

Fortis Quay remediation strategy

20 November 2018

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Executive summary

This remediation strategy has been prepared to document how risks to human health and controlled waters arising from the presence of land contamination at the Fortis Quay site will be managed.

Beaumont Morgan propose to develop an existing site with the construction of a new residential development. The works will include demolition of existing buildings, construction of new high-rise buildings and the addition of additional floors to existing buildings, as well as the associated civil engineering infrastructure, including car parks, roads and amenity spaces. A summary of the proposed works is as follows:

- Northhill Apartments - An existing low rise building is to be demolished and a new 27 story tower without basement is to be built;
- Grapnel Apartments - A new 13 storey building is to be constructed on an existing ground level car park; and
- Danforth and Herreshoff Apartments - Existing six and ten storey buildings (previously named Customs House and Furness House) will be vertically extended by an additional three floors and their foundations will be strengthened.

Two ground investigations (1) and (2) have been undertaken and a contaminated land risk assessment has been prepared (3).

Risks directly related to the construction of piled foundations have been addressed in a standalone foundation work risk assessment.

The contaminated land risk assessment identified potential risks to human health and controlled waters. This remediation strategy describes how these will be addressed.

Risks arising due to the presence of asbestos are addressed separately in the asbestos management plan for the site (4).

The made ground present at the site poses a potential risk to both human health in areas of soft landscaping, if end users come into direct contact with the material, and controlled waters, if the development results in a potential increase in leaching of contaminants.

The following techniques are considered feasible based upon the known site conditions and restrictions, including short timescales, limited space and the remediation objectives. These techniques are recommended for the site (in combination for parts of the site):

- Capping by hardstanding or hard landscaping;
- Use of a cover system in soft landscaping areas;
- Installation of gas protection measures in buildings and enclosed spaces; and
- Excavation and disposal of made ground in new areas of soft landscaping and where it's geotechnical properties are unsuitable.

The remediation will be undertaken in the following stages:

- Stage 1 - excavation and foundation construction;
- Stage 2 - installation of gas protection measures;
- Stage 3 - capping by hardstanding or hard landscaping areas;
- Stage 4 - removal of made ground from new areas of soft landscaping;
- Stage 5 - installation of cover system in existing soft landscaping areas; and

- Stage 6 - verification.

If dewatering is required, groundwater quality monitoring will be undertaken to ensure that additional groundwater contamination is not mobilised.

1 Introduction

This remediation strategy has been prepared to document how risks to human health and controlled waters arising from the presence of land contamination at the Fortis Quay site will be managed. This document is intended to provide sufficient information for compliance condition 7 attached to planning permission 17/70682/FUL to be discharged.

1.1 Background

Beaumont Morgan propose to develop an existing site with the construction of a new residential development. The works will include demolition of existing buildings, construction of new high-rise buildings and the addition of additional floors to existing buildings, as well as the associated civil engineering infrastructure, including car parks, roads and amenity spaces. A summary of the proposed works is as follows:

- Northill Apartments - An existing low rise building is to be demolished and a new 27 story tower without basement is to be built;
- Grapnel Apartments - A new 13 storey building is to be constructed on an existing ground level car park; and
- Danforth and Herreshoff Apartments - Existing six and ten storey buildings (previously named Customs House and Furness House) will be vertically extended by an additional three floors and their foundations will be strengthened.

1.2 Objectives and scope of work

Mott MacDonald were commissioned by Beaumont Morgan to prepare a remediation strategy to address risks to human health and controlled waters from land contamination at the site.

This document is intended to support the discharge of Condition 7 attached to planning permission 17/70682/FUL.

Condition 7 reads:

“Details of any proposed Site Remedial Works as recommended by the Site Investigation Report shall be submitted to and approved in writing by the Local Planning Authority. Such Remedial Works shall be incorporated into the development during the course of construction and completed prior to occupation of the development.”

The local authority’s planning consultant made the following comments on the planning application in relation to Condition 7:

“There is no remediation strategy included within the application. A full remediation strategy is required in order to discharge this condition based on the site investigation, but in particular;

- Information regarding how asbestos will be managed during and following construction;
- Details of piling methodologies to avoid creating preferential pathways and impacting groundwater; and
- Sampling strategies for imported material to create 600mm cover.”

A standalone foundation works risk assessment was prepared to address risks to human health and controlled waters associated with the construction of piled foundations at the site (5). A

standalone asbestos management plan was prepared by WSP outlining how risks posed by the presence of asbestos at the site will be managed.

1.3 Proposed development

The relevant details of the proposed development are summarised in sections 1.3.1 to 0 below. The proposed site layout is included in Appendix A.

1.3.1 Northhill Apartments

The proposed Northhill Apartments building will be a 27 storey residential tower on the site of an existing building at the south-western end of the site. The building will be constructed on piled foundations extending to a depth of approximately 21.5m below ground level (BGL) extending a minimum of 3.3m into the Sherwood Sandstone Group. The piles will be constructed using continuous flight auger (CFA) piling techniques.

The ground beneath the footprint of the building will be excavated to a depth of approximately 3m BGL to facilitate the construction of the pile cap. This is expected to be sufficient to completely remove the made ground from within the footprint of the building. The pile cap will be cast in-situ and will have a thickness of 2.0m. This is reduced to 0.45m within the footprint of the lift shafts.

Approximately 0.85m of granular fill material will be placed above the pile cap and a 0.15m thick floor slab will be cast in-situ above this material.

1.3.2 Grapnel Apartments

The proposed Grapnel Apartments building will be a 13 storey residential building. The building will be constructed on piled foundations extending to a depth of approximately 20m below ground level (BGL) into the Sherwood Sandstone Group. The piles will be constructed using CFA piling techniques.

The ground beneath the footprint of the building will be excavated to a level of between approximately 22m above ordnance datum (AOD) and approximately 21m AOD to facilitate the construction of the piling mat. At its deepest point the excavation will be approximately 3m deep leaving a minimum of approximately 12m of superficial deposits above the Sherwood Sandstone Group. Existing ground level ranges from approximately 21.5m AOD to approximately 24.4m AOD. This excavation is expected to completely remove the made ground from within the footprint of the Grapnel Apartments building.

A finished floor level of 23.28 AOD is proposed, approximately 1.7m to 2.5m of granular fill material will be placed above the piling mat and the new ground floor slab will be cast as a suspended in-situ reinforced concrete flat slab.

1.3.3 Danforth and Herreshoff Apartments

These existing six and ten storey buildings (previously named Customs House and Furness House) will be vertically extended by an additional three floors and their foundations will be strengthened.

The foundation strengthening for Danforth will require additional pile caps and ground beams to the edge of the core wall pile caps. The piles will extend one metre into the underlying Sherwood Sandstone Group at a depth of approximately 16 to 18m. The piles will be constructed using CFA and sectional flight auger (SFA) piling techniques.

Ground beneath the footprint of the foundation strengthening to be excavated to a level of between 20.48m AOD and 20.23m AOD to facilitate the construction of the foundation strengthening. Existing ground levels are approximately 22.1 to 22.2m AOD. This excavation is expected to remove the made ground from the footprint of the proposed additional piled foundations but not remove the full thickness of the superficial deposits.

The foundation strengthening for Herreshoff will require additional pile caps and ground beams to the edge of the core wall pile caps to support external walls. The piles will extend to a depth of 16m BGL. The piles will be constructed using CFA and SFA piling techniques.

Where new ground beams are required the ground will be excavated to a level of between 20.73m AOD and 20.15m AOD to facilitate the construction of the improved foundations. Existing ground levels are approximately 22.1 to 22.2m AOD. This excavation is expected to remove the made ground from the footprint of the ground beams and associated piles.

No excavation will take place where SFA piles are to be constructed within the building footprint.

1.4 Responsibilities and limitations

This report is subject to the following limitations which should be read in conjunction with the Disclaimer in Appendix B. This report does not consider risks from or related to asbestos, nuclear or radioactive emissions, or any incidence of toxic mould.

An asbestos management plan has been prepared by WSP (4) and should be referred to for details of how any risks arising from asbestos will be managed at the site.

2 Site description and setting

2.1 Site location

The site is located in Salford Quays, Manchester and is centred on approximate Ordnance Survey National Grid Reference (NGR) 381211, 397390. The site is approximately bound by A5063 Trafford Road to the east, Erie Basin to the north west and Ontario Basin to the south west.

2.2 Site description

The site is irregular in shape and covers an area of approximately 1.7 hectares. The majority of the site is approximately level at 22m AOD. The ground levels rise up to approximately 25m AOD towards the eastern side of the site. Further details are provided on the CSL Topographical Survey drawing 101254-01C in Appendix A. The site is currently occupied by residential buildings, offices, car parks and landscaping.

Metrolink light rail tracks cross the western end of the site on an elevated viaduct. This viaduct is not part of the Fortis Quay development project. The underside of the viaduct provides approximately 6m of clearance from existing ground level.

2.3 Sources of information

The following sources of information were consulted for this report:

- WML Consulting, Phase 1 Desk Study and Preliminary Geo-Environmental Assessment for a site at Furness Quay, Salford, undertaken on behalf of Beaumont Morgan Developments, 5th May 2016 (5);
- ESG, Fortis Quay Development Site, Salford Quays, Factual Report on Ground Investigation, Report No. A7048-17, September 2017 (1);
- Mott MacDonald, Fortis Quay Interpretative Ground Investigation Report, 21 November 2017 (6);
- Mott MacDonald, Fortis Quay Contaminated Land Risk Assessment Report, dated December 2017; and
- REC Geo-Environmental Site Assessment, Furness Quay, dated May 2017 (7).

2.4 Site history

Full details of the site history and that of the surrounding area are included in the Phase 1 Desk Study and Preliminary Geo-Environmental Assessment (5). A summary is presented as follows:

- Prior to 1891 the site was developed as Manchester Race Course; the eastern part of the site was occupied by terraced housing while a Saw Mills occupied the south-western area;
- By 1906, the site had been re-developed as a railway junction with sidings serving Salford Dock; and
- Between 1956 and 1972 the site was redeveloped into its current configuration.

2.5 Geology

A layer of made ground approximately 1m thick underlies the majority of the site with a thicker layer (approximately 2m thick) present beneath the north-east of the site (8).

The made ground is in turn underlain by superficial deposits comprising Alluvium, Glaciofluvial Deposits and Glacial Till. These deposits comprise interbedded clay, silt, sand and gravel.

The underlying Sherwood Sandstone Group is generally around a level of 7m AOD, giving an approximate depth to rock head of 15 to 17m.

Further details of the site geology are available in the contaminated land risk assessment for the site (3) and the contractors Factual Reports (1) and (2).

2.6 Hydrology and hydrogeology

The nearest surface water bodies are the Ontario and Erie basins and the Manchester Ship Canal. These are located approximately 75m south-west, 100m north-west and 450m west of the site respectively.

The desk study (5) presents the Environment Agency aquifer classification for the superficial and bedrock deposits. It indicates that the superficial deposits of Alluvium underlying the site and the Glaciofluvial Deposits are designated as Secondary A aquifers. The Glacial Till is designated as a Secondary (Undifferentiated) Aquifer. The bedrock of Triassic Chester Pebble Beds Formation of the Sherwood Sandstone Group are designated as Principal aquifer's.

The site is not within 500m of a source protection zone and there are no groundwater abstraction licences within 500m of the site.

Groundwater monitoring was carried out over the months of June to August 2017. The monitoring indicated that groundwater levels range between 20.7 and 22.2m AOD. Ground levels at the site range from approximately 22 to 25m AOD, with groundwater 1 – 4m below the surface, as monitored in the shallow superficial deposits. The groundwater in the superficial deposits and underlying bedrock aquifer is likely to be largely in hydraulic continuity but some areas of shallow perched groundwater are present within the site.

2.7 Previous analysis

2.7.1 Soils

A contaminated land risk assessment has been undertaken for the proposed development. This included a generic quantitative risk assessment (GQRA) that indicated that made ground at the site has the potential to pose a risk to human health. The exceedances of the generic screening criteria are summarised in Table 1. Full details of the screening undertaken are included in the contaminated land risk assessment (3).

Table 1: Soil exceedance results

Determinant	Exploratory Hole	Depth (m BGL)	Residential without produce 1% SOM	Unit	Exceedance result
Arsenic	RC04	0.5	40	mg/kg	75.3
	WS02	0.3	40	mg/kg	40.3
	BH101	1	40	mg/kg	50.4
	BH102	0.5	40	mg/kg	60.5
Beryllium	RC03	1	1.7	mg/kg	3.32
	TP02	0.2	1.7	mg/kg	1.88
	TP03	0.5	1.7	mg/kg	2.02

Determinant	Exploratory Hole	Depth (m BGL)	Residential without produce 1% SOM	Unit	Exceedance result
Benzo(b)fluoranthene	WS01	0.5	1.7	mg/kg	2.66
	WS02	0.3	1.7	mg/kg	2.07
	WS03	1	1.7	mg/kg	1.98
	RC03	0.5	3.9	mg/kg	4.01
	RC06	0.5	3.9	mg/kg	4.92
	RC06	1	3.9	mg/kg	5.69
	TP03	0.5	3.9	mg/kg	12.1
	TP04	0.5	3.9	mg/kg	5.49
	TP06	0.2	3.9	mg/kg	30.5
	WS02	0.3	3.9	mg/kg	6.05
	WS05	0.2	3.9	mg/kg	5.32
	BH102	0.5	3.9	mg/kg	6.58
Dibenz-a-h-anthracene	RC03	0.3	0.31	mg/kg	0.33
	RC03	0.5	0.31	mg/kg	0.48
	RC06	0.5	0.31	mg/kg	0.56
	RC06	1	0.31	mg/kg	0.76
	TP03	0.5	0.31	mg/kg	1.24
	TP04	0.5	0.31	mg/kg	0.72
	TP06	0.2	0.31	mg/kg	4.52
	TP10	0.5	0.31	mg/kg	0.33
	WS02	0.3	0.31	mg/kg	0.64
	WS05	0.2	0.31	mg/kg	0.54
	BH102	0.5	0.31	mg/kg	0.53
Benzo(a)anthracene	TP03	0.5	11	mg/kg	11.9
	TP06	0.2	11	mg/kg	32.6
Benzo(a)pyrene	RC06	0.5	3.2	mg/kg	4.3
	RC06	1	3.2	mg/kg	5.07
	TP03	0.5	3.2	mg/kg	9.43
	TP04	0.5	3.2	mg/kg	4.39
	TP06	0.2	3.2	mg/kg	25
	WS02	0.3	3.2	mg/kg	4.73
	WS05	0.2	3.2	mg/kg	4.4
	BH102	0.5	3.2	mg/kg	5.37
Naphthalene	RC05	0.3	2.3	mg/kg	4.67
	RC09	0.3	2.3	mg/kg	20.2
Aromatics >C21-C35	RC05	0.3	1900	mg/kg	3610
	BH104	0.5	1900	mg/kg	6665*
Lead (6% SOM)	RC01	0.5	310	mg/kg	423.1
	TP04	0.5	310	mg/kg	1110
	BH102	0.5	310	mg/kg	663

Contaminated land risk assessment (3)

Asbestos was encountered in five soil samples on the site. The risks arising due to the presence of asbestos and how they will be managed are documented in the asbestos management plan (4).

