hardstanding, consisting of imported materials, over a geo-textile membrane;
 - ii. Provision of Characteristic Situation 2 gas protection (3.5 points) for any structures which do not align with the NHBC standard assumptions (*i.e.* gas protection will be required for apartments and any dwellings without a clear ventilated sub-floor void); and

iii. Suitable verification of remediation measures.

4.2 CONSTRUCTION WORKERS

4.2.1 All construction workers will be made aware of the potentially contaminated nature of the ground prior to the commencement of works. The principal contractor will be required to have a health, safety and environmental management plan in place which should include asbestos management controls.

4.3 USERS OF THE FUTURE DEVELOPMENT

4.3.1 A clean soil cover system will be required in all areas of the site although will not be required beneath buildings or hardstandings. The cover system shall comprise a geotextile membrane beneath a combination of subsoil and topsoil to variable depths across the site.

4.3.1.1 Any geotextile membrane to be used within the clean cover system must not be subject to degradation and must be robust enough to last the lifetime of the proposed development. Details of the membrane should be supplied to IDOM prior to use on site. Technical specification details of the membrane will be included within the validation report.

4.3.2 Proposed depths of the clean cover defined by usage have been summarised in the table below:

Table 2: Clean cover depth requirements

Area	Clean cover depth requirements
Private Gardens	600 mm
Shared Gardens	450 mm
Public open space	300 mm

4.3.3 The clean cover shall comprise imported validated clean sub-soil and topsoil. A testing import strategy should be implemented to ensure they comply with the specific acceptance criteria for reuse. The tables below provide the chemical criteria for each material type in different re-use scenarios.

4.3.4 Table 3 below refers to soils intended for reuse within residential gardens that would be considered to be sub-soil. The criteria below are derived from *Suitable for Use Levels* (S4ULs) published in 2015 by LQM/CIEH for a residential property with provision for homegrown produce assuming a soil organic matter (SOM) of 1%.

Table 3: Summary of acceptability criteria for sub-soil reuse within private gardens

CONTAMINANT	UNITS	ACCEPTANCE CRITERIA
Asbestos in soil	-	none
pH	-	5-9

CONTAMINANT	UNITS	ACCEPTANCE CRITERIA
Arsenic	mg.kg ⁻¹	37
Cadmium	mg.kg ⁻¹	11
Chromium (total)	mg.kg ⁻¹	910
Hexavalent Chromium	mg.kg ⁻¹	6
Lead	mg.kg ⁻¹	200
Mercury	mg.kg ⁻¹	40
Nickel	mg.kg ⁻¹	130
Selenium	mg.kg ⁻¹	250
TPH Aliphatic >EC ₅ - EC ₆	mg.kg ⁻¹	42
TPH Aliphatic >EC ₆ - EC ₈	mg.kg ⁻¹	100
TPH Aliphatic >EC ₈ - EC ₁₀	mg.kg ⁻¹	27
TPH Aliphatic >EC ₁₀ - EC ₁₂	mg.kg ⁻¹	130
TPH Aliphatic > EC ₁₂ - EC ₁₆	mg.kg ⁻¹	1100
TPH Aliphatic >EC ₁₆ – EC ₂₁	mg.kg ⁻¹	65000
TPH Aliphatic >EC ₂₁ – EC ₃₅	mg.kg ⁻¹	65000
TPH Aromatic >EC ₅ - EC ₇	mg.kg ⁻¹	70
TPH Aromatic >EC ₇ - EC ₈	mg.kg ⁻¹	130
TPH Aromatic >EC ₈ - EC ₁₀	mg.kg ⁻¹	34
TPH Aromatic >EC ₁₀ - EC ₁₂	mg.kg ⁻¹	74
TPH Aromatic >EC ₁₂ - EC ₁₆	mg.kg ⁻¹	140
TPH Aromatic >EC ₁₆ - EC ₂₁	mg.kg ⁻¹	260
TPH Aromatic >EC ₂₁ – EC ₃₅	mg.kg ⁻¹	1100
Acenaphthene	mg.kg ⁻¹	210
Acenaphthylene	mg.kg ⁻¹	170
Anthracene	mg.kg ⁻¹	2400
Benz(a)anthracene	mg.kg ⁻¹	7.2
Benzo(a)pyrene	mg.kg ⁻¹	2.2
Benzo(b)fluoranthene	mg.kg ⁻¹	2.6
Benzo(ghi)perylene	mg.kg ⁻¹	320
Benzo(k)fluoranthene	mg.kg ⁻¹	77
Chrysene	mg.kg ⁻¹	15
Dibenz(ah)anthracene	mg.kg ⁻¹	0.24
Fluoranthene	mg.kg ⁻¹	280
Fluorene	mg.kg ⁻¹	170
Indeno(123-cd)pyrene	mg.kg ⁻¹	27
Naphthalene	mg.kg ⁻¹	2.3
Phenanthrene	mg.kg ⁻¹	95
Pyrene	mg.kg ⁻¹	620
Phytotoxins	Units	
Copper	mg.kg ⁻¹	200
Nickel	mg.kg ⁻¹	110
Zinc	mg.kg ⁻¹	300

- 4.3.5 Table 4 below refers to soils intended for reuse within residential gardens that would be considered to be Topsoil. The criteria below are derived from *Suitable for Use Levels* (S4ULs) published in 2015 by LQM/CIEH for a residential property with provision for homegrown produce assuming a SOM of 2.5%. A higher SOM has been adopted due to topsoil having a higher organic content due to its inherent nature.