2.7.2 Groundwater

Leachate concentrations have been assessed against Environmental Quality Standards (EQS) and/or Drinking Water Standards (DWS) in the contaminated land risk assessment (3).

Leachate from these soil samples were found to have elevated concentrations of antimony, arsenic, cadmium, chromium, copper, iron, lead, nickel, zinc, chromium (III), chromium (VI), ammoniacal nitrogen, manganese and sulphate.

Leachate from soil samples was also tested for a range of organic contaminants and several were found to be present at concentrations exceeding the relevant screening criteria. These results may be underestimates of the actual pore water concentrations of these contaminants due to volatilisation or low solubility of some organic contaminants. The results of the screening exercise are summarised in Table 2 below.

Table 2: Leachate exceedance results

Determinant	Exploratory Hole	Depth (m BGL)	DWS	EQS	Unit	Exceedance result
Antimony	CP02	0.5	0.005	-	mg/l	0.006
	RC02	0.1	0.005	-	mg/l	0.007
	RC03	1	0.005	-	mg/l	0.005
	RC05	0.3	0.005	-	mg/l	0.005
	RC06	0.5	0.005	-	mg/l	0.007
	RC07-A	0.5	0.005	-	mg/l	0.006
	TP03	0.5	0.005	-	mg/l	0.005
	TP08A	0.5	0.005	-	mg/l	0.005
	WS02	0.3	0.005	-	mg/l	0.008
	WS03	1	0.005	-	mg/l	0.015
Arsenic	RC02	1	0.01	0.05	mg/l	0.012
	RC03	0.3	0.01	0.05	mg/l	0.012
	RC04	0.5	0.01	0.05	mg/l	0.018
	TP03	0.5	0.01	0.05	mg/l	0.015
	WS03	1	0.01	0.05	mg/l	0.045
Cadmium	BH105	0.6	0.005	0.00025	mg/l	0.0006
	CP01	0.5	0.005	0.00025	mg/l	0.0051
	CP02	0.5	0.005	0.00025	mg/l	0.0003
	RC01	0.5	0.005	0.00025	mg/l	0.0003
	RC01	1.8	0.005	0.00025	mg/l	0.0003
	RC02	0.1	0.005	0.00025	mg/l	0.001
	RC02	1.0	0.005	0.00025	mg/l	0.0006
	RC03	1.0	0.005	0.00025	mg/l	0.0004
	RC07-A	0.5	0.005	0.00025	mg/l	0.0003
	RC10	0.3	0.005	0.00025	mg/l	0.0004
	WS02	0.3	0.005	0.00025	mg/l	0.0006
	WS03	1.0	0.005	0.00025	mg/l	0.0021
Chromium	RC03	0.3	0.05	0.0047	mg/l	0.028
	TP01	0.3	0.05	0.0047	mg/l	0.055
Copper	RC01	0.5	2	0.02532	mg/l	0.11
	RC02	1.0	2	0.02532	mg/l	0.058
	RC03	0.3	2	0.02532	mg/l	0.087
	TP03	0.5	2	0.02532	mg/l	0.031

Determinant	Exploratory Hole	Depth (m BGL)	DWS	EQS	Unit	Exceedance result
Iron	CP01	0.5	0.2	1	mg/l	0.31
	CP01	1.5	0.2	1	mg/l	0.32
	CP02	0.5	0.2	1	mg/l	0.37
	RC01	0.5	0.2	1	mg/l	3.41
	RC01	1.8	0.2	1	mg/l	1.63
	RC02	1	0.2	1	mg/l	2.82
	RC08	0.5	0.2	1	mg/l	1.34
	RC10	0.3	0.2	1	mg/l	0.44
	TP01	0.3	0.2	1	mg/l	0.22
	TP03	0.5	0.2	1	mg/l	0.69
	TP08A	0.5	0.2	1	mg/l	0.24
	TP10	0.5	0.2	1	mg/l	0.42
	TP11	0.3	0.2	1	mg/l	0.45
	WS02	0.3	0.2	1	mg/l	0.25
	WS05	0.2	0.2	1	mg/l	1.1
	WS06	0.5	0.2	1	mg/l	1.61
Lead	RC01	0.5	0.01	0.00664	mg/l	0.066
	RC01	1.8	0.01	0.00664	mg/l	0.015
	RC02	1.0	0.01	0.00664	mg/l	0.029
	RC07-A	0.5	0.01	0.00664	mg/l	0.008
	RC08	0.5	0.01	0.00664	mg/l	0.04
	TP03	0.5	0.01	0.00664	mg/l	0.017
	WS05	0.2	0.01	0.00664	mg/l	0.038
	WS06	0.5	0.01	0.00664	mg/l	0.018
Nickel	WS03	1.0	0.02	0.01947	mg/l	0.05
Phenol	BH105	0.6	0.0005	0.0077	mg/l	0.0032
	CP01	1.5	0.0005	0.0077	mg/l	0.0027
	RC02	0.1	0.0005	0.0077	mg/l	0.0012
	RC03	0.3	0.0005	0.0077	mg/l	0.0139
	RC05	0.3	0.0005	0.0077	mg/l	0.0075
	RC09	0.3	0.0005	0.0077	mg/l	0.0024
	RC10	0.3	0.0005	0.0077	mg/l	0.001
	TP01	0.3	0.0005	0.0077	mg/l	0.0128
	TP02	0.2	0.0005	0.0077	mg/l	0.0042
	TP03	0.5	0.0005	0.0077	mg/l	0.0021
	TP04	0.5	0.0005	0.0077	mg/l	0.0064
	TP06	0.2	0.0005	0.0077	mg/l	0.003
	TP08A	0.5	0.0005	0.0077	mg/l	0.0027
	TP09	0.2	0.0005	0.0077	mg/l	0.0042
	TP10	0.5	0.0005	0.0077	mg/l	0.0047
	TP11	0.3	0.0005	0.0077	mg/l	0.0037
	WS03	1	0.0005	0.0077	mg/l	0.0007
	WS05	0.2	0.0005	0.0077	mg/l	0.0036
	WS06	0.5	0.0005	0.0077	mg/l	0.0078
Zinc	BH105	0.6	5	0.02712	mg/l	0.196
	CP01	1.5	5	0.02712	mg/l	0.054

Determinant	Exploratory Hole	Depth (m BGL)	DWS	EQS	Unit	Exceedance result
	CP02	0.5	5	0.02712	mg/l	0.101
	RC01	0.5	5	0.02712	mg/l	0.132
	RC01	1.8	5	0.02712	mg/l	0.056
	RC02	1	5	0.02712	mg/l	0.204
	RC03	0.3	5	0.02712	mg/l	0.03
	RC03	1.0	5	0.02712	mg/l	0.212
	RC06	0.5	5	0.02712	mg/l	0.034
	RC07-A	0.5	5	0.02712	mg/l	0.085
	RC08	0.5	5	0.02712	mg/l	0.076
	TP03	0.5	5	0.02712	mg/l	0.079
	TP08A	0.5	5	0.02712	mg/l	0.059
	TP11	0.3	5	0.02712	mg/l	0.047
	WS02	0.3	5	0.02712	mg/l	0.075
	WS03	1.0	5	0.02712	mg/l	0.083
	WS05	0.2	5	0.02712	mg/l	0.083
	WS06	0.5	5	0.02712	mg/l	0.109
Chromium (III) Oxide	TP01	0.3	-	0.0047	mg/l	0.007
Chromium - Hexavalent	RC02	0.1	-	0.0034	mg/l	0.01
	RC03	0.3	-	0.0034	mg/l	0.023
	TP01	0.3	-	0.0034	mg/l	0.048
Ammoniacal Nitrogen as N	CP02	0.5	0.38	0.78	mg/l	1.2
	RC01	1.8	0.38	0.78	mg/l	6.4
	RC02	1.0	0.38	0.78	mg/l	2.9
	TP11	0.3	0.38	0.78	mg/l	0.6
Manganese	BH105	0.6	0.05	0.975	mg/l	3.522
	CP01	1.5	0.05	0.975	mg/l	0.172
	RC01	0.5	0.05	0.975	mg/l	0.053
	RC01	1.8	0.05	0.975	mg/l	0.352
	RC02	1	0.05	0.975	mg/l	0.681
	RC03	1	0.05	0.975	mg/l	1.034
	RC07-A	0.5	0.05	0.975	mg/l	0.215
	TP08A	0.5	0.05	0.975	mg/l	1.221
	TP10	0.5	0.05	0.975	mg/l	0.157
	TP11	0.3	0.05	0.975	mg/l	0.104
	WS02	0.3	0.05	0.975	mg/l	0.385
	WS03	1	0.05	0.975	mg/l	5.935
	WS06	0.5	0.05	0.975	mg/l	0.103
Sulphate as SO4	WS02	0.3		400	mg/l	701
	RC03	1	250	400	mg/l	351
Anthracene	TP02	0.2	-	0.0001	mg/l	0.00172
Fluoranthene	TP01	0.3	-	0.0000063	mg/l	0.000128
	TP02	0.2	-	0.0000063	mg/l	0.00316
	TP03	0.5	-	0.0000063	mg/l	0.000186
	TP06	0.2	-	0.0000063	mg/l	0.000057
	TP08A	0.5	-	0.0000063	mg/l	0.000082

Determinant	Exploratory Hole	Depth (m BGL)	DWS	EQS	Unit	Exceedance result
Benzo(a)pyrene	TP09	0.2	-	0.0000063	mg/l	0.000104
	TP11	0.3	-	0.0000063	mg/l	0.000095
	TP01	0.3	0.00001	0.00000017	mg/l	0.000038
	TP02	0.2	0.00001	0.00000017	mg/l	0.000114
	TP03	0.5	0.00001	0.00000017	mg/l	0.0002
	TP08A	0.5	0.00001	0.00000017	mg/l	0.000034
	TP11	0.3	0.00001	0.00000017	mg/l	0.000015
Aromatics >C12-C16	TP02	0.2	0.01	-	mg/l	0.013
Aromatics >C21-C35	TP02	0.2	0.01	-	mg/l	0.01
	TP03	0.5	0.01	-	mg/l	0.01
Aromatics >C16-C21	TP02	0.2	0.01	-	mg/l	0.032

Groundwater samples were also assessed by screening against Environmental Quality Standards and Drinking Water Standards as summarised in Table 3.

Table 3: Groundwater exceedance results

Determinant	Exploratory Hole	DWS	EQS	Unit	Exceedance result
Ammoniacal Nitrogen as N	RC01	0.38	0.78	mg/l	0.8
	RC03	0.38	0.78	mg/l	1.8
	WS01	0.38	0.78	mg/l	1.8
	WS03	0.38	0.78	mg/l	1.0
Manganese	BH105	0.05	0.975	mg/l	0.452
	CP01	0.05	0.975	mg/l	0.126
	RC01	0.05	0.975	mg/l	0.28
	RC03	0.05	0.975	mg/l	3.403
	WS01	0.05	0.975	mg/l	1.919
	WS03	0.05	0.975	mg/l	3.648
Selenium	RC01	0.01	-	mg/l	0.013
Fluoranthene	RC01	-	0.0000063	mg/l	0.000159
	WS01	-	0.0000063	mg/l	0.000075
Benzo(a)pyrene	RC01	0.00001	0.00000017	mg/l	0.000068
	WS01	0.00001	0.00000017	mg/l	0.000047
Aliphatics >C10-C12	CP01	0.01	-	mg/l	0.026
	RC03	0.01	-	mg/l	0.01
Aliphatics >C12-C16	RC01	0.01	-	mg/l	0.013
Aromatics >C21-C35	RC01	0.01	-	mg/l	0.045

The contamination testing undertaken indicates that the made ground present at the site has the potential to act as a source of contamination. This is however dependant on the volume of leachate generated by rainwater ingress into the ground, dispersion, and attenuation of organics and inorganics on their pathway towards the groundwater.

The contaminated land risk assessment (3) concluded that the made ground at the site was not currently causing pollution of controlled waters but has the potential to do so if there is a change to the current leaching environment and soils are not correctly managed.

2.7.3 Ground gas

Risks from ground gases to future building occupants have been assessed in accordance with BS8485:2015 (9) in the contaminated land risk assessment for the site (3). This concludes that the observed gas flows and concentrations are consistent with a characteristic situation (CS2) site. Carbon dioxide concentrations also exceeded 5% by volume in WS05 on several occasions indicating that this result is not considered to be an isolated spike.

Due to the CS2 classification it will be necessary to ensure that the three buildings have sufficient gas protection measures in place.

UK Radon mapping (10) indicates that the site is not in a radon affected area as less than 1% of Properties are above the Action Level.

Risks to human health from vapours arising from contaminants dissolved in groundwater have been assessed by screening against the generic assessment criteria proposed in (11). No exceedances of the screening criteria were identified.

3 Conceptualisation

3.1 Conceptual site model

A conceptual site model has been developed following a review of the contaminated land risk assessments for the site (8) and (7).

3.1.1 Sources

The following potential on-site sources of contamination have been identified:

S1: Widespread made ground due to past industrial land use and historical ground raising;

S2: Historical electrical substations;

S3: Off-site contamination due to historical industrial land use; and

S4: Alluvium as a source of ground gas.

It is assumed that a robust environmental management plan will be adopted during the construction works and that no contamination will occur as a result of leaks and spills during construction.