Table 4: Summary of acceptability criteria for topsoil reuse within private gardens

CONTAMINANT	UNITS	ACCEPTANCE CRITERIA
Asbestos in soil	-	none
pH	-	5-9
Arsenic	mg.kg ⁻¹	37
Cadmium	mg.kg ⁻¹	11
Chromium (total)	mg.kg ⁻¹	910
Hexavalent Chromium	mg.kg ⁻¹	6
Lead	mg.kg ⁻¹	200
Mercury	mg.kg ⁻¹	40
Nickel	mg.kg ⁻¹	130
Selenium	mg.kg ⁻¹	250
TPH Aliphatic >EC ₅ - EC ₆	mg.kg ⁻¹	78
TPH Aliphatic >EC ₆ - EC ₈	mg.kg ⁻¹	230
TPH Aliphatic >EC ₈ - EC ₁₀	mg.kg ⁻¹	65
TPH Aliphatic >EC ₁₀ - EC ₁₂	mg.kg ⁻¹	330
TPH Aliphatic > EC ₁₂ - EC ₁₆	mg.kg ⁻¹	2400
TPH Aliphatic >EC ₁₆ - EC ₂₁	mg.kg ⁻¹	92000
TPH Aliphatic >EC ₂₁ - EC ₃₅	mg.kg ⁻¹	92000
TPH Aromatic >EC ₅ - EC ₇	mg.kg ⁻¹	140
TPH Aromatic >EC ₇ - EC ₈	mg.kg ⁻¹	290
TPH Aromatic >EC ₈ - EC ₁₀	mg.kg ⁻¹	83
TPH Aromatic >EC ₁₀ - EC ₁₂	mg.kg ⁻¹	180
TPH Aromatic >EC ₁₂ - EC ₁₆	mg.kg ⁻¹	330
TPH Aromatic >EC ₁₆ - EC ₂₁	mg.kg ⁻¹	540
TPH Aromatic >EC ₂₁ - EC ₃₅	mg.kg ⁻¹	1500
Acenaphthene	mg.kg ⁻¹	510
Acenaphthylene	mg.kg ⁻¹	420
Anthracene	mg.kg ⁻¹	5400
Benzo(a)anthracene	mg.kg ⁻¹	11
Benzo(a)pyrene	mg.kg ⁻¹	2.7
Benzo(b)fluoranthene	mg.kg ⁻¹	3.3
Benzo(ghi)perylene	mg.kg ⁻¹	340
Benzo(k)fluoranthene	mg.kg ⁻¹	93
Chrysene	mg.kg ⁻¹	22
Dibenz(ah)anthracene	mg.kg ⁻¹	0.28
Fluoranthene	mg.kg ⁻¹	560

CONTAMINANT	UNITS	ACCEPTANCE CRITERIA
Fluorene	mg.kg ⁻¹	400
Indeno(123-cd)pyrene	mg.kg ⁻¹	36
Naphthalene	mg.kg ⁻¹	5.6
Phenanthrene	mg.kg ⁻¹	220
Pyrene	mg.kg ⁻¹	1200
Phytotoxins	Units	
Copper	mg.kg ⁻¹	200
Nickel	mg.kg ⁻¹	110
Zinc	mg.kg ⁻¹	300

- 4.3.6 Table 5 below refers to soils intended for reuse within public open space that would be considered to be sub-soil. The criteria below are derived from *Suitable for Use Levels* (S4ULs) published in 2015 by LQM/CIEH for a residential property with provision for homegrown produce assuming a soil organic matter (SOM) of 1%.

Table 5: Summary of acceptability criteria for sub-soil reuse in public open space areas

CONTAMINANT	UNITS	ACCEPTANCE CRITERIA
Asbestos in soil	-	none
pH	-	5-9
Arsenic	mg.kg ⁻¹	79
Cadmium	mg.kg ⁻¹	120
Chromium (total)	mg.kg ⁻¹	1500
Hexavalent Chromium	mg.kg ⁻¹	7.7
Lead	mg.kg ⁻¹	630
Mercury	mg.kg ⁻¹	120
Nickel	mg.kg ⁻¹	230
Selenium	mg.kg ⁻¹	1100
TPH Aliphatic >EC ₅ - EC ₆	mg.kg ⁻¹	570000
TPH Aliphatic >EC ₆ - EC ₈	mg.kg ⁻¹	600000
TPH Aliphatic >EC ₈ - EC ₁₀	mg.kg ⁻¹	13000
TPH Aliphatic >EC ₁₀ - EC ₁₂	mg.kg ⁻¹	13000
TPH Aliphatic >EC ₁₂ - EC ₁₆	mg.kg ⁻¹	13000
TPH Aliphatic >EC ₁₆ - EC ₂₁	mg.kg ⁻¹	250000
TPH Aliphatic >EC ₂₁ - EC ₃₅	mg.kg ⁻¹	250000
TPH Aromatic >EC ₅ - EC ₇	mg.kg ⁻¹	56000
TPH Aromatic >EC ₇ - EC ₈	mg.kg ⁻¹	56000
TPH Aromatic >EC ₈ - EC ₁₀	mg.kg ⁻¹	5000
TPH Aromatic >EC ₁₀ - EC ₁₂	mg.kg ⁻¹	5000
TPH Aromatic >EC ₁₂ - EC ₁₆	mg.kg ⁻¹	5100
TPH Aromatic >EC ₁₆ - EC ₂₁	mg.kg ⁻¹	3800
TPH Aromatic >EC ₂₁ - EC ₃₅	mg.kg ⁻¹	3800

CONTAMINANT	UNITS	ACCEPTANCE CRITERIA
Acenaphthene	mg.kg ⁻¹	15000
Acenaphthylene	mg.kg ⁻¹	15000
Anthracene	mg.kg ⁻¹	74000
Benz(a)anthracene	mg.kg ⁻¹	29
Benzo(a)pyrene	mg.kg ⁻¹	5.7
Benzo(b)fluoranthene	mg.kg ⁻¹	7.1
Benzo(ghi)perylene	mg.kg ⁻¹	640
Benzo(k)fluoranthene	mg.kg ⁻¹	190
Chrysene	mg.kg ⁻¹	57
Dibenz(ah)anthracene	mg.kg ⁻¹	0.57
Fluoranthene	mg.kg ⁻¹	3100
Fluorene	mg.kg ⁻¹	9900
Indeno(123-cd)pyrene	mg.kg ⁻¹	82
Naphthalene	mg.kg ⁻¹	4900
Phenanthrene	mg.kg ⁻¹	3100
Pyrene	mg.kg ⁻¹	7400
Phytotoxins	Units	
Copper	mg.kg ⁻¹	200
Nickel	mg.kg ⁻¹	110
Zinc	mg.kg ⁻¹	300

4.3.6.1 Table 6 below refers to soils intended for reuse within public open space that would be considered to be Topsoil. The criteria below are derived from *Suitable for Use Levels* (S4ULs) published in 2015 by LQM/CIEH for a residential property with provision for homegrown produce assuming a SOM of 2.5%. A higher SOM has been adopted due to topsoil having a higher organic content due to its inherent nature.