3.1.2 Pathways

The following potential contamination pathways have been identified:

P1: Human exposure pathways;

P1a: Direct soil and dust ingestion;

P1b: Dermal uptake (indoor and outdoor);

P1c: Inhalation of dust and vapours indoor and outdoor;

P2: Production and vertical migration of leachates in unsaturated zone;

P3: Vertical and horizontal migration of contaminants in saturated zone;

P4: Ground gas migration;

P5: Direct contact with buried structures and infrastructure; and

P6: Man made pathways.

3.1.3 Receptors

The following potential receptors have been identified:

R1: End users;

R2: Adjacent site users

R3: Construction and maintenance workers;

R4: Fabric of building and infrastructure;

R5: Groundwater in the underlying, Alluvium (Secondary A aquifer), Glaciofluvial Deposits (Secondary A aquifer), Glacial Till and Chester Formation of the Sherwood Sandstone Group (Principal aquifer); and

R6: Manchester Ship Canal including the Ontario and Erie Basins.

3.2 Summary of potential contamination risks

The review of the conceptual site model and previous risk assessments has identified the following potential active pollutant linkages that require remediation.

Source	Pathway	Receptor
S1: Widespread made ground due to past industrial land use and historical infilling. S2: Historical electrical substations	P1a: Direct Soil and Dust Ingestion P1b: Dermal Uptake (Indoor and Outdoor)	R1: End users
	P1c: Inhalation of Dust and Vapours indoor and outdoor P4: Soil gas migration	R1: End users
	P2: Production and vertical migration of leachates in unsaturated zone P3: Vertical and horizontal migration of contaminants in saturated zone P6: Man made pathways	R5: Groundwater in the underlying Alluvium (Secondary A aquifer), Glaciofluvial Deposits (Secondary A aquifer), Glacial Till (Secondary Undifferentiated aquifer) and Chester Formation of the Sherwood Sandstone Group (Principal aquifer)
	P4: Ground gas migration;	R1: Site end users
S1: Widespread made ground due to past industrial land use and historical infilling S3: Off-site contamination due to historical industrial land use S4: Alluvium		

4 Remediation strategy

4.1 Objectives

The purpose of remediation is to reduce any potentially unacceptable risks by risk avoidance, risk mitigation or risk reduction by breaking pollutant linkages identified in section 3.3 of this report. These relate to the presence of made ground at the site.

The objectives of this strategy are to:

- Reduce the identified risks;
- Minimise removal of material to landfill;
- Ensure that changes to the site layout and usage do not introduce new pollutant linkages; and
- Ensure that any imported materials do not pose an unacceptable risk to human health or controlled waters.

The following sections outline the specific measures that will be taken to ensure that the proposed works pose a low risk to the defined receptors.

It is not proposed to undertake any remediation of existing groundwater contamination at the site. Gross contamination of groundwater has not been observed at the site and it is likely that the level of contaminants present in groundwater at the site are similar to background concentrations in the surrounding urban area. Consequently, it is unlikely that remediation of the observed groundwater contamination would deliver sufficient benefit to justify the cost. It is proposed to remove a substantial volume of made ground from the site which is likely to improve local groundwater quality in the long term.

4.2 Options appraisal

4.2.1 Soils

The made ground present at the site poses a potential risk to both human health, if end users come into direct contact with the material, and controlled waters if the development results in a potential increase in leaching of contaminants. A summary of the remediation options considered to address these pollution linkages is included in Table 4.

Table 4: Potential remediation options - Soils

Technique	Target contaminants	Advantages	Disadvantages
Capping beneath hardstanding – breaking direct contact pathways and reducing infiltration	All	Risk averse. Targeted – does not require significant volumes of imported material or disposal. Addresses risk to human health.	Excavation of materials in some areas may be required to ensure correct capping thickness / levels achieved. Required importation of suitable capping materials. Major constraints on future developments remain, e.g. site levels, drainage etc. Potential risk to groundwater, following demolition when the made ground is exposed and before redevelopment works commence.
Bioremediation – use of microorganisms to destroy or immobilise contaminants in place.	Organics	Low cost. Less invasive. Can be performed on-site. No toxic chemicals required. Does not require significant volumes of imported material.	Does not fit within the timescales of the redevelopment and requires a large area on site. May not suitably treat metals contamination Volumes may be too small for in-situ bioremediation (dependant on outcome of additional ground investigation). Odour nuisance to residents living nearby
Excavation and disposal of made ground	All	Short timescale. Permanent removal of source in treated area. If undertaken to a suitable standard, guaranteed effectiveness of remediation. Addresses the risks to human health and leaching/ migration into groundwater.	Expensive. Less sustainable option than others. Requires importation of suitable backfill and disposal of soils to a landfill or soil treatment facility
Cover system in areas of public open space (soft landscaping)	All except VOCs	Short timescale Sustainable option if site won material can be used Addresses risk to human health Cheaper than disposing of soils to landfill	Expensive if large volumes of imported materials needed. Less sustainable if imported materials required. Requires testing of existing materials or importation of suitable materials Hotspots remain in-situ and may represent a risk if the land use or site levels change in the future.
Soil vapour extraction (SVE) and air sparging – can be used together to treat contaminants above and below the groundwater table	VOCs, SVOCs, Hydrocarbons	In-situ	Treatment unit required Installation of wells with 1.5m spacing (approx.) Not suitable for metals Best results in permeable soils
Soil washing – water based, ex-situ scrubbing/ separation technique to remove contaminants	Hydrocarbons, metals and SVOCs	Short to medium timescales Can be performed on-site. Does not require significant volumes of imported material.	Heterogeneous contaminant compositions throughout the soil mixture make it difficult to formulate a single suitable washing solution

Technique	Target contaminants	Advantages	Disadvantages
		Addresses the risks to human health and groundwater.	Residual contaminated material produced which would require disposal Volumes may be too small to make it viable
Soil stabilisation – addition of compounds to convert hazardous substances into less soluble, mobile or toxic forms.	Organics, metals and inorganics	Can be performed on-site. Does not require significant volumes of imported material. Addresses the risks to human health and groundwater.	Concerns over effectiveness and timescales which may not fit with project programme. Volumes may be too small to make it viable
Thermal desorption - heats the contaminated soil to desorb and volatilise the contaminants, which are then either recovered or destroyed	VOCs, SVOCs, PAHs, PCBs, mercury	Can be performed on-site. Does not require significant volumes of imported material.	Expensive Timescales unlikely to fit with the timescales of the redevelopment Complex health and safety requirements May not suitably treat metals contamination Large energy consumption

The following techniques are considered feasible based upon the known site conditions and restrictions, including short timescales, limited space, and the remediation objectives:

- Capping beneath hardstanding in areas of hard landscaping;
- Use of a cover systems in areas of soft landscaping;
- Installation of gas protection measures in buildings and enclosed spaces; and
- Excavation and disposal of made ground in areas of new soft landscaping that are currently beneath hardstanding or where made ground is geotechnically unsuitable.

4.2.2 Ground gases

Ground gas mitigation measures are required to a CS2 standard as set out in CIRIA C665 (12) and BS8485 (9).

The British Standard requires gas protection measures which equate to a score of 3.5 for a 'Type B' building which is defined as: "A private or commercial property with central building management control of any alterations to the building or its uses but limited or no central building management control of the maintenance of the building, including the gas protection measures. Multiple occupancy. Small to medium size rooms with passive ventilation of rooms and other internal spaces throughout ground floor and basement areas."

A Type B building is considered the most appropriate development type for this assessment due to the nature of the development with multiple occupancy, but with a reasonable degree of control over building management and alterations. There are a number of ways to achieve the required gas protection score which are set out in BS8485 these may include:

- Passive subfloor ventilation; and/or
- Reinforced cast in-situ floor slab, well reinforced to control cracking and with minimal penetrations; and/or
- Proprietary gas resistant membrane installed to reasonable levels of workmanship/in line with current good practice under Construction Quality Assurance (CQA) with integrity testing and independent validation and a pressure relief pathway.

The gas protection measures to be used in each building will be determined by the building designer.

Source removal is not considered to be a viable option for addressing the risks posed by ground gases at the site as the source may be widespread and includes the underlying Alluvium. Further discussion is provided in the following section regarding appropriate gas protection measures.

4.3 Proposed remediation works implementation plan

4.3.1 Stage 1 - excavation and foundation construction

4.3.1.1 Northhill Apartments

Excavation to a depth of approximately 3m BGL is required to facilitate the construction of the foundations of Northhill Apartments. This will remove the made ground from within the footprint of the proposed building. The excavated material will be disposed of off-site at a suitably licensed facility.

4.3.1.2 Grapnel Apartments

The ground beneath the footprint of the building will be excavated to a level of between 21.96m AOD and 21.06m AOD to facilitate the construction of the piling mat. Existing ground level ranges from approximately 21.5m AOD to approximately 24.4m AOD. This excavation is expected to completely remove the made ground from within the footprint of the Grapnel Apartments building. The excavated material will be disposed of off-site at a suitably licensed facility.

4.3.1.3 Danforth and Herreshoff Apartments

Material beneath the majority of the footprint of the existing Danforth and Herreshoff Apartment buildings will remain in-situ.

4.3.2 Stage 2 - installation of gas protection measures

The gas protection measures proposed for each building are outlined below.

The gas resistant membranes must meet the following criteria as described in BS8485 (9):

- sufficiently impervious to the gases with a methane gas transmission rate <40.0 ml/day/m²/atm (average) for sheet and joints (tested in accordance with BS ISO 15105-1 manometric method);
- sufficiently durable to remain serviceable for the anticipated life of the building and duration of gas emissions;
- sufficiently strong to withstand in-service stresses (e.g. settlement if placed below a floor slab);
- 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);
- capable, after installation, of providing a complete barrier to the entry of the relevant gas; and
- verified in accordance with CIRIA C735 (13).

4.3.2.1 Northhill Apartments

The following gas protection measures will be put in place for the proposed Northhill Apartments building:

- Reinforced cast in-situ monolithic ground bearing raft;
- Pressure relief pathway; and
- Gas resistant membrane.

This would provide a gas protection score of 4 as defined in BS8485 (9).

4.3.2.2 Grapnel Apartments

The following gas protection measures will be put in place for the proposed Grapnell Apartments building:

- Suspended in-situ reinforced concrete floor slab;
- Pressure relief pathway; and
- Gas resistant membrane.

This would provide a gas protection score of 3.5 as defined in BS8485 (7).

4.3.2.3 Danforth and Herreshoff Apartments

Full details of the original construction of Danforth and Herreshoff Apartments are not available at the time of writing. During the development of the design of the building refurbishment it will be necessary to consider whether sufficient gas protection is provided by the existing structure or whether additional measures are required.

4.3.3 Stage 3 - capping by hardstanding or hard landscaping areas

It will be possible to leave the made ground in-situ and provide an impermeable cap across the areas of the site where hard landscaping is proposed as the final surface. These areas will comprise either buildings, hardstanding access roads or car parking areas which will include hardstanding at ground surface and therefore there will not be any direct contact pathways for human health or any infiltration through made ground.

4.3.4 Stage 4 - removal of made ground from new areas of soft landscaping

Where hardstanding is to be removed and new areas of soft landscaping are to be created made ground that does not meet the acceptance criteria outlined in section 5 will be removed and disposed of off-site and replaced with imported material. Sampling of imported material will be undertaken as described in section 5.3.

4.3.5 Stage 5 - installation of cover system in existing soft landscaping areas

Where existing areas of soft landscaping are to be retained and made ground is to be left in place a cover system will be installed. This would include use of subsoil and topsoil of which has been tested and proven to be suitable quality for the land use. The material used in the cover system could be site won or imported as long as an appropriate testing regime has been undertaken (see section 5). The cover system will be a minimum of 600mm thick. If necessary existing material may be excavated and disposed of off site to a suitably licenced facility. A permeable geotextile layer will be placed at the base of the cover layer to minimise the mixing of soil with underlying made ground.

This assessment does not consider the risks arising due to the presence of asbestos. Where asbestos is present, a thicker cover system may be required.

4.3.6 Stage 6 verification

A verification report outlining details of the remediation works undertaken will be prepared by a suitably experienced and qualified remediation and land contamination specialist and submitted to the local authority as described in section 6.

4.4 Unexpected contamination

A visual inspection of the excavated materials will be undertaken during soil stripping and excavation works. Due to the site history and the likely variability of the materials present on the site, it is possible that contaminated material may be encountered that was not identified during the recent and historical ground investigations.

The protocol below sets out the process for dealing with any unexpected contamination during construction.

During the site works, and in particular during the initial below-ground excavation, the works will be monitored continuously by all contractors involved in the earthworks to check for unexpected or unusual materials that could be contaminative. Contamination may be indicated by areas of:

- Discoloured soil and water (e.g. chemical residues);
- Olfactory evidence of contamination (chemical, oil smells);
- Fibrous texture to the soil (e.g. asbestos);
- Presence of foreign objects (e.g. chemical/oil containers/asbestos);
- Evidence of previously worked soil;
- Evidence of underground structures, tanks etc.;
- Waste pits;
- Redundant drain runs, tanks, flues, etc.;
- Redundant oil pipes;
- Evidence of liquids or solid wastes; and
- Evidence of oils in sediments.

In the event that such contamination is suspected, works in the immediate area will be made safe and secure and stopped and a land contamination specialist will be contacted for advice. The contaminated land specialist will inspect the site and, where deemed necessary, arrange for further sampling and laboratory testing of soils or liquids. Further assessments to identify risks to receptors will be carried out as necessary and reported to the employer, the local authority and the Environment Agency.

Should unacceptable risks be identified, the contractor shall submit to and agree a method statement for dealing with the contaminated material in consultation with the local authority and the Environment Agency.

4.5 Permits

Some aspects of the construction works may require regulatory permits and licences including Environmental Permits, Trade Effluent Discharge Consents, Local Authority Mobile Crushing Plant Permits etc. The contractor(s) will be responsible for ensuring these are in place prior to any remediation works starting.

4.6 Waste management

Where it is necessary to excavate material remove it from the site this will be to an appropriately licensed landfill or soil treatment centre. Additional sampling of any material that will be disposed of off-site will be required to determine its waste categorisation and the most appropriate destination for disposal.

4.7 Dewatering

In some areas of the site, particularly where shallow perched groundwater is present it may be necessary to control groundwater levels and/or inflows during excavations for the proposed foundations. Water abstracted during any dewatering operations will be discharged to tanker or to sewer with an appropriate consent in place.

During any dewatering operations monitoring of groundwater quality will be undertaken to determine whether existing contamination is being mobilised by the dewatering operations. The following parameters will be recorded at the discharge point on a daily basis:

- pH;
- Electrical conductivity; and
- Dissolved oxygen.

In addition, the discharge point will be monitored on an hourly basis for any visual or olfactory evidence of contamination. If any visual or olfactory evidence of contamination is observed or if any of the monitored parameters changes by more than 30% from the initial condition then a suitably qualified land contamination specialist should be consulted within 24 hours to determine if additional action is required.

Monitoring of groundwater levels and quality will be undertaken in the following standpipes on a weekly basis during any dewatering operations:

- RC10;
- RC08;
- WS02;
- BH103; and
- BH104 – S.

Water quality samples will be tested for the suite of contaminants outlined in Table 6. If it is necessary to remove any of the standpipes a replacement will be installed within 20m.

5 Imported materials and reuse of site won material

5.1 Imported materials

5.1.1 General

Any material imported onto site for use in the final development will either:

- Be imported under the Waste and Resources Action programme (WRAP) protocol – Aggregates from Inert Waste (WRAP, 2013) which confirms that the material coming onto site is a non-waste product and can therefore be reused, this relates to aggregate materials only;
- Be proven to be from a natural source (quarry or similar) – details of the source location and material provider will be required; or
- Have sufficient chemical soil laboratory analysis to prove that the material is appropriate for use on site for a particular land use, laboratory results would be compared to the S4ULs specific to the land use (residential without produce). The results of testing would be below the S4UL or site specific assessment criteria to allow use on site. It is possible that additional risk assessment may confirm that the material is acceptable if low level exceedances are identified, this would need to be agreed with the LPA.

Any imported topsoil will be as specified in BS 3882:2007 (14) as “suitable for their intended purpose”.

5.1.2 Initial screening

All material imported to the site will be inspected to ensure that it does not exhibit gross visual evidence of contamination. Such materials include:

- Asbestos and material presenting unacceptable asbestos risk (risks to be determined by others);
- Material exhibiting evidence of non-aqueous phase hydrocarbons;
- Coal tar materials (including road pavement blacktop materials);
- Material exhibiting evidence of sewage contamination;
- Material exhibiting visual and olfactory evidence of contamination; and
- Refuse, putrescible, and biodegradable materials including timber, plastic, glass, and metal.

5.1.3 Sampling strategy

5.1.3.1 Sampling frequency

With the exception of material from a proven natural source or imported under WRAP protocol, soils imported to the site will be sampled for environmental testing at a frequency of one sample for every 250m³ of material imported. A minimum of three samples will be taken from each source of material. Samples will be taken prior to the placement of material.

5.1.3.2 Soil assessment criteria

Limiting values have been defined for soils imported to or reused on site and these are included in Table 5 and Table 6 below.

Soils imported to the site will be screened against the following criteria to ensure that they pose a low risk to human health. Only soils that do not exceed these criteria will be imported onto the site.

Table 5: Human health screening criteria

Determinant	Screening value (S4UL public open space residential land use)
Asbestos	No asbestos detected
Arsenic	79
Cadmium	120
Chromium (III)	1500
Chromium (VI)	7.7
Copper	12000
Lead	630*
Nickel	230
Elemental Mercury (Hg)	16
Inorganic Mercury (Hg ²⁺)	120
Methyl Mercury (Hg ⁺)	40
Selenium	1100
Zinc	81000
Aliphatic EC 5-6	570000
Aliphatic EC >6-8	600000
Aliphatic EC >8-10	13000
Aliphatic EC >10-12	13000
Aliphatic EC >12-16	13000
Aliphatic EC >16-35	250000
Aliphatic EC >35-44	250000
Aromatic EC 5-7	56000
Aromatic EC >7-8	56000
Aromatic EC >8-10	5000
Aromatic EC >10-12	5000
Aromatic EC >12-16	5100
Aromatic EC >16-21	3800
Aromatic EC >21-35	3800
Aromatic EC >35-44	3800
Aliphatic and Aromatic EC >44-70	3800
Acenaphthene	29000
Acenaphthylene	29000
Anthracene	150000
Benz[a]anthracene	49
Benzo[a]pyrene	11
Benzo[b]fluoranthene	13
Benzo[ghi]perylene	1400
Benzo[k]fluoranthene	370

Determinant	Screening value (S4UL public open space residential land use)
Chrysene	93
Dibenz[ah]anthracene	1.1
Fluoranthene	6300
Fluorene	20000
Indeno[123-cd]pyrene	150
Naphthalene	1200
Phenanthrene	6200
Pyrene	15000
Coal Tar	4.4

*C4SL value used for Lead

5.1.3.3 Soil leachate

Soils imported to the site will be screened against the following criteria to ensure that they pose a low risk to controlled waters. Only soils that do not exceed these criteria will be imported onto the site.

Table 6: Controlled waters screening criteria

Determinant	Screening value (UK DWS or EQS) (µg/l)
Antimony	5
Arsenic	10
Barium	100
Boron	1000
Cadmium	0.25
Chromium	4.7
Cyanide (total)	1
Lead (dissolved)	6.6
Magnesium	50,000
Nickel	20
Nitrate (as NO ₃)	50
Phenol	0.5
Ammonium as NH ₄ ⁺ (total)	500
Chloride	250,000
Sulphate	250,000
Benzo(a)pyrene	0.00017
Hydrocarbons (dissolved/emulsions)	10
Benzene	1
Toluene	50

5.2 Reuse of site won material

Reuse of site won material in different areas of the site may be appropriate if there is an excess of material in one area and a deficit in another. This will either be completed under:

- An environmental permit obtained from the Environment Agency;
- A waste exemption registered with the Environment Agency; or
- A CL:AIRE materials management plan.

If a materials management plan is used, it will require:

1. Certainty of use of the material (where it will come from and go to, including drawings)
2. Confirmation through risk assessment that the material is appropriate for reuse in the proposed areas, this would be undertaken based on the results of additional ground investigation.
3. Confirmation that the Environment Agency and LPA have no objections to the reuse of material.
4. Volume of material to be reused on site and where.
5. Sign off by a Qualified person.

This can only be applied if prepared prior to the excavation of material.

5.3 Removal of existing hardstanding

Where existing hardstanding is to be removed and replaced with soft landscaping the existing made ground will be removed unless it meets the acceptance criteria outlined in section 5.1.

Sampling to assess the acceptability of material in these areas will be undertaken on a 15m grid. The grid may include existing data points reported in the contaminated land risk assessment (3).

5.4 In-situ soils

Providing the proposed remediation options are implemented, no additional sampling and testing of material is proposed where in situ made ground is left in place beneath hard standing or existing areas of soft landscaping.

5.5 Asbestos

Asbestos has been identified in soil samples taken from the site. Mott MacDonald cannot advise on the detection or management of asbestos contamination.

Further information on the management of suspected and known asbestos contamination is detailed in the Asbestos Management Plan (4).

6 Verification Plan

6.1 Objectives

The objective of the verification report will be to provide a complete record of remediation activities that have occurred on the site. The required data and evidence required to demonstrate that remediation is successful should be in line with that presented in the verification plan.

The verification report will provide evidence to the regulatory bodies that remediation has achieved its objectives and remediation targets / criteria.

It will define the duration of time and the phase (if applicable) that this particular report covers, if development take place over an extended period of time.

The verification report will follow the structure and objectives set out in the verification plan outlined below.

6.2 Content of verification plan

The following points will be recorded during remediation works for use in the verification report.

Table 7: Verification plan

Content	Description
Background of the site conditions prior to remediation	Summary of the background as set out in this report and the preceding contaminated land risk assessment (3).
Roles and responsibilities	Beaumont Morgan will be responsible for completion of the works as agreed with the LPA and for maintaining appropriate records for use in the verification report.
Excavated material	Presentation of the location and volume of material excavated including photographs and confirmation of disposal (together with copies of waste transfer tickets) or reuse.
Data management; how records have been kept	Details of how records of material movement and monitoring data have been kept.
Imported materials	Confirm that all imported soils are either imported under the WRAP protocol (aggregates) or are tested prior to use on site. Include laboratory results undertaken as described in section 5.1 and comparison to appropriate acceptance criteria in section 5.1.3.
Reused materials	A verification report will be required if a materials management plan is used for reuse of site won material. This will include drawings showing material movements and will confirm that the reuse has been undertaken as set out in the materials management plan. This will be a separate document but should be referenced in the verification plan.
Verification of cover thickness	Records of the thickness of any cover systems will be kept including photographs showing the thickness of material placed.
Gas protection measures	Verification of the gas protection measures will be undertaken in accordance with CIRIA C735 (13) and records and certificates maintained.

Content	Description
Limitations	Provide information on any limitations encountered and justification for the setting of any new objectives to meet through remediation.
Unexpected contamination	Details of any unexpected contamination encountered including location, volume of material, sampling undertaken, laboratory testing results and records of disposal or reuse.

6.3 Standards and guidance

There are a number of relevant standards that the remediation works were required to comply with, for example the requirements of Part IIA of the Environmental Protection Act 1990, the National Planning Policy Framework (NPPF), planning conditions, related statutory and authoritative UK non-statutory guidance and in accordance with the model procedures framework that underpins contaminated land good practice in the UK (EA/DEFRA CLR11, 2004).

The verification plan will follow the procedures outlined in the Environment Agency (2010) Verification of remediation of land contamination report (Report SC030114/R1).

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Appendices

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A. Figures

HARD LANDSCAPE SPECIFICATIONS

SURFACE TREATMENTS

- S1 - Kellen Breccia Black Paving - Vehicular**
200 x 100 x 80mm in mixed colours Legenta B (10%), Tagenta E (40%) and Rosso (50%) with 300mm wide granite kerb upstand. Supplied by Hardscape or equal approved - contact Anthony Collins 07702 864 211.
- S2 - Kellen Breccia Black Paving - Pedestrian**
150 x 300 x 60mm in mixed colours Legenta B (10%), Tagenta E (40%) and Rosso (50%) with 150-300mm wide granite kerb laid flush. Supplied by Hardscape or equal approved - contact Anthony Collins 07702 864 211.
- S3 - Self Binding Gravel**
50-100mm depth self binding gravel laid on min 100mm MOT type 1 sub-base with 150mm wide granite kerb laid flush. Supplied by DCM Ltd or equal approved - contact 01772 440340.
- S4 - Artificial Grass**
30mm pile height artificial turf from Tiger Turf with rubber shock pad (pending advice from outdoor fitness manufacturer) with 150mm wide granite kerb laid flush. Supplied by Tiger Turf UK Ltd - contact 01299 253 966.
- S5 - Tarmac**
Black tarmacadam to the vehicular access and parking bays as indicated on the drawing with 300mm wide granite kerb upstand. To highways engineer's specification.
- S6 - Composite Decking**
Enhanced grain Coppered Oak composite deck boards to be laid as a flush surfaced path and localised raised (outlined blue) boxed seating features around trees as shown. Supplied by Milboard Decking or equal approved - contact 024 7645 9945.
- S7 - Concrete steps**
Double Tact Concrete slabs (subject to detailed design) used to form shallow steps up the bank as shown. Supplied by Hardscape or equal approved - contact Anthony Collins 07702 864 211.
- S8 - Play safe surface**
Blue Wet pore Absorb-a-fall two layer rubberised safety surface system laid onto a structural base course of concrete or bituminous macadam. Surface to include localised angular ground in the middle. Supplied by DCM Ltd or equal approved - contact 01772 440340.
- S9 - Surface artwork detailing**
Corten/steel steps surface based to black paving to create the impression of historic train lines which once ran through the site. Bespoke detail which is subject to detailed design and development.

- E1 - Granite Kerb Edge upstand**
300mm wide granite kerb upstand around the vehicular access roads in Royal White colour. Supplied by Hardscape or equal approved - contact Anthony Collins 07702 864 211.
- E2 - Granite Kerb laid flush**
150-300mm wide granite kerb laid flush to define changes in surfaces and edge detail for pedestrian areas in Royal White colour. Supplied by Hardscape or equal approved - contact Anthony Collins 07702 864 211.

SOFT LANDSCAPE

- Existing Trees Retained**
Existing trees as shown to be retained and protected inline with BS5837:2012 and DEP Tree Protection Plan 3397.04.
- Existing Trees Removed**
Existing trees to be removed to accommodate the development all works to be carried out outside of the bird nest season (March-August).
- Trees**
Proposed trees to be planted in soft landscaped areas as shown, please refer to DEP Planting Plan for further information 3397.07.
- Shrub Beds**
Proposed shrub plantings across the site, please refer to DEP Planting Plan for further information 3397.07.
- Grass**
Proposed areas of grass to be laid as turf.

Bat house to be relocated as a permanent fixture in the landscape under the tram line.

Existing metal palisade fence to be replaced with decorative railings following discussions with the adjacent land owner.

concrete ret. wall

flush kerb to loading bay

concrete wall to car park

circular surface detail around the columns

cycle (10)

seating

indicative feature lighting under tram line

steps

bollards

existing conc retaining wall

existing permacul wall retained

existing conc retaining wall

existing conc retaining wall

existing conc retaining wall

existing conc retaining wall

existing conc retaining wall

existing conc retaining wall

existing conc retaining wall

existing conc retaining wall

existing conc retaining wall

existing conc retaining wall

existing conc retaining wall

existing conc retaining wall

existing conc retaining wall

STREET FURNITURE & FEATURES

- F1 - Cast Stone Bench with timber insert**
12no. Log 200 seat 2080 x 360 x 450mm cast stone bench in white with timber insert and steel and timber back rest. Supplied by Landmark or equal approved - contact Kieran Lewis (ref Q-0717-1603A) 01686 689 198.
- F2 - Timber Lounger**
7no. Westminster Lounger 1730 x 600 x 780mm timber slatted lounger fixed into the mounds. Supplied by Landmark or equal approved - contact Kieran Lewis (ref Q-0717-1603A) 01686 689 198.
- F5 - Cast stone bench**
5no. Northwich Cast Stone Bench 2000 x 600 x 450mm with base plinth in light grey. Supplied by Landmark or equal approved - contact Kieran Lewis (ref Q-0717-1603A) 01686 689 198.
- F4 - Timber Bench Top**
2no. Timber Bench Top 2400 x 600mm bench top to be fixed to the granite walls (walls specified separately). Supplied by Landmark or equal approved - contact Kieran Lewis (ref Q-0717-1603A) 01686 689 198.
- F5 - Table Tennis Table**
1no. Concrete Table Tennis Table 2740 x 1520 x 760mm heavy duty concrete with orange top colour. Supplied by Landmark or equal approved - contact Kieran Lewis (ref Q-0717-1603A) 01686 689 198.
- F6 - Outdoor Gym Equipment**
1no. Calisthenics Bundle (6 pieces of outdoor gym equipment) powder coated in Yellow. Supplied by HAGS SMP or equal approved - contact 0845 260 1655.
- F7 - Green Roof Cycle Shelters**
3no. Blea Cycle Shelter with Green Roof. To be heavy duty SHS mild steel frame with vertical timber slats and sedum roof system, hinged lockable gates and 4000g galvanneal cycle stands as indicated. Supplied by Landmark or equal approved - contact Kieran Lewis (ref Q-0717-1603A) 01686 689 198.
- F8 - Cycle Stands**
77no. Stafford Cycle Stands, mild steel and powder coated in Yellow (or colour to match architecture of the building). Supplied by Landmark or equal approved - contact Kieran Lewis (ref Q-0717-1603A) 01686 689 198.
- F9 - Bollards**
Mild Steel Folding Bollards to be powder coated in Yellow (or colour to match the architecture of the building). Supplied by Landmark or equal approved - contact Kieran Lewis (ref Q-0717-1603A) 01686 689 198.