Table 6: Summary of acceptability criteria for topsoil reuse within public open space

CONTAMINANT	UNITS	ACCEPTANCE CRITERIA
Asbestos in soil	-	none
pH	-	5-9
Arsenic	mg.kg ⁻¹	79
Cadmium	mg.kg ⁻¹	120
Chromium (total)	mg.kg ⁻¹	1500
Hexavalent Chromium	mg.kg ⁻¹	7.7
Lead	mg.kg ⁻¹	630
Mercury	mg.kg ⁻¹	120
Nickel	mg.kg ⁻¹	230
Selenium	mg.kg ⁻¹	1100
TPH Aliphatic >EC ₅ - EC ₆	mg.kg ⁻¹	590000

CONTAMINANT	UNITS	ACCEPTANCE CRITERIA
TPH Aliphatic >EC ₆ - EC ₈	mg.kg ⁻¹	610000
TPH Aliphatic >EC ₈ - EC ₁₀	mg.kg ⁻¹	13000
TPH Aliphatic >EC ₁₀ - EC ₁₂	mg.kg ⁻¹	13000
TPH Aliphatic >EC ₁₂ - EC ₁₆	mg.kg ⁻¹	13000
TPH Aliphatic >EC ₁₆ - EC ₂₁		250000
TPH Aliphatic >EC ₂₁ - EC ₃₅		250000
TPH Aromatic >EC ₅ - EC ₇	mg.kg ⁻¹	56000
TPH Aromatic >EC ₇ - EC ₈	mg.kg ⁻¹	56000
TPH Aromatic >EC ₈ - EC ₁₀	mg.kg ⁻¹	5000
TPH Aromatic >EC ₁₀ - EC ₁₂	mg.kg ⁻¹	5000
TPH Aromatic >EC ₁₂ - EC ₁₆	mg.kg ⁻¹	5100
TPH Aromatic >EC ₁₆ - EC ₂₁	mg.kg ⁻¹	3800
TPH Aromatic >EC ₂₁ - EC ₃₅	mg.kg ⁻¹	3800
Acenaphthene	mg.kg ⁻¹	15000
Acenaphthylene	mg.kg ⁻¹	15000
Anthracene	mg.kg ⁻¹	74000
Benz(a)anthracene	mg.kg ⁻¹	29
Benzo(a)pyrene	mg.kg ⁻¹	5.7
Benzo(b)fluoranthene	mg.kg ⁻¹	7.2
Benzo(ghi)perylene	mg.kg ⁻¹	640
Benzo(k)fluoranthene	mg.kg ⁻¹	190
Chrysene	mg.kg ⁻¹	57
Dibenz(ah)anthracene	mg.kg ⁻¹	0.57
Fluoranthene	mg.kg ⁻¹	3100
Fluorene	mg.kg ⁻¹	9900
Indeno(123-cd)pyrene	mg.kg ⁻¹	82
Naphthalene	mg.kg ⁻¹	4900
Phenanthrene	mg.kg ⁻¹	3100
Pyrene	mg.kg ⁻¹	7400
Phytotoxins	Units	
Copper	mg.kg ⁻¹	200
Nickel	mg.kg ⁻¹	110
Zinc	mg.kg ⁻¹	300

- 4.3.7 In addition to the above chemical criteria, it shall be ensured that the imported soils are free from any staining, odours or deleterious materials. Furthermore, any additional soil nutrient or contaminant specifications required by the landscape designer will be met.
- 4.3.8 Material imported for the formation of domestic gardens and landscaped areas should be obtained from a validated source. The validation should incorporate an assessment of the provenance of the material and chemical analysis. Independent validation of the chemical quality and thickness of clean cover will also be required.

- 4.3.9 All soils intended for reuse on the site will be required to be tested for chemical suitability prior to import. The testing frequencies have been summarised in the table below:

Table 7: Summary of required topsoil and subsoil validation testing

Material Type	Sampling Frequency
Virgin Quarried Material	1-2 to confirm inert nature of material
Crushed hardcore, stone, brick	1/1000m3
Greenfield/ Manufactured soils	Minimum 3 or 1 per 250 m3
Brownfield/Screened Soils	Minimum 6 or one per 100m3

- 4.3.10 Depth checks on the soft landscaping will be completed by a suitably trained environmental engineer at rates specified below:

- i. One front garden and one rear garden inspection pit for every four plots; and,
- ii. One inspection pit per 10 m x 10 m square in all POS areas.

4.4 **GROUND GAS**

- 4.4.1 For structures which align with the assumptions in NHBC guidance (*i.e.* low rise housing with a beam and block floor and ventilated underfloor void), no additional gas protection measures are required.
- 4.4.2 For other structures (*i.e.* apartments or dwellings without a clear ventilated sub-floor void) then basic gas protection measures commensurate with Characteristic Situation 2 are required and should achieve 3.5 gas protection points using the BS8485 system. There are various ways to achieve the required points depending on the floor slab construction, however typically either i) a combination of good performance passive sub-floor dispersal plus a verified gas resistant membrane will be required or, alternatively ii) a solid slab and a verified membrane could achieve the required points. Further options to achieve the required points are set out below.