LIGHTING

- L1 - Artwork Feature Coloured Lights**
Subject to detailed design coloured LED uplights to be used to create an artwork feature under the tram lines as shown.

For full details of all external lighting across the whole of the site please refer to P+HS drawings FG-FHP_INF_XX_E_94-03/05 External Services Lighting Scheme.

BOUNDARY TREATMENTS

- B1 - 2.1m High Railings**
Vertical, flat top metal railings with lockable gates to conform to BS1722 part 9, galvanneal and Powder Coated in BLACK. Railings to secure the ground floor apartments of the back of Grapnel. Supplied by Alpha Rail or equal approved - contact 01623 750 214.
- B2 - Low Feature Wall**
400mm high feature walls to provide a defensible buffer to the semi-private terraces. To be 150mm wide curved granite walls in a smooth finish made from Royal White granite. Supplied by Hardscape or equal approved - contact Anthony Collins 07702 864 211.
- B3 - 1.5m Timber slatted fencing**
Jakkured Recluser Panel Fence made from vertically timber slats positioned at a 15 degree angle facing out of the play area set between slatted timber posts. Supplied by Jackson Fencing or equal approved - contact 01829 770776.
- B4 - Feature Walls**
500mm high feature walls to provide a defensible buffer around the activity areas in the middle of the site. To be 300mm wide curved granite walls made from Royal White granite. Supplied by Hardscape or equal approved - contact Anthony Collins 07702 864 211.
- B5 - Safety Railings**
Safety railings to be fitted at the top of the gabion walls around Grapnel. Railings specification and fixings to the gabions to be detailed by the engineer.
- B6 - Low Wall/Retaining Walls**
Low walls / retaining walls 150-1000mm high around the semi-private terraces to Grapnel. Walls to be constructed to match the building facade with a granite coping. 1200 balustrade to be installed where retaining walls exceed 600mm and should match the building architecture. Please note all structural walls to be designed by the structural engineers and architects.
- Retaining Walls**
All structural retaining walls to be designed and specified by the structural engineers and architects.

For further details of the retaining walls across the site please refer to Mott MacDonald drawings FG_MMMD_SW_XX_DR_C_11_4001, 4002 and 4003 Retaining Wall Layout, sections and Elevations.

The existing retaining wall and palisade fence on top to be retained and will continue to form the site boundary.

The lintel from the original Customs House to be relocated within the landscape at the end of the garden avenue.

SUSTAINABLE DRAINAGE

- D1 - Sustainable Urban Drainage System**
- Landscaped areas to be used for SuDS, areas to be confirmed by the drainage engineer.
- D2 - Swale**
- Landscaped areas to be used for SuDS, areas to be confirmed by the drainage engineer.
- D3 - Street Rain Garden**
- Landscaped areas to be used for SuDS, areas to be confirmed by the drainage engineer.

For further details of the drainage strategy and SuDS across the site please refer to Mott MacDonald drawings FG_MMMD_SW_XX_DR_C_11_3001 and 3002 Site Wide Drainage Masterplan.

FEATURE

- Totem Pole**
- Totem pole to be located within the shrub bed area in front of Danforth. Foundations to be detail designed by the engineer and totem to be upliffe.

Stone filled gabion baskets to form the retaining walls around the back of the building, to be detailed by the engineers.

Railings and gate to secure the back of the ground floor apartments.

Retaining walls around the building frontage to be a brick finish to match the building.

Existing trees and shrubs to the embankment to be removed and the bank re graded to 1:3 following the installation of the gabion walls and working zones. New planting to be established at the top of the embankment.

Semi-private amenity space to be provided at the back of the ground floor apartments. Retaining wall to sit within the existing embankment to provide level access out from the apartments.

Existing retaining walls and palisade fence to the site boundary to be retained.

Future development to maintain the pedestrian link to Trafford Road. Existing hard surface in the wider area to be removed and replaced with soft landscape - existing trees to be retained.

Section of existing wall to be demolished between the existing piers to provide an opening into the site.

Retaining wall to be detailed by the engineer.

Existing metal palisade fence to the neighbouring development to be retained.

Existing trees to be retained.

Southern boundary of the site subject to change following future discussions between the adjacent landowner and the Local Authority.

Existing trees along the site boundary to be removed and replaced and the existing flag on edge retaining wall to be replaced with a granite wall inline with engineers details.

Proposed levels and contours as designed by Mott's engineers and drainage engineers.

Area to be soft landscaped as part of the proposed wider landscape improvement works. Existing palisade fence around this boundary to be retained to secure the site.

Revision Status		
H	Two extra external cycle spaces added	EP230718
G	Two extra external cycle spaces added	EP180718
F	Totem Pole added into the scheme	EP200818
E	Boundaries around Grapnel updated - 100	EP110618
D	Minor amendments to detailed treatments of parking bays and loading zone to North Hill updated	EP040418
C	Parking bays and disabled bay numbers revised	EP140318
B	Indicative lighting moved out of the self landing gravel	EP151218
A	Hardworks spec updated following agreement with B&D	EP161217

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Client: Beaumont Morgan Developments Ltd
Project: Furness Quay, Salford
Description: Hardworks Plan
Status: Planning
Scale: 1:250@A0
Job number: 3397
Drawing number: 06
Date: Feb 17
Revision: H

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B. Disclaimer

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This report represents the technical findings and opinions of experienced geoenvironmental specialists and does not constitute legal, insurance or financial advice, for which separate, independent advice should be consulted from qualified professionals if so required.

The findings and opinions of this report are based on information obtained from a variety of sources as detailed in this report. We cannot and do not guarantee the authenticity or reliability of the information from other sources upon which we have relied. To the extent that this document is based on information supplied by other parties, We accept no liability for any loss or damage suffered by the client due to an error or omission in this report which is (i) due to an error or omission data, information or statements supplied to us by other parties including the client (“Data”) or (ii) which arises from any conclusions based on such Data. We have not independently verified such Data and have assumed it to be accurate, complete, reliable and current as of the date of such information.

To the extent that this report is based on information obtained from a ground investigation, any such investigation can examine only a small part of the subsurface conditions. Where we have been responsible for the design of a ground investigation, we shall have used reasonable skill and care. However, in any ground investigation there remains a risk that pockets or “hot-spots” of contamination may not be identified, because investigations are necessarily based on sampling at localised points. Not finding any indicators of contamination does not mean that hazardous substances do not exist at the site.

Certain indicators or evidence of hazardous substances or conditions may have been outside the limited portion of the subsurface investigated or monitored and thus may not have been identified or their full significance appreciated. Such risks may be mitigated to a degree by carrying out further ground investigation, or during construction works, by on-site visual observation and validation testing.

It is also possible that environmental monitoring has not identified certain conditions because of the relatively short monitoring period. Accordingly it is possible that the ground investigation and monitoring failed to indicate the presence or significance of hazardous substances or conditions. If so, their presence could not have been considered in the formulation of our findings and opinions.

For the avoidance of doubt, where the words “remediation” or “remedial action” are used in this report, these words and phrases shall refer to actions to reduce or control risks from relevant

pollutant linkages associated with the site. Unless explicitly stated, remediation shall NOT be assumed to refer to actions to eliminate contamination risks.

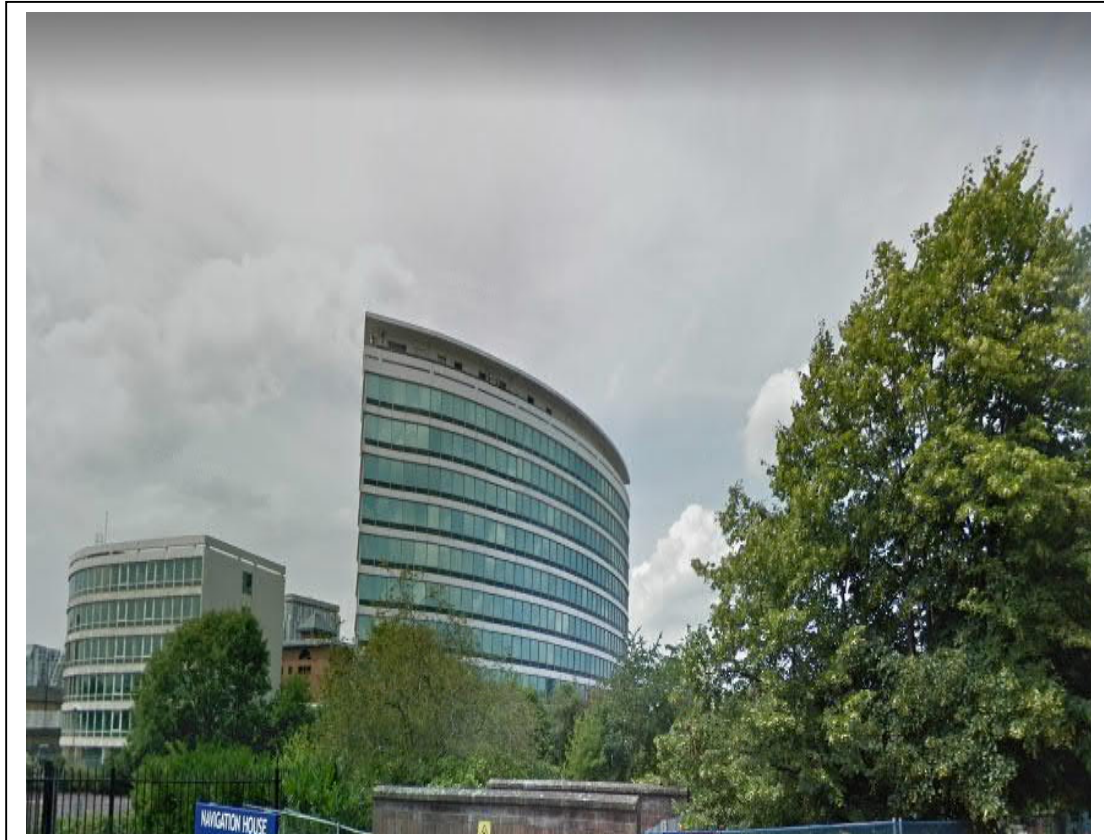
This report has been produced using due skill and care, in accordance with statute and best practice at the reporting date stated in the report. We accept no liability for any change in geoenvironmental risk interpretation resulting from changes in guidance and/or statute after the reporting date.

We believe that providing information about limitations is essential to help the client identify and thereby manage its risks. These risks can be mitigated – but they cannot be eliminated -through additional research. We will, on request, advise the client of the additional research opportunities available, their impact on risk, and their cost.

C. Asbestos management plan

Beaumont Morgan

Fortis Quay Asbestos Management Plan



Fortis Quay Asbestos Management Plan

Beaumont Morgan

Rev 2

Confidential

Project No. 70051902
Date: November 2018

WSP UK Ltd
WSP.com

Quality Management

Issue/Revision	First Issue	Revision 1	Revision 2	Revision 3
Remarks	Final	Rev 01		
Date	11 th October 2018	14 th November 2018		
Prepared By	Nick Mannell	Nick Mannell		
Checked by	Michael Hussey	Shona Baugh		
Authorised by	Michael Hussey	Shona Baugh		
Signature				
Project Number	70051902	70051902		
Report Number	70051902	70051902		
File Reference	WSP Central Data Shared Drive	WSP Central Data Shared Drive		

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The original of the technology-based document sent herewith has been authenticated and will be retained by WSP for a minimum of ten years. Since the file transmitted is now out of WSP's control and its integrity can no longer be ensured, no guarantee may be given to any modifications to be made to this document

Asbestos Management Plan

Fortis Quay

8th November 2018

Client

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- 1 Introduction
- 2 Asbestos Controls
- 3 Requirements for management of contaminated soil works
- 4 Information to be provided by the contractor
- 5 Ongoing Asbestos Control Measures
- 6 Limitations

- Appendix A- Site Plans

1.0 Introduction

1.1 Authorisation

WSP was instructed by Beaumont Morgan Developments (the client) to prepare an Asbestos Management Plan for the proposed ground works at the Fortis Quay Development, Salford

1.2 Introduction

During recent ground investigation surveys, asbestos containing materials (ACM) were identified in the form of insulation debris and loose fibre in samples. Beaumont Morgan will need to include the asbestos removal as part of the remediation contract for the site and a further, asbestos specific, site investigation may be required as part of the planning process.

In addition to the identified asbestos containing material, Asbestos Containing Soils (ACS) are thought to be present at the site. Asbestos quantification information is not available for all materials present at the site, and no site specific investigation for asbestos has been carried out. Therefore, it must be presumed that ACS are present throughout the site

An Asbestos Management Plan (AMP) is required to facilitate safe and suitable ground disturbance works associated with ground materials present at the site.

This asbestos management plan describes how risks from asbestos should be controlled during groundworks.

This document highlights the overarching arrangements related to asbestos legal compliance, for any works on site. The information within this document has been produced to inform the Principal Contractor and their sub-contractors of their responsibilities for managing the asbestos risk.