BS 8485:2015+A1:2019 Gas Protection Measures - refer to standard for full guidance					
Select two or more elements from the following three types of protection to achieve score (only one element per type permitted)					
Structural Barrier	Score ^{A)}	Ventilation Measures		Score	Gas Resistant Membrane
Precast suspended segmental subfloor (i.e. beam and block)	0	Pressure relief pathway (usually formed of low fines gravel or with a thin geocomposite blanket or strips terminating in a gravel trench external to the building)		0.5	Gas resistant membrane meeting all of the following criteria: 1. sufficiently impervious, both in the sheet material and in the sealing of sheets and sealing around sheet penetrations, to prevent any significant passage of methane and/or carbon dioxide through the membrane. <i>A membrane with a methane gas transmission rate <40.0 ml/day/m²/atm (average) for sheets and joints (tested in accordance with BS ISO 15105-1:2007 manometric method) is regarded as sufficiently impervious.</i> 2. sufficiently durable to remain serviceable for the anticipated life of the building and duration of gas emissions 3. sufficiently strong* to withstand the installation process and following trades until covered (e.g. penetration from steel fibres in fibre reinforced concrete, penetration of reinforcement ties, tearing due to working above it, dropping tools, etc) and to withstand in-service stresses (e.g. settlement if placed below a floor slab) 5. capable, after installation, of providing a complete barrier to the entry of the relevant gas 6. verified in accordance with CIRIA C735 * For example, reinforced LDPE (virgin polymer) membranes having a minimum mass per unit area of 370 g/m² and not significantly less than 0.4 mm thickness between the reinforcement scrim (tested in accordance with Procedure D (2 mm diameter tip) of BS EN ISO 9863-1:2016) installed above floor slabs are considered sufficiently strong to meet the performance criteria (see also C.3). Thicker and more robust membranes or an additional membrane protection layer should be installed directly beneath cast-in-situ floor slabs
Cast in situ ground-bearing floor slab (with only nominal mesh reinforcement)	0.5	Passive sub floor dispersal layer	Very good performance ^{E)}	2.5	
			Good performance ^{E)}	1.5	
Cast in situ monolithic reinforced ground bearing raft or reinforced cast in situ suspended floor slab with minimal penetrations	1 or 1.5 ^{B)}	Active dispersal layer, usually comprising fans with active abstraction (suction) from a subfloor dilution layer, with roof level vents. The dilution layer may comprise a clear void or be formed of geocomposite or polystyrene void formers ^{E)}		1.5 to 2.5	
Basement floor and walls conforming to BS 8102:2009, Grade 2 waterproofing ^{C) D)}	2	Active positive pressurization by the creation of a blanket of external fresh air beneath the building floor slab by pumps supplying air to points across the central footprint of the building into a permeable layer, usually formed of a thin geocomposite blanket ^{E)}		1.5 to 2.5	
Basement floor and walls conforming to BS 8102:2009, Grade 3 waterproofing ^{C) D)}	2.5	Ventilated car park (floor slab of occupied part of the building under consideration is underlain by a basement or undercroft car park) ^{F)}		4	

2

4.4.3 The design of the gas protection system should be reviewed to ensure it meets these requirements and the installation should be independently verified in accordance with CIRIA C735.

4.5 CONTROLLED WATERS

4.5.1 No significant risks to controlled waters have been identified.

4.6 ADJACENT LAND

4.6.1 During the earthworks and construction phase, the potential for contaminants to affect adjacent land has been assessed in relation to airborne dust migration. The principal control measure will therefore be the control of dust arising from all stockpile management, earthworks and construction activities. A Construction Environmental Management Plan should be put in place prior to any works commencing.

4.7 INFRASTRUCTURE

- 4.7.1 All concrete in the ground will be provided with protection in accordance with BRE publication *SD1 Concrete in aggressive ground*. Additional local testing may be necessary to establish the appropriate specification for materials in contact with made ground.
- 4.7.2 Water services will be provided with appropriate protection following guidance set out in UK Water Industry Research document *Guidance for the selection of water supply pipes to be used in brownfield sites*. Additional local testing will be necessary to establish the appropriate specification for materials.

4.8 UNEXPECTED CONTAMINATION

- 4.8.1 During site clearance and groundworks, any observations of ground conditions atypical of those already described should be reported to IDOM immediately so that an assessment of appropriate action can be made.

4.9 WASTE CLASSIFICATION, OFF-SITE DISPOSAL OR RE-USE

4.9.1 Waste Considerations

- 4.9.1.1 The presence of visible ACM in made ground soils would attract a hazardous waste classification for disposal. Where no visible ACMs are present and asbestos soil content is below 0.1% by weight, made ground soils are likely to attract a non-hazardous classification, however, it is likely that no made ground soils would be classified as inert based on investigation data. Any soils destined for landfill should be subject to waste acceptance (WAC) testing.
- 4.9.1.2 Materials, including waste soils which are not to be retained on site, should be removed and disposed of in accordance with all relevant statutes including the *Environmental Protection Act 1990* as amended, *The Controlled Waste Regulations 2012* as amended, *The Waste Regulations 2011* as amended, *The Hazardous Waste Regulations 2005* as amended, *The Waste Management Regulations 2006*, *The Environmental Permitting Regulations 2010* as amended and *The Hazardous Waste (Miscellaneous Amendments) Regulations 2015*.
- 4.9.1.3 It is a requirement of these regulations that waste sent to landfill should have been subject to measures to reduce the amount of waste, reduce harmful or hazardous properties and facilitate recycling. These requirements may be satisfied by measures such as segregation and screening of wastes to recover suitable fill and material for crushing, segregation of inert materials and putrescible wastes.

4.9.2 Re-use Considerations

- 4.9.2.1 As a sustainable alternative to off-site disposal, it may be possible to re-use site-won soils provided the following criteria are met:

- i.* Use of the material will not create an unacceptable risk of pollution to the environment or harm to human health;
 - ii.* The material must be chemically and geotechnically suitable without further treatment;
 - iii.* There must be certainty of use within the scheme;
 - iv.* Material should only be used in the quantity necessary for that use.
- 4.9.3 Provided these criteria are met, the re-use of site-won materials is unlikely to be deemed a waste activity. Production of a *Materials Management Plan* under the industry *CL:AIRE Code of Practice on the Definition of Waste* represents a robust method of demonstrating that the proposed re-use of material meets the criteria and is not liable for landfill tax.

SECTION 5 ASBESTOS MANAGEMENT PLAN

5.1 INTRODUCTION

- 5.1.1 Relevant legislation and guidance for managing asbestos is set out in the CAR 2012 and guidance provided in CIRIA 733 Chapter 3. The guidance in CIRIA C733 for CAR 2012 Regulation 5 states that in order to avoid disproportionate responses to this regulation [specifically (b) (ii)] any brownfield redevelopment could have a contingency plan stating what to do if and when suspect materials are found. Any asbestos found would then be dealt with under the CAR.
- 5.1.2 Bulk earth movement works on the site will involve soils with trace / incidental ACMs which will constitute working with asbestos under Regulation 2 (2) (definition of working with asbestos) as set out in the following paragraphs.
- 5.1.3 It also cannot be precluded that previously undiscovered bulk ACMs may be encountered during earthworks. Therefore, general groundworks involving soil, including *inter alia*: bulk soil excavations where asbestos is present, backfilling and placement, are considered to come under the provisions of: Regulation 4 (duty to manage asbestos), Regulation 5 (adequate assessment to identify asbestos present [which may be considered available in this report]), Regulation 6 (risk assessment) Regulation 7 (written plan of works detailing how works with asbestos will be carried out), and Regulation 10 (provision of adequate information and training for employees other than sub-contracted licensed asbestos removal contractors (LARCs)).
- 5.1.4 The following sections therefore provide written procedures to cover the following:
 - i.* Notifiable potentially licensable works (asbestos cache removal);
 - ii.* Notifiable non-licensable works which can be undertaken by an appointed subcontractor; and

- iii.* Non-notifiable non-licensable works which include general groundworks to ensure that risk of fibre exposure is understood and minimised.

5.2 IDENTIFICATION OF AREA AFFECTED BY ASBESTOS

- 5.2.1 The whole site is considered to be affected by asbestos and the site manager or nominated deputy should maintain a watching brief during works in case of unexpected contamination.

5.3 RISK ASSESSMENT

5.3.1 Risk characterisation – operatives exposure to airborne asbestos

- 5.3.1.1 An assessment of risk is based on the current site condition.

- 5.3.1.2 This risk of fibre release from ACMs in soil is considered to be very low due to the moisture content of the soils. For the duration of the earthworks phase, it is therefore considered that a low risk of exposure to fibres in excess of the clearance limit of 0.01 fibres/ml would exist from diffuse fibres in soil. A slightly greater risk has been identified for more granular materials stockpiled at the site. The risk for this material is considered to be 'Medium'.

- 5.3.1.3 If, during the earthworks, bulk ACMs occur as a cache (see Section 8.14), the risk of exposure to fibres during removal under notification would appear to be low provided moisture contents of soil and ACMs are maintained.

5.3.2 Risk characterisation – public and adjacent land users' exposure to airborne asbestos

- 5.3.2.1 For public exposure to asbestos it is also appropriate to consider exposure risk from airborne fibres that may potentially be generated by site activities. The risk to receptors which are at a greater distance from the earthworks would be even lower than that indicated for site operatives. Therefore, given the limited potential for fugitive fibre generation and deposition, it is considered that long term chronic risks to the public are unlikely to exceed those from exposures to background levels.

5.4 GENERAL PROCEDURE FOR SERVICE TRENCHES

- 5.4.1 Service trenches will have a layer of pea gravel in the base. Should workers need to enter the trench to fix services, impervious sheets will be draped over the sides to prevent direct contact between the workers and any potentially asbestos impacted soils. Any arisings from the potentially asbestos contaminated layers should be segregated.

5.5 GENERAL PROCEDURE FOR PLANT DECONTAMINATION

- 5.5.1 Any plant that comes into contact with the potential asbestos contaminated ground (e.g. dumper, excavator) should be washed down at the end of each day.

5.6 GENERAL PROCEDURE FOR TEMPORARY STOCKPILES

- 5.6.1 Temporary stockpiles containing asbestos impacted ground should be sheeted or kept damp to minimise the risk of any fugitive dust / fibre emissions.

5.7 ASBESTOS AWARENESS

- 5.7.1 All site staff will be made aware of the risks of asbestos at the site during site inductions. This element of the staff induction will be provided by the Principal Contractor. A written non-technical summary of the risks and mitigation procedures to be adopted should be displayed in staff welfare facilities and site offices. Inductions will include:

- i.* Regulations;
- ii.* Control Limits;
- iii.* Health Hazards;
- iv.* Identification;
- v.* Risk Assessment;
- vi.* Personnel Safety; and
- vii.* Decontamination Procedures.

- 5.7.2 Accredited awareness training should be provided to key staff involved in bulk earthworks to enable them to identify ACMs. Training will be compliant with the requirements of the CAR 2012. Additional permanent site staff in the watching brief role should additionally have notifiable non-licenced training.

5.8 LICENSED ASBESTOS REMOVAL CONTRACTOR (LARC)

- 5.8.1 If a decision is taken to remove ACMs by picking, a LARC should be engaged who will, as required, prepare risk assessments and task-specific method statements for asbestos removal – based on the risk assessment and ground conditions (anticipated ACM occurrences). It is intended that these will be provided along with this AMP to the Health and Safety Executive to obtain their agreement on the measures adopted to control asbestos and carry out potentially licensable removal activities.

5.9 PPE AND RPE

- 5.9.1 For normal working conditions on site which may involve working with soils which may contain trace asbestos fibres and for which monitoring data shows airborne fibre levels of <0.01 f/ml, the use of respiratory protective equipment (RPE) is not proposed, provided soil dust conditions are kept within statutory limits. It is proposed dust generation will be minimised as far as practicable. RPE (Disposable P3 mask to EN149) will be required for sporadic, short-duration non-licensable works (such as hand picking of surface cement) with potentially licensable ACM cache removal

procedures or upon discovery of suspected caches and activities involved in sampling and delineating caches (re-usable P3 mask to EN140).

- 5.9.2 Personal Protective Equipment (PPE) requirements for normal working conditions on site which may involve working with soils which contain trace asbestos fibres and bonded cement debris will comprise as a minimum: gloves, safety boots, hard hat and hi-visibility clothing. Coveralls (Type 5 to BS EN ISO 13982-1) will be required for sporadic, short-duration non-licensable works, potentially licensable ACM cache removal procedures or upon discovery of suspected caches and the activities required for their sampling and delineation.

5.10 **STAFF/RESPONSIBILITIES**

- 5.10.1 An asbestos testing and air monitoring contractor will be engaged to carry out monitoring as described in the following sections. The Principal Contractor shall:

- i.* Ensure all personnel engaged in groundworks on site are suitably inducted and trained with regards ACMs and asbestos related risks and procedures;
- ii.* Ensure the asbestos watching brief role is being discharged by an appropriately trained personnel;
- iii.* Ensure exclusion of non-essential staff from areas where earthworks are taking place (including organisation of fencing, signage and monitoring) and cessation of excavation in areas where uncontrolled disturbance of ACMs could occur; and
- iv.* Ensure site records on ACMs being found, removed and disposed of are kept and maintained on site and for subsequent verification reporting.

5.11 **GENERAL ACMS BONDED**

- 5.11.1 It is considered that no significant additional degradation of bonded ACMs (e.g. cement, bitumen, ropes, gaskets) will occur. It is therefore considered that operations involving movement of soils containing bonded ACMs, and hand picking of any such items, can be conducted as a non-notifiable non-licensed activity.