The provisions of this document are mandatory for all site personnel who may be involved in any ground disturbance work.

The Principal Contractor shall be responsible for the design and implementation of Risk Assessments and Method Statements (RAMS).

This asbestos management plan is not intended as a materials management plan nor is it intended to provide guidance on the reuse of asbestos containing soils at the site.

1.3 Site Conditions

Existing structures in the form of two 1960s office buildings are present at the site. These buildings have been stripped back to the structural frame and will be used as part of the new development. Other areas of the site, incorporating external car parking and open land will also form the basis of new residential structures to be developed.

1.4 Existing Information

WSP has not undertaken a site investigation. This document has been prepared with reference to the following client supplied documents:

- ESG Report A7048-18: Factual Report on Ground Investigation
- Mott McDonald Report FQ-MMD-SW-XX-RP-C-0003 Rev A: Contaminated Land Risk Assessment
- Mott McDonald Report FQ-MMD-SW-XX-RP-C-0002 Rev A: Interpretive Ground Investigation Report
- Mott Macdonald Remediation Strategy – JS ALC DRAFT
- REC Report LA103607P2R1- Geo-Environmental Site Assessment (Furness Quay)
- WYG Report A102258- Ground Investigation Factual Report

2.0 Asbestos Controls

2.1 Summary of Positive Asbestos Identification

As detailed in the reports REC Report LA103607P2R1, ESG Report A7048-18, WYG Report A102258 and Mott McDonald Report FQ-MMD-SW-XX-RP-C-0003 Rev A asbestos containing material (ACM) has been identified as debris and loose fibre in soil samples. Table A, below, summarises the findings.

Table A

Report No.	Sample No/ Test point	Sample Depth	Material Type	Asbestos Type	Reported concentration
ESG Report A7048-18	1761992	Not specified	Soils	Chrysotile	Not specified
ESG Report A7048-18	CL/1764769	TP08A 0.50m Soils	Free fibre	Chrysotile	Not specified
ESG Report A7048-18	CL/1764771	TP04 0.50m Soils	Free fibre	Chrysotile, Amosite & Crocidolite	Not specified
ESG Report A7048-18	CL/1764774	TP03 0.50m Soils	Free fibre	Amosite	Not specified
Mott McDonald Report FQ-MMD-SW-XX-RP-C-0003 Rev A	RC1	0.5m depth	Loose Insulation	Crocidolite	Not Specified
Mott McDonald Report FQ-MMD-SW-XX-RP-C-0003 Rev A	WS3	1.0m depth	Loose Insulation	Chrysotile	Not Specified

Table A (continued)

Report No.	Sample No/ Test point	Sample Depth	Material Type	Asbestos Type	Reported concentration
Mott McDonald Report FQ- MMD-SW-XX- RP-C-0003 Rev A	TP08A	0.5m depth	Free Fibre	Chrysotile	Not Specified
Mott McDonald Report FQ- MMD-SW-XX- RP-C-0003 Rev A	TP04	TP04-0.5m depth	Free Fibre	Chrysotile, Amosite & Crocidolite	Not Specified
Mott McDonald Report FQ- MMD-SW-XX- RP-C-0003 Rev A	TP10	TP10-0.5m depth	Free Fibre	Amosite	Not Specified
REC Report LA103607P2R1	BH101	1.0m depth	Free fibre	Chrysotile & Amosite	<0.001%
REC Report LA103607P2R1	BH102	0.5m depth	Free fibre	Chrysotile & Amosite	<0.001%
REC Report LA103607P2R1	RC01	0.5m depth	Loose insulation	Crocidolite	Not specified
REC Report LA103607P2R1	WS3	1.0m depth	Loose insulation	Chrysotile	Not specified
WYG Report A102258	BH101	1.0 M Depth	Fibre Bundles	Chrysotile	<0.001%
WYG Report A102258	BH102	.05m depth	Fibre Bundles	Amosite	<0.001%

These findings should not be considered exhaustive as the reports state there is potential for other ACM in areas of made ground. A full asbestos investigation has not been carried out and will be required prior to redevelopment works commencing.

Due to the nature of degraded ACMs it should be presumed that further contamination will be present and uncovered during future works.

Reuse on site or off-site disposal of soils would require further testing for classification.

The proposed activities required at the site associated with the ground works and preliminary works will result in a of disturbance of the materials. These activities have the potential to generate airborne asbestos fibres and control measures will be required to mitigate this risk, to site workers, future site operators and external receptors. Any ground disturbance to areas of identified or suspected asbestos contamination (either as bulk ACMs or loose free asbestos fibres) must be undertaken in accordance with the Control of Asbestos Regulations 2012 (CAR). The site plan in Appendix A illustrates the location of the asbestos. It should be noted that areas where levels are >0.1% weight for weight will be isolated until remediation and/or further management procedures are put in place

2.2 Asbestos Risk to Health Analysis

The proposed redevelopment of the site, inclusive of the Infrastructure and Building Work phases, will result in disturbance of the ground. Any ground disturbance has the potential to generate airborne asbestos fibres and control measures will be required to mitigate associated risks to site workers, future site operators and external receptors.

Any ground disturbance to areas of identified or suspected asbestos contamination (either as bulk ACMs or loose free asbestos fibres in soils) must be assessed by the Principal Contractor and managed appropriately.

Based upon the asbestos risk present at the site there is a requirement to comply with the following legislation and its interpretation. Note this list is not exhaustive

- Health and Safety at Work Etc Act 1974;
- Construction (Design & Management) Regulations (CDM2015)
- Environmental Protection Act 1990.
- Control of Asbestos Regulations (CAR2012); including CL:AIRE CAR SOIL guidance
- Management of Health and Safety at Work Regulations 1999;
- The Hazardous Waste (England and Wales) Regulations 2016;
- The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009

2.3 Summary of Key Project Requirements

It is the Principal Contractor's responsibility to manage and mitigate the asbestos risk during the works. The Principal Contractor may employ competent help as required such as a Licensed Asbestos Removal Contractor to undertake Licensable work with asbestos or non-licensed work that requires their expertise and competency. Therefore, in conformance with statutory Health and Safety requirements and specifically Regulation 11 of the Control of Asbestos Regulations "Prevention or Reduction of Exposure to Asbestos", the basic arrangements for managing and mitigating the asbestos risk will include the following:

- Site Specific Awareness training & bespoke induction;
- Additional task-specific practical training for non-licensed asbestos working as detailed in this plan.
- Issue of a Permit to Dig;
- Safe Systems of Work and supporting Risk Assessments;
- Control Measures and details of PPE & RPE;
- Airborne fibre Monitoring Strategy (Personal exposure monitoring and Static air tests inclusive of comprehensive boundary monitoring);
- Emergencies and unforeseen disturbances of asbestos;
- Waste Storage and Handling; and
- Full time provision of competent and asbestos specialist resources.

In addition, it will be assumed that:

- Any bonded or bulk asbestos materials identified during groundworks will be removed by Licensed or competent personnel as appropriate to the asbestos work category defined by risk assessment;
- Any identified asbestos materials associated with below ground pipework or infrastructure will be removed by the Principal Contractor;
- A competent person is present during the disturbance of the concrete/hardstanding to conduct a visual assessment for potential asbestos containing materials;

- Any concrete/hardstanding demarcated as being potentially contaminated with asbestos will be quarantined and assessments undertaken to ascertain most appropriate remedial actions;
- It is probable that asbestos contaminated soils with a concentration of <0.1% w/w may be utilised as a sub-base engineered fill at depths below 1m of the finished platform level (subject to meeting additional geotechnical criteria); but the reuse of asbestos containing soils on site will require additional approval and is not covered in this plan.
- Any crushed concrete utilised for piling mats or surface cover post-remediation must be free visibly of asbestos (both visual and laboratory analysis).
- In the event of significant buried ACMs being encountered. Site works will cease in that area, the area segregated from the remainder of site and made safe with an assessment undertaken by a competent person to determine the nature and extent of the contamination and the appropriate remedial actions.

3.0 Requirements for Management of Contaminated Soil Works

3.1 Compliance with the Control of Asbestos Regulations (CAR) 2012

In all circumstances where work of any nature is to be undertaken at a site, there is a need to assess the potential for human health exposure risks from asbestos to occur to those who may be involved directly or indirectly with the works.

All employers have a duty to provide a safe working environment for their employees and this requires them to assess and manage any potential asbestos risk. The key issues to be assessed are as follows:

- Is there a risk of asbestos being present at the site?
- Is there a risk of any release of asbestos fibres into the air?
- Is there a risk of any such release exceeding any of the stated control limits?

It is anticipated that the following tasks will all involve, or potentially involve, working with asbestos impacted soils or potentially ACM debris. These tasks must be included in the preparation of the Risk Assessment and Plan of Works.:

- Site mobilisation (Infrastructure and Building Works);
- Works undertaken to clear made ground from existing concrete slab foundations (Infrastructure Works);
- Works undertaken on made ground materials beneath the existing concrete slab foundations (Infrastructure Works);
- All remedial treatment works of soils (Infrastructure Works);
- Excavation, movement and processing of made ground materials.
- Excavation, movement and processing of made ground materials to support their reuse and creation of the finished levels such as reduced level yards and works required to construct new structures and buildings;
- Placing of any cover system onto temporary stockpiles of materials excavated from site areas;
- Placing of any cover systems onto made ground material in its current location and any subsequent designated relocation areas for creation of Landscaping; and
- Installation of suitable and sufficient perimeter segregation barriers.

NOTE: The Control of Asbestos Regulations 2012 are supported by the Approved Code of Practice L143. L143 has a special legal status and by being able to demonstrate following the approved Code of Practice an employer will normally be doing enough to comply with the law. However, L143 was produced with the aim of managing asbestos risks in buildings and many parts of the document do not specifically address work on brownfield sites and asbestos in soils and construction and demolition materials. In any event the CAR must be complied with. In order to assist Employers interpret the regulations for soils a joint industry working group (JIWG) under the authority of CL:AIRE has produced a document CAR SOIL that has been reviewed by both the JIWG HSE and is accepted current industry guidance.

CIRIA has produced other guidance CIRIA C765 Asbestos in Soil and made ground good practice site guide and again, HSE has provided support in producing this guidance.

Competent persons involved in the production of CAR compliant Risk Assessments and Method Statement are strongly advised to make use of these invaluable reference documents.

Applicable parts of CAR SOIL and CIRIA c765 have been incorporated into the management plan.

3.2 Characterisation of Works (Regulation 3)

Work with asbestos includes any work that is liable to disturb asbestos on or in the land or in construction and demolition materials, including the excavation, conveying, loading, processing etc. of soil and construction and demolition materials contaminated with asbestos fibres or ACMs, as well as any ancillary work and any supervision of such work.

According to the HSE, there is now significant monitoring evidence available within the ground investigation and remediation industry to suggest that significant visible quantities of bound ACMs will need to be present to give rise to exposures above 0.01 f/ml, equivalent to one tenth of the control limit, unless they are being subject to highly energetic processes (e.g. crushing, power screening and grading of demolition waste and made ground or soil).

3.2.1 Deciding if the work is licenced

First and foremost, employers need to consider whether the proposed work on soil or C&D materials contaminated by asbestos meets the criteria set out in the definition of licensed work in CAR Regulations 2(1)(a) and (b). If it does, a licence will be required in all cases.

The nature of the form of asbestos and ACMs encountered on a brownfield site will have implications for the application of the licensing regime set out in CAR 2012. The position regarding ACMs in soils is that work will be licensed if it involves material described as 'clearly identifiable' 'original form' asbestos coatings (excluding textured decorative coatings), and almost certainly licensed if it involves:

- material/debris described as asbestos insulation, or
- material/debris described as asbestos insulating board (AIB).

Original form ACMs can occur on brownfield sites because of illegal dumping of asbestos that has been removed from buildings during refurbishment or prior to demolition. Asbestos in this form may have been tipped on the surface of the site, or it may have been buried. It may be contained in UN-approved waste packaging, or not. Either way, the key factor is that the material is clearly identifiable as asbestos coatings (as defined in regulation 2), thermal insulation or insulating board products that were used in construction.

Guidance in ACoP L143 states that, debris containing asbestos is also covered by the Regulations. If the debris contains raw asbestos, asbestos coating, asbestos insulation or AIB, even where it is not fulfilling its original purpose, i.e. the asbestos materials may no longer be coating or insulating anything, a Licensed Asbestos Removal Contractor is required to carry out the work, unless it does not meet the conditions in the definition of licensed work in regulation 2(1).

It is given fact that any ACMs that are encountered in the ground mixed in soil, or entrained in C&D materials, will not be fulfilling their original purpose.

For materials contaminated with all other ACMs, the decision on whether the work on the material is licensed or not will be dependent, in most circumstances, on the potential degree of exposure to airborne fibres caused by the work activity. Again, where the exposure to asbestos of employees from working on these ACMs is unlikely to be sporadic and of low intensity (SALI) and where the risk assessment cannot clearly demonstrate that the control limit will not be exceeded, the work will be licensed work.

The potential airborne fibre release from fragments of fibrous materials and/or dispersed debris that may originally have been asbestos insulation or AIB and which occur in soil and C&D materials, is likely to be lower, possibly even by several orders of magnitude than airborne fibre releases from equivalent ACMs encountered in buildings. It does not automatically follow, therefore, that work on soil and C&D materials contaminated by such fibrous debris will always be licensed work.

Justification for this position is provided on the basis that the materials may be intrinsically bound up in wetted host materials and work on the material would not meet the requirements of regulations 2(1)(a) and (b) regarding licensed work.

Specifically, this is likely to be the case where the ACM is considered to be loose fibrous asbestos 'debris', where exposure to asbestos of employees is SALI and where the risk assessment can clearly demonstrate that the control limit will not be exceeded.

Conversely, such a position would not be expected to apply in the case of work on clearly identifiable insulation or AIB, where the potential risk is likely to be much greater and where the exposure to asbestos of employees is unlikely to be SALI and where the risk assessment cannot clearly demonstrate that the control limit will not be exceeded.

'Clearly identifiable original form' is taken to mean that it is possible for a trained and competent person to identify the type of material presumed to be ACM from its appearance in situ on site.

It may be possible to state that a material is clearly identifiable as a coating if, for example, it is found to be attached to a substrate where it is possible to conclusively state that the material was likely to have served as a surface coating as may typically have been used for fire protection purposes or as heat and/or sound insulation.

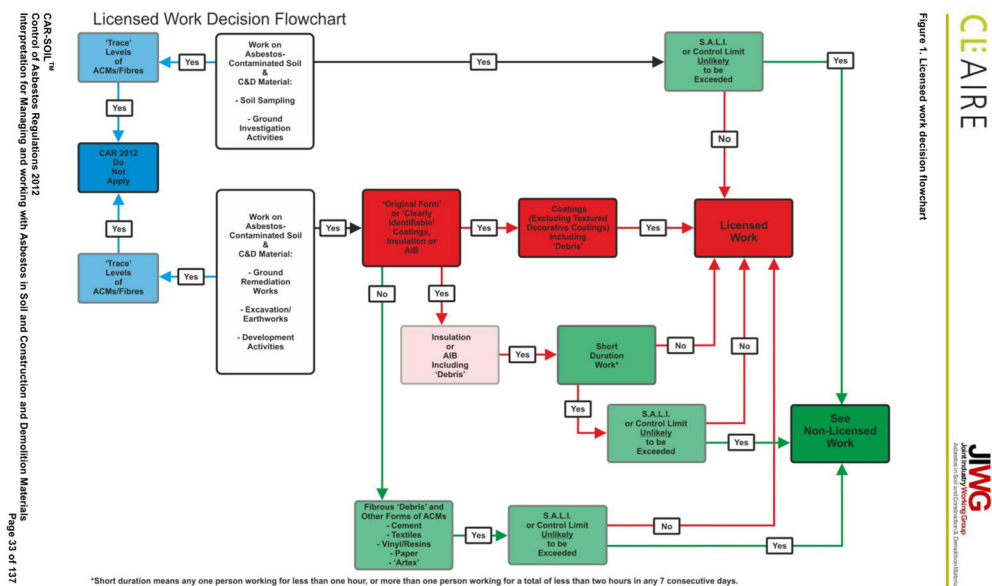
Likewise, a material is clearly identifiable as insulation if, for example, it is found to be attached to a pipe or vessel where it is possible to conclusively state that the material was likely to have been used for thermal insulation.

For a material to be clearly identifiable as asbestos insulating board (AIB), consideration would have to be taken of the nature and form of the material as encountered. A large intact sheet of material that bore the typical characteristics of AIB would be more readily 'clearly identifiable 'original form' AIB than small broken fragments of asbestos sheet material.

It is unlikely that the determination of whether a material is clearly identifiable original form asbestos coating, asbestos insulation or AIB can be made solely based on laboratory analysis of a small sample, as the material will not be in context.

Whilst presumptions regarding the form of material may be made on site, the presence of asbestos in all suspected ACMs must be confirmed by laboratory identification.

It should be noted that the type of asbestos fibre present is not a factor for consideration when determining whether work is licensed or not.



Based on currently available site sampling and analysis data, it is likely that the works will not be Licensable. However as works progress there remains the possibility that higher risk materials may be encountered.

CARSOIL provides further guidance for assessment based on the quantification of asbestos fibres within soils and these may be used in the Work Category Assessment Decision support tool that is available for free download on the link below; the file needs to be unzipped before use.

<https://www.claire.co.uk/component/phocadownload/category/36-asbestos-in-soil?download=549:jwq-dst-work-categories-decision-support-tool>

For the purposes of definition of quantities, reference is made to the following mass concentration descriptors in the Work Category Assessment Decision Support Tool:

- Large - 0.1% wt/wt
- Moderate - 0.05% wt/wt to <0.1% wt/wt
- Low - 0.01% wt/wt to <0.05% wt/wt
- Very Low - 0.001% wt/wt to <0.01% wt/wt

These mass concentrations relate to the amount of asbestos fibre estimated to be present in selected ACM/fibre type as a mass percentage of the host matrix material, detected in samples submitted for quantification analysis.

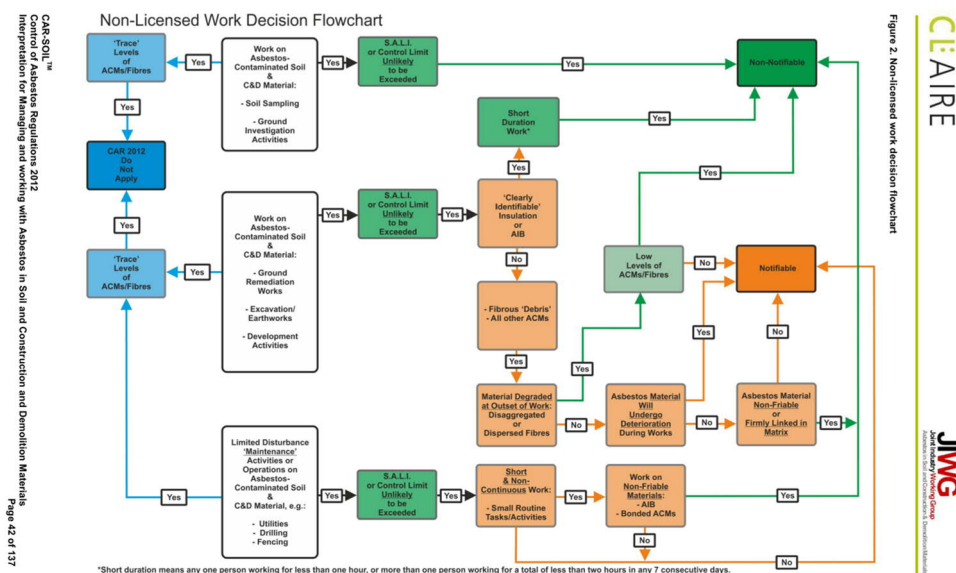
The highest concentration of asbestos sampled and quantified on the site is 0.206% and refers to asbestos cement debris within the soil sample. If the work involves large or moderate quantities of loose dispersed fibrous asbestos 'debris' and/or asbestos sheeting/board 'debris', it is likely that the work would be NNLW, provided that the Control Limit/STEL will not be exceeded. This would apply to debris comprising material of uncertain/original use that may not be positively described as being asbestos coating, insulation or AIB.

Note that it is imperative to consider the extent of contamination found to be present in individual samples in the context of that which may be found to be present and distributed over the wider site in assessing the overall degree of contamination present.

For the purposes of the assessment of the degree of distribution of asbestos contamination over the wider site, reference is made to the following descriptors in the JIWG Work Category Assessment Decision Support Tool:

- No visible contamination by ACMs
- Occasional/random occurrences of visible contamination by ACMs
- Sporadic/random occurrences of visible contamination by ACMs
- Moderate levels of visible contamination by ACMs
- Moderate/frequent occurrences of visible contamination by ACMs
- Gross/very frequent occurrences of visible contamination by ACMs

<https://www.claire.co.uk/component/phocadownload/category/36-asbestos-in-soil?download=575:jiwg-receptor-ranking-dst-final-version-2-1>



NOTES:

For clarification:

- 'Degraded' means the material is damaged or in poor 'as found' condition. Fragments of ACM are not degraded material, if they are intact and in good condition;
- 'Deterioration' constitutes the materials' matrix being destroyed or broken while the asbestos containing soil (ACS) is being worked with; and
- 'Debris' as referenced in CAR.

Apart from identifiable asbestos coatings, insulation and AIB, work on all other asbestos materials including asbestos cement products, textured coatings, textiles, paper and many others generally does not require a licence, but the workers must be competent, and exposure must be eliminated or reduced as far as is reasonably practicable.

Where circumstances arise that have not been addressed in the Plan of Work, e.g. when licensed materials are encountered, work should not restart until a new Plan of Work is drawn up or until

the existing plan is amended. This may mean that the work may have to continue to be carried out by a different (licensed) contractor, if a LARC has not already been engaged to undertake the work.

3.3 Risk Assessment (Regulation 6)

Prior to the commencement of any works where there is a potential for ACMs to be disturbed (disturbance of the made ground), an assessment of risk is required. The person undertaking the Risk Assessment must be competent to do so in line with Regulation 10 of CAR.

The person that carries out the risk assessment must:

- carry it out in time to comply with the Regulations and enable appropriate precautions to be taken before work begins;
- make sure the assessment is job-specific and considers the full scope of the work;
- establish the extent of potential risks and who could be affected;
- identify the steps taken to remove the risk or, if that is not possible, to reduce the risk;
- record significant findings in writing (electronic or paper);
- communicate significant findings to employees and anyone else who could be affected in an understandable way, as appropriate, to minimise risks to them or to take appropriate precautions to reduce/remove the risk before work begins;
- review the assessment regularly and update it as required.

Suitable and Sufficient Risk Assessment

To be suitable and sufficient, the risk assessment should include:

- for non-licensed work, a statement of why the work meets the criteria for non-licensed rather than licensed work, and whether it is>NNLW
- a description of the work being carried out and the expected scale and duration;
- a description of the type(s) of asbestos and results of any survey, investigation or analysis or a statement that the assumption is that the asbestos is not chrysotile alone;
- a description of the nature of the asbestos and its distribution, type and condition.
- A description of work including type and duration;

Details of expected exposures should be recorded and include:

- data on the concentration of asbestos fibres likely to be present, including the source for this information;
- whether they are liable to exceed the control limit and the number of people likely to be affected;
- the level of expected exposure, so that suitable personal protective equipment (PPE) and respiratory protective equipment (RPE) can be selected;
- whether anyone other than employees may be exposed, and their expected exposures;
- whether intermittent higher exposures may arise and their expected frequency and duration;
- any results already available from air monitoring carried out in similar circumstances and/or during similar types of work activity.

The steps to take to control exposure to the lowest level reasonably practicable should also be recorded, e.g.:

- the type of controlled wetting and method of application;
- the use of low intensity work methods;
- using local exhaust ventilation (LEV) – if applicable.

The risk assessment should also include:

- the steps taken to control asbestos releases into the environment, e.g. the use of controlled demarcation zones, or external reinforced enclosures with negative pressure; together with entry and exit procedures (if special circumstances require this);
- where it is not considered practicable to use enclosures, which may be in the majority of cases on open land, the risk assessment should set out in detail why this is justified, as well as provide clear advice on what action to take if there is an accidental release;
- details of the personal decontamination procedures for personnel, including using personal hygiene units where appropriate;
- details of the procedures for transferring and removing waste from site, including contaminated tools and equipment;
- details of the decontamination procedures for any plant and vehicles involved in the works and which are at risk of becoming contaminated by asbestos;
- procedures for the selection, provision, use and decontamination or disposal of PPE/RPE;
- procedures for dealing with emergencies;
- any other information relevant to safe working practices, such as other significant non-asbestos hazards like working around heavy plant, machinery and vehicles or working in excavations;
- measures to keep the other (non-asbestos) workers and the general public away from the asbestos work area(s);
- management arrangements for ensuring that risks are adequately controlled during work.

The findings of the risk assessment as detailed above are all deemed to be significant and must be recorded, as required by regulation 6(1)(b), and available on site always.

Reviewing assessments

The Principal Contractor should review risk assessments as part of the ongoing management of their health and safety systems to make sure they are still relevant and reflect any lessons learned from what has gone well and what has not. A competent person should conduct the review. A specific review should take place if:

- methods used to control fibre release change;
- there is doubt about the efficiency of control measures;
- there is a significant change in the type of work, amount of asbestos or method of work;
- the results of air monitoring indicate the exposure levels to be higher than previously assessed.

Where monitoring of exposure levels, or other information gathered during the course of work indicates that the initial assessment was wrong about either the duration of the task or nature of the materials:

- immediately review the assessment and control measures and whether the nature and
- extent of the exposure means that the work should be done using different methods and equipment;
- review whether the work needs to be done by a licensed contractor;
- record any changes made to the risk assessment (the revised assessment must be available on site always).

3.4 Plans of Works (Regulation 7)

The plan is the record of how senior managers/directors want the job to be done. Its main purpose is to guide site work and an up-to-date copy must always be on site. It also demonstrates that they have considered the significant risks and how to address them.

Work must not take place unless a copy of the Plan of Work is readily available on site. Employees must be informed of the contents of the plan and be instructed on the work methods and controls to use. A copy should also be kept at the head office, so management can effectively monitor performance. Access to general procedures should also be available at site level, either as paper copies or electronically. The plan should be kept updated to reflect any subsequent changes to the work.

The Plan of Work must also be shown to anyone who needs to see it, including those carrying out inspections of the works and/or air monitoring. It should also be available on request to employees, safety representatives and other elected representatives of employee health and safety, as well as others who may be affected by the work.

For a Plan of Work to be deemed suitable and sufficient it must include, as a minimum:

- the nature and probable duration of the work;
- the number of people involved in the work;
- the address and location where the work is to be carried out;
- the methods to be used to prevent or reduce exposure to asbestos, e.g. prevention and control measures and arrangements for the handling and disposal of asbestos waste;
- the type of equipment, including PPE and RPE, used for:
 - protecting and decontaminating those carrying out the work;
 - protecting other people present at or near the worksite.
- the nature and probable duration of works;

- the method(s) to be used to prevent or reduce exposure to asbestos, permit to dig etc;
- the supervision & monitoring of the works;
- type of equipment used for protection and decontamination of those employees carrying out works and the equipment used;
- detailed excavation/soil disturbance techniques;
- detailed site layout showing location of ACMs, location of welfare and any areas of restricted access and/or respirator zones, site access/egress controls, and traffic routes;
- a full list of organisations, contacts and telephone numbers.

The Principal Contractor shall ensure, so far as is reasonably practicable, that the work to which the plan of work relates is carried out in accordance with that plan of work and any subsequent written changes to it.

3.5 Licencing of Works (Regulation 8)

Before any work on Licensed ACMs commences an employer must hold a HSE licence for working with asbestos. This must be in line with the application and notification requirements.

At the time of writing it is judged that the site works will fall under the Notifiable Non-Licensed Works category and therefore a Licence to work with asbestos is not required.

However, a Licensed asbestos removal contractor may be engaged during specific phases of the works to provide additional competence.

A Licensed Contractor will be employed at the site should a review of existing risk assessments and working methods indicate a change of work category from>NNLW to Licensable work, triggers for this may include the following:

- Higher than expected airborne fibre levels generated when making proper use of control measures, i.e. the Control Limit or STEL is likely to be breached.
- When bulk ACM in the form of Coatings are encountered.
- When bulk ACM are discovered that include, Insulation or Insulating Board in anything other than very small quantities

3.6 Notification of Works with Asbestos (Regulation 9)

Notification of Licensable Work - When undertaking licensed work, the appropriate enforcing authority must be notified with details of the proposed work at least 14 days before work starts. This enables the enforcing authority to assess the proposals for carrying out work with asbestos and, if appropriate, to inspect the site either before or during the work.