5.12 **FRIABLE AND FIBROUS ASBESTOS**

- 5.12.1 Sporadic occurrences of more friable and weak forms of asbestos (e.g. AIB and paper products) typically up to 100 mm across could also be encountered and will be considered as a low intensity short duration operation for either picking or handling of soils containing such items. The following conditions must be satisfied:
- i.* the work must not take more than two hours in any seven-day period; or
 - ii.* any person carries out that work for more than one hour.

- 5.12.2 Based on current site knowledge, during the normal course of earth movements, such as moving made ground from gardens, it is considered that the above conditions would be satisfied.
- 5.12.3 However, if the above conditions cannot be satisfied or if numerous or large amounts of such ACMs are present where removal for sampling and identification is not applicable and/or practical then working with this material will come under the provisions of Section 8.14.

5.13 CACHE PROCEDURES

- 5.13.1 For the purpose of this management plan, a cache is defined as an occurrence of weak or friable ACM (*e.g.* lagging, board) for which works are unlikely to be of short duration (*i.e.* not sporadic). The *intensity* of exposure to airborne fibres is likely to be low for moist soils and ACMs within the soil (<0.01 f/ml). A relatively higher risk of exposure to airborne fibres is considered to exist in comparison with quick operations presented in the preceding sections but this can be minimised by adopting suitable procedures.
- 5.13.2 Where the trained banksman observes a cache, he will alert the excavator driver to cease digging and empty any arisings in the bucket back to the excavation. If the excavator driver is the first to observe a cache, he will cease excavation and alert the banksman and dumper driver to ensure that materials already loaded are not moved from the area and can be kept separate.
- 5.13.3 If a cache is found *in-situ*, temporary barriers will be placed 10 m from the suspected cache with warning signs. Confirmation of ACMs will be undertaken by confirmatory testing. Visual means of identification can only be used to make a presumption of asbestos being present. If immediate removal of ACMs cannot occur, the ground surface will be covered with polythene sheeting, adequately weighted down.
- 5.13.4 For a cache found *in-situ* and for soils containing visible friable and fibrous ACMs where a decision has been made to pick the soils, the PPE and RPE equipped LARC will remove by hand or hand tools ACM fragments until the soils are free from visible ACMs. A mechanical excavator will then slowly remove a thin soil layer to expose underlying material to repeat as required. The arisings from the stripped layer may be raked over to allow handpicking.
- 5.13.5 All arisings and exposed soil faces will be wetted using misting or low-pressure jetting to maintain moisture contents. Current guidance indicates that the potential for fibre release to air reduces significantly with moisture contents from 5% and above.
- 5.13.6 Personnel air monitors will be attached to staff undertaking ACM removal. Static air monitors will be located upwind and downwind at the edge of the exclusion zone (minimum two) around the working area.
- 5.13.7 The LARC will carry out personnel decontamination in accordance with their own method statement which will likely be informed by the findings of personnel air fibre monitoring.

5.14 VALIDATION FOLLOWING REMOVAL OF CACHE

- 5.14.1 Verification shall confirm arisings are free from visible readily friable ACMs.

5.15 WASTE HANDLING

- 5.15.1 Where removal is required, ACMs are likely to be present in quantities that will be dealt with by approved marked polythene asbestos waste bags. Picked ACMs will be double bagged and stored in lockable skips or a secure area.

5.16 EMERGENCY PROCEDURES

- 5.16.1 Based on current knowledge, it is concluded that there remains a small possibility that more hazardous forms of asbestos may be encountered in excavations but in small amounts and that generation of significant airborne fibres is unlikely due to the soil moisture content.
- 5.16.2 It is possible that clumps of more hazardous products in soil may be missed by banksmen monitoring the dig. These may become entrained in soils subject to backfilling and placement and become dried out. This is considered to be the worst-case scenario.
- 5.16.3 To mitigate the risks of fibre release from these materials being exposed and then dried, cut surfaces and filled area surface will be routinely inspected. In the event that such materials are encountered, these will be wetted and covered for removal under the cache procedure. If the occurrence is small, isolated and can be removed quickly it is considered possible to wet the material and remove by hand to a suitable container, where this would be demonstrably a low risk, short duration activity.
- 5.16.4 If machinery has tracked over exposed material, the tracks/wheels will be washed down using a low-medium pressure hose to clean tracks/wheels without spreading contamination. This will be carried out in areas subject to further backfilling. Boots of site operatives will also be washed if operatives are suspected of having walked on affected ground. This will be in addition to any boot wash facilities provided at the edge of site compound/parking areas.

5.17 DUST CONTROLS

- 5.17.1 Generation of visible dust shall be avoided as far as practical. The contractor will nominate persons to maintain a daily dust and site conditions diary, including incidences of visible dust generation and measures taken to reduce dust.

5.18 ASBESTOS AIR MONITORING

- 5.18.1 Where required, haul roads will be established with coarse crush materials placed and compacted to cover exposed ground and avoid vehicle tracking on loose, fine-grained soils. Vehicle movements will be restricted to established routes and the capping layer will be kept damp with tractor-towed bowsters as required. The frequency of bowser passes will depend upon weather conditions and the Contractor shall designate person(s) responsible for monitoring haul road condition and ensuring moisture levels are maintained. Site speed limits shall be enforced. Sheeting of any lorries removing soils from site shall be enforced.

5.18.2 A UKAS accredited monitoring consultant will undertake air monitoring for asbestos fibres to HSG248.

5.18.3 The number and position of static, boundary sample pumps will be decided subject to site activities and wind conditions. A minimum of two is proposed at any one time on the site boundary and will include pumps located at the top of hoardings to confirm if fugitive dust/fibres are present at height. Monitoring will be conducted at the boundary on a weekly basis and reviewed thereafter but conducted for a minimum of two months pending satisfactory results (fibre counts are consistently below the reporting limit and below the clearance limit of 0.01 fibres/ml).

5.19 SITE HYGIENE

5.19.1 Site compounds (office, mess and welfare areas) will be established in a 'clean' zone to avoid transfer of made ground soils into those areas. Site workers will wear washable safety boots and boot washing facilities will be placed at the edge of the 'clean' compound area to be used when leaving construction areas.

5.19.2 Wheel washing facilities should be maintained for all vehicles leaving the working areas of the site. Visitor and employee vehicles should park in car park areas formed from clean compacted granular materials and will not enter construction areas. Pedestrian access between parking areas and construction areas will be via the 'clean' site compound.

SECTION 6 MATERIALS MANAGEMENT PLAN

6.1 If there is a requirement to alter the existing landform, the re-use and movement of soils required to achieve the consented development should be governed by Materials Management Plans (MMPs) under the CL:AIRE Code of Practice on the Definition of Waste.

SECTION 7 VERIFICATION PLAN

7.1 The following sections set out the scope of actions which will be followed to verify that the planned remediation works have been implemented correctly.

7.2 All relevant records associated with groundworks will be collated and retained including

- i.* Air monitoring results if considered necessary within the AMP;
- ii.* Diary of daily ground observations by appropriate site manager or engineer conducting a watching brief;
- iii.* Waste transfer tickets for the removal waste and asbestos containing materials;
- iv.* Testing results related to the verification of clean cover materials;

- v. Records of clean cover depth checks completed by suitably trained engineers; and,
 - vi. Any records relating to specialist advisors responding to unforeseen conditions.
- 7.3 Where any unexpected/unforeseen conditions or newly identified contamination is found an extended risk assessment, options appraisal and remediation strategy will be prepared by suitably qualified and experienced environmental consultants. If additional remediation requirements outside the scope currently identified are considered necessary, advice will be sought from the environmental engineer. The scope of any revised scheme will be provided to the local authority for comment and approval.
- 7.4 All imported clean material will be tested at the rate stated above with a minimum of three samples collected per source. Samples will be submitted to a MCERTS/UKAS accredited laboratory for analysis of a suite of contaminants set out in the Tables above dependant on the end use scenario of re-use.
- 7.5 If material is identified from site arisings which is considered to be suitable for reuse it will be stockpiled and tested in accordance with the above frequency and standards.
- 7.6 All records associated with testing of imported or reused soils will be collated and retained. This will include details of any materials rejected as unsuitable.
- 7.7 Independent depth checks will be undertaken in completed soft landscaped areas at an approximate frequency of one test per plot (alternating front and rear gardens) and each and every soft landscaped public open space with the results compared against the relevant thresholds. Depth checks shall be carried out to the following methodology:
 - i. A suitably trained engineer will hand excavate an inspection pit to expose the geo-textile separation membrane;
 - ii. The depth of the clean cover will be measured from the membrane to the finish design levels. A picture will be taken to verify that the clean cover meets the minimum depths specified in Table 3 above. A second picture showing the inspection pit in relation to the wider development will also be captured. All pictures shall be annotated and included within the final validation report; and,
 - iii. The pit shall be backfilled with excavated materials in the same succession that they were excavated.
- 7.8 Structures which do not align with the standard NHBC scenarios (which on this development would include apartments or dwellings without a clear ventilated sub-floor void) must be identified at an early stage. The design of the gas protection (structural drawings) for these structures must be made available to the

environmental consultant for review to confirm that the requirements of BS8485 are met. The installation of the gas protection measures must be verified independently in accordance with the requirements of CIRIA C735.

SECTION 8 RE-USE CONSIDERATIONS

8.1.1 As a sustainable alternative to off-site disposal, it may be possible to re-use site-won soils provided the following criteria are met:

- i.* Use of the material will not create an unacceptable risk of pollution to the environment or harm to human health;
- ii.* The material must be chemically and geotechnically suitable without further treatment;
- iii.* There must be certainty of use within the scheme;
- iv.* Material should only be used in the quantity necessary for that use.

8.1.2 Provided these criteria are met, the re-use of site-won materials is unlikely to be deemed a waste activity. Production of a Materials Management Plan under the industry CL:AIRE Code of Practice on the Definition of Waste (DoWCoP) represents a robust method of demonstrating that the proposed re-use of material meets the criteria and is not liable for landfill tax. It should be in place prior to the commencement of the development.

8.2 Following the DoWCoP procedure entails the provision of a Material Management Plan together with supporting plans and studies. The culmination of the process is the provision of a verification report. This document would provide an audit trail to show that material has been placed in the correct destination.

8.1 OFF-SITE WASTE

8.1.1 It is anticipated that the following surplus materials will be removed from site as a result of the works:

- i.* Picked asbestos containing materials;
- ii.* Surplus materials already stockpiled on site, or that will be excavated to create a development platform; and,
- iii.* Materials deemed not suitable for use.

8.1.2 Materials, including waste soils which are not to be retained on site, should be removed and disposed of in accordance with all relevant statutes including the *Environmental Protection Act 1990*, *The Controlled Waste Regulations 2012* as amended, *The Waste Regulations 2011* as amended, *The List of Wastes Regulations 2005* as amended, *The Hazardous Waste Regulations 2005* as

amended, *The Waste Management Regulations 2006* and *The Environmental Permitting Regulations 2010* as amended.

SECTION 9 ENVIRONMENTAL CONTROLS

9.1 INTRODUCTION

- 9.1.1 Standard PPE precautions (gloves, overalls *etc.*) will minimise risks to construction workers when handling made ground. Dust control measures will also be required to avoid exposure by inhalation.

9.2 EMISSIONS CONTROLS

- 9.2.1 The Principal Contractor will produce a plan for monitoring and controlling emissions during their works.
- 9.2.2 The main noise-generating activities are considered to be piling works required to form the foundations of the new building(s). Piling may also give rise to localised vibration.
- 9.2.3 The main dust-generating activities are considered to be soil handling and dust generation from plant/vehicle movements over dry surface soils. Due regard should be given to the fact that made ground soils on the site are contaminated by asbestos and the monitoring required (as set out in Section 8). The groundworker should have a method statement in place for minimising dust. Placement of temporary surfacing for haul routes and damping down is considered to be the most effective method of control for dust. In addition, any hard-surfaced vehicle routes should be kept clean to minimise potential for general dust generation. Particular care must be taken to avoid cross-contamination of clean materials with made ground and any exposed made ground (at formation level or in stockpile) should be treated so as to minimise dust generation (by damping down).

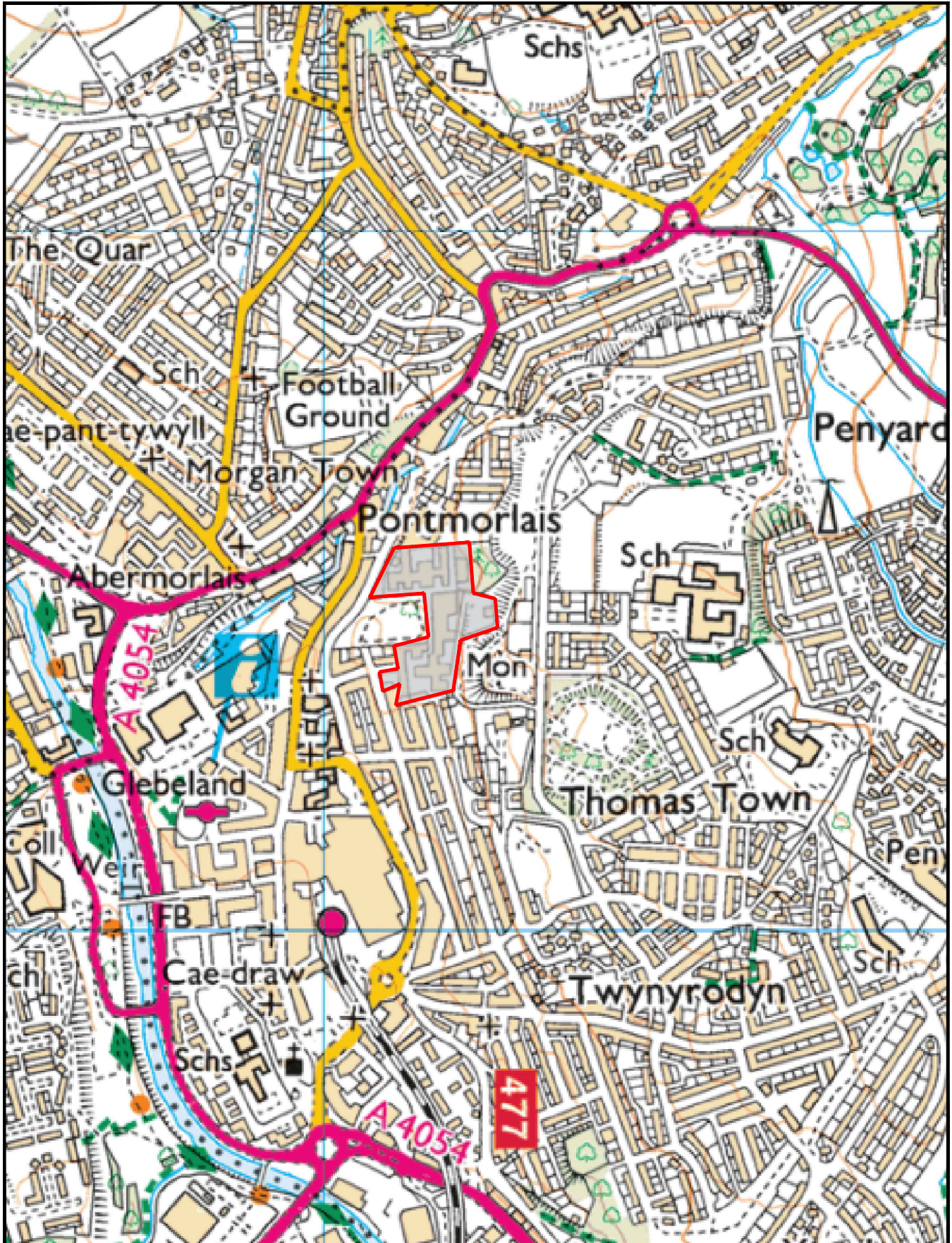
SECTION 10 REPORTING

- 10.1 The following records will be presented in a final verification report:
- i.* Waste tickets for quarantined soils removed from site;
 - ii.* Records demonstrating the provenance and suitability of imported topsoil and subsoils (certificates to be provided by supplier);
 - iii.* Results of validation testing of imported subsoil and topsoil;
 - iv.* Photographic records confirming required depth of clean cover; and
 - v.* Verification records of installation of gas protection measures where appropriate.

SECTION 11 CONCLUSIONS

- 11.1 The site has been investigated and a remedial strategy has been designed to ensure a safe development.
- 11.2 This document sets out the principles for the remediation and also specifies how the works will be validated to demonstrate that the site is suitable for its intended use and that there are no significant adverse effects during the works.
- 11.3 It is necessary that this report is submitted to the Local Authority Planning Department who may consult the Environmental Health Officer and NRW.

APPENDIX 1 ▪ Drawings



Reproduced from the Ordnance Survey's 1:25000 map published with the permission of the Controller of Her Majesty's Stationery Office, © Crown copyright.
IDOM Merebrook Limited AL 100048771

IDOM

Coronado Property Developments Ltd
Merthyr Tidfil Hospital
Site Location Plan

Cromford Mills, Mill Lane, Matlock, Derbyshire DE4 3RQ
t: +44(0)1773 829 988 f: +44(0)1773 829 393 e: info.derbyshire@idom.com

First Issue		02-07-2019		
Issue Details		FDO	TPC	TPC
Job No.		Dwg No.	Revision	
21988		001-001	-	
Scale		Date	Frame Dimensions mm (A4) 250x181	
N.T.S		July 2019		
Drawn		Checked	Approved	
FDO		TPC	TPC	



Legend

MBHref

Merebrook borehole with location reference

MWSref

Merebrook window sample with location reference

MTPref

Merebrook trial pit location with reference

MSPref

Merebrook soakage test location with reference

CBRref

Merebrook CBR test location with reference

Stockpile ref

Merebrook stockpile audit location with reference

First issue	19/02/2021		-
	TPC	LB	TPC
Issue Details	Dwn	Chd	App'd
Client/Project			
Coronado Former St Tydfil Hospital Merthyr Tydfil			
Dwg Title			
Approximate Undertaken Investigation Locations			
Job No. 21988	Dwg No. 304-001	Revision -	
Scale N.T.S	Date February 2021	Frame Dimensions mm (A3) 400 x 280	
Drawn TPC	Checked LB	Approved TPC	
London Kent Derbyshire Cardiff Manchester Stirling Birmingham IDOM Cromford Mills, Mill Lane, Matlock, Derbyshire DE4 3RQ t: +44(0)1773 829 988 f: +44(0)1773 829 393 e: info.derbyshire@idom.com			

IDom

IDOM Cromford Mills, Mill Lane, Matlock, Derbyshire DE4 3RQ
t +44 (0)1773 829 988 **f** +44 (0)1773 829 393 **e** info.derbyshire@idom.com **idom.com**

Registered in England No. 02740216 Registered office: as above

offices Birmingham London Kent Derbyshire Cardiff Manchester Stirling