Although the requirement is to notify the relevant enforcing authority office in writing at least 14 days before any licensed work begins, the enforcing authority may allow a shorter period, e.g. in an emergency where there is a serious risk to the health and safety of any person. This shorter period is known as a 'waiver' or 'dispensation'.

It is highly unlikely, however, that waivers would be granted for most types of activities on soil and C&D materials contaminated with asbestos covered by this guidance. Such activities are usually longer-term, well-planned activities. Waivers would probably only be considered by the enforcing authority in exceptional circumstances, e.g. or emergency clear up after a flood, clear up of unintended releases of ACMs, etc.

Since most, if not all, of the types of activities on soil and C&D materials contaminated with asbestos covered by this guidance would be classed under the category 'construction' which includes remediation, the relevant enforcing authority will be the Health and Safety Executive.

The Licensed Asbestos Removal Contractor must inform the enforcing authority in writing if there are changes to the work that might affect the particulars of the notification.

Normally each individual licensed job should be notified to the enforcing authority. However, a single notification of licensed asbestos work may be submitted to the enforcing authority for work likely to be regularly repeated on the same site. If there are several distinct sites, a separate notification is required for each of them. Any other subsequent work not covered in the original notification will need to be separately notified.

For Notifiable Non-Licensed Work - Employers who plan to carry out NNLW should notify the work using the online notification form for notifying HSE. Notification must be made before the work begins.

Notifications must only be made using the online notification form ASB NNLW1 at:

<https://extranet.hse.gov.uk/lfservlet/external/asbnnlw1>

NOTES

- there is no stipulated minimum prior notice period, but they should notify before work starts;
- work may proceed once notification has been submitted, no permission for work to proceed is required;
- an acknowledgment PDF copy of your notification will be provided electronically and should be kept with other documentation (such as the Plan of Work) relating to the activity;
- for a long-term project of work involving multiple jobs in one localised area the whole project should be notified once;
- Licensed asbestos contractors are required to notify both licensed and NNLW work.
- there is further guidance on the online notification form itself.
- The decision as to whether to notify particular NNLW or not may in certain cases depend entirely on the condition of the ACM on site and will be a matter of judgement and opinion. A person with sufficient experience and knowledge, who has been trained according to regulation 10, and who will be able to show their decision was reasonable, should make the decision.

3.7 Information, Instruction & Training (Regulation 10)

It must be ensured that the following information, instruction and training are provided to all persons involved in the infrastructure, building and post development control phases, where they are involved in the disturbance and/or movement of made ground or the placement of cover layer or the installation of suitable and sufficient perimeter segregation barriers:

- Significant findings of risk assessment and site investigations;
- An increased awareness of the nature and properties of asbestos and its effects on health;
- Familiarity with the types, uses and likely occurrences of asbestos in soils;
- An understanding of how to avoid the risks from asbestos by understanding:
- Where to obtain information on asbestos in soils prior to commencing work;
- What to do if suspicious materials are discovered;
- How to use appropriate workplace precautions, including the risk assessments and training requirements under CAR 2012;
- How to seek advice on workplace precautions, in respect of the risks of asbestos;
- How to undertake work activities in a safe manner and without risk to themselves or others.
- An awareness of the general legislation in relation to Health & Safety and asbestos in particular;
- Procedures following unintentional contact with Asbestos Containing Materials;
- An understanding of the appropriate emergency arrangements; and
- The relevant Control Limit.

Groundworkers engaged at the site must have been in receipt of asbestos awareness training that will have covered the following topics:

- An increased awareness of the nature and properties of asbestos and its effects on health;
- Familiarity with the types, uses and likely occurrences of asbestos in soils;
- An understanding of how to avoid the risks from asbestos by understanding:
- Where to obtain information on asbestos in soils prior to commencing work;
- What to do if suspicious materials are discovered;
- How to use appropriate workplace precautions, including the risk assessments and training requirements under CAR 2012;
- How to seek advice on workplace precautions, in respect of the risks of asbestos;

In addition to asbestos awareness, for those engaged in non-licensed asbestos works, the following topics will be covered:

- RPE inspection, fitting, usage and limitations
- Personal decontamination techniques
- Control measures to reduce fibre release.
- Procedures to be followed when working in asbestos areas (no smoking, eating, drinking)
- Waste handling
- Relevant RAMS to which they are working.
- Specific training for any plant being utilised.
- Emergency procedures following discovery or disturbance of bulk asbestos in the form of insulation, insulating board and coating (or visibly identifiable debris from those products).

For Licensable work, training in accordance with Regulation 10 must have been undertaken in accordance with the licensed contractor's own policies and procedures.

It is also recognised that contamination of land by a potentially wide range of other substances in addition to asbestos may be an important consideration on any particular site. Asbestos risks, therefore, cannot be considered in isolation and appropriate levels of training, skills and practical experience may have to be available to cover such additional contamination risks.

Training for Supervisors, Managers and Directors

- To help employers comply with their legal duties under the Regulations, additional training, at an appropriate level, should be given to supervisors, managers and directors, so that they can effectively carry out their role on site. This should include:
- their responsibilities for directing, supervising and monitoring all aspects of work on site, including health and safety, particularly the importance of making sure employees and others follow the procedures, controls and preventative measures set out in the Plan of Work and risk assessment;
- the importance of the supervisor being on site at all key stages of the work (witnessing the smoke test, if applicable, ensuring that the personal hygiene facilities are fully operational before work starts, ensuring signs and barriers are correctly erected, carrying out daily checks) to ensure that it is done safely;
- how to produce and implement plans of work that set out the appropriate procedures, controls and preventative measures based on the assessment, including how and when to update plans of work;
- how and when to notify the appropriate enforcing authorities that work is taking place and about situations where re-notification is necessary;

- how to deal with situations where the methods set out in the Plan of Work cannot be followed, due to a change in circumstances and a revision to the plan is needed;
- the application of suitable emergency procedures if controls fail;

Information and instruction for non-employees

- Employers who are working with asbestos on contaminated sites have a duty to make sure, so far as is reasonably practicable, that adequate information and instruction is given to those persons not employed by them, who may be working on site and could be affected by the work. The information provided should include details of:
 - the location(s) where work is taking place, so people can avoid it/them;
 - possible risks from rearranging thoroughfares and fire exits because of the work;
 - any other information to help people avoid risks from the disturbance of ACMs caused by the work being done.

Evidence of the above training is to be retained on-site for the duration of the works.

NOTE: There is no legal requirement for employees to be issued with or possess a certificate of training before they can work with asbestos. Many external training providers, however, issue trainees with certificates to indicate completion of a training course. A certificate is not proof of competency to do the job, but where issued, a certificate is an indication that training has been received and may be kept as part of an individual's training record.

3.8 Prevention/ Reduction of Asbestos Exposure (Regulation 11)

There is a requirement to prevent the exposure of employees to asbestos so far as is reasonably practicable. If it is not possible to prevent exposure, this must be reduced by methods other than Respiratory Protective Equipment (RPE).

Non-licensed or NNLW work should be carried out using the most effective low intensity method or combination of low intensity methods which minimises fibre release and so reduces exposure to the lowest levels reasonably practicable. Low intensity methods may be coupled with the use of controlled wetting using atomiser sprays as appropriate, in order to further reduce exposure levels and to prevent the potential spread of asbestos.

The use of Control Measures will be determined by the outcome of the risk assessment developed by the Principal Contractor however, measures are likely to include:

- All persons to undertake excavation work in closed cabin excavators;
- All persons to undertake movement of materials in closed cabin vehicles;
- Tool box talk prior to commencement of works;
- Provision of a competent person on site to act as a watching brief to visually assess made ground materials for asbestos materials;
- Asbestos exclusion area and subsequent relocation areas to be quarantined from the rest of the site utilising a suitable and sufficient segregation and wind reduction barrier;
- Excavation areas to be quarantined from the rest of site using barrier tape and warning signs where required;

- Appropriate fibre suppressant methods for wetting down materials during excavation and subsequent movement of materials. Studies have demonstrated that the addition of 10% of water to soil or suitable suppressant decreases the risk of the potential release of asbestos in to the air by a factor of between 2 and 10. Locations commonly identified on sites as having this potential are excavations, intrusive hole locations, spoil, areas where any hard surfacing is removed, vehicle routes passing between soft ground and hard standing, open skips and muddied boots and clothing;
- Decontamination procedures;
- Adoption of suitable PPE/RPE;
- Waste handling procedures; and,
- Emergency procedures.

In addition to the above Control Measures, the risk assessment should highlight the need for Personal and Respiratory Protective Equipment (RPE & PPE) during work with ACMs:

- P3 high efficiency particulate filtered respirators in accordance with HSE guidance note HSG53; and,
- Type 5/6 Coveralls or equivalent coverall suitable for working with asbestos fibres i.e. resistant to penetration by dust and fibres.

The number of both employees and others who might be exposed to asbestos at any one time must be kept to as low as reasonably practicable.

In addition to the use of Control Measures, CAR requires that the effectiveness of these Controls Measures to be continually assessed to ensure their suitability.

Maintaining and decontaminating equipment and plant contaminated with asbestos

Where there is a risk of asbestos fibre release or spread of asbestos, all decontamination and maintenance of equipment contaminated with asbestos must be done under controlled conditions. This should be done by a trained, competent person, in accordance with a written risk assessment and the Plan of Work.

When an item of asbestos control plant (such as air extraction equipment, class 'H' vacuum cleaner (BS 8520-3:2009)) that has been used in relation to any work on asbestos-contaminated soil and/or C&D materials, e.g. for controlling fibre levels in enclosures or for personal decontamination, or other decontamination or control tasks on site), needs to be stripped down, it should be carried out within an asbestos work area, permanently set aside, which is under negative pressure and which is connected to a dedicated personal hygiene facility by an airlock system. Where this work is done on site, it must be done inside an enclosure.

There may also be an issue regarding large non-asbestos control plant and vehicles used for handling contaminated soils in bulk – these should be cleaned and maintained in such a way that those carrying out the work are not exposed to asbestos.

To establish how contaminated equipment and plant is may require the help of an accredited asbestos analyst, especially if there has been an excessive amount of disturbance of the ACM or disturbance of asbestos coatings, insulation and/or AIB, as well as significantly damaged asbestos cement.

The release of asbestos fibres during decontamination of plant and vehicles may be effectively controlled by carrying out an initial visual inspection to ensure that wheels, tracks etc. are free from visible fragments which should be manually picked and double-bagged.

The person carrying out the visual inspection should be competent and have appropriate training, PPE and face-fitted RPE.

Further decontamination may be achieved by the use of a class 'H' vacuum cleaner (BS 8520-3:2009), or by washing down. This will be dependent on the type of equipment used.

When wet methods are employed for decontamination of plant and equipment contaminated with asbestos, due consideration should be made of the possibility that asbestos contamination may be spread from plant and equipment to the surrounding environment.

Robust measures should be designed and implemented to reduce the potential for the spread of asbestos and to ensure that compliance is maintained with respect to any conditions imposed on the work site designed to avoid pollution of any watercourses and/or the public surface water sewage system.

Likewise, when wet methods are employed for decontamination of vehicles that may be contaminated with asbestos prior to them leaving site onto the public road network, appropriate systems should be put in place to ensure that washings are contained and dealt with appropriately in order to reduce the potential for the spread of asbestos.

Practical guidance on the decontamination of asbestos-contaminated vehicles and plant has been produced by the Health and Safety Executive for Northern Ireland (HSENI).

3.9 Use of Control Measures (Regulation 12)

The Principal Contractor will be responsible for outlining and implementing procedures to ensure that all reasonable steps are taken to ensure control measures are properly utilised or applied and are not made less effective by other work practices or other plant/machinery. These procedures should include:

- Regular checks;
- Prompt action when a problem/issue is identified.

As an integral part of the general duties imposed by regulation 12(2), every employee should in particular:

- Use control measures as intended;
- Follow carefully all the procedures set out in the Risk Assessment and Plan of Work;
- Maintain a clean workplace;
- Eat, drink and smoke only in designated areas;

Report any defects concerning control measures to the appropriate nominated person(s)

3.10 Maintenance of Control Measures (Regulation 13)

The Principal Contractor will be responsible for outlining and implementing procedures to ensure all equipment to be utilised, as documented in the Plan of Work, should be maintained in an efficient state, in efficient working order, in good repair and in a clean condition and maintained in a good working order.

In addition, the Principal Contractor will outline procedures to ensure that any safe systems of work, supervisory protocols and any other measures are reviewed at suitable intervals and revised if necessary.

Employers must draw up maintenance procedures for all control measures and PPE. These should also cover the equipment used for cleaning, washing and changing facilities and the controls used to prevent the spread of contamination. The procedures should make it clear which control measures require maintenance, when and how to carry this out and who is responsible for doing it.

In particular, maintenance is required for:

- enclosures (if required), including any reinforcing/protection measures, e.g. scaffolding, close-boarding;
- air extraction equipment, e.g. Negative Pressure Units;
- dust suppression equipment, e.g. low pressure sprays, airless sprays, high-efficiency diffusers;
- personal decontamination/hygiene facilities; fixed and/or mobile;
- equipment and systems used for decontamination of plant and equipment, including vehicles;
- class 'H' vacuum cleaner (BS 8520-3:2009);
- disposable and non-disposable RPE, including storage.

3.11 Provision/ cleaning of protective clothing (Regulation 14)

The Principal Contractor will be responsible for outlining and implementing measures to ensure that any protective clothing provided is disposed of as asbestos waste and removed from the premises in a sealed container labelled as a product containing asbestos.

3.12 Arrangements to Deal with Accidents/ Incidents (Regulation 15)

The Principal Contractor will be responsible for outlining and implementing measures to ensure that in the event of an incident involving the unplanned release of asbestos at the workplace, immediate steps can be taken to mitigate effects of the event and inform any person(s) other than persons in designated area who may be affected.

The clean-up of any release that leads to potential exposures at or above the control limit or that are not sporadic and low intensity, e.g. releases of asbestos lagging, loose fill, asbestos coatings (not textured coatings) or large-scale releases of AIB must be done by a licensed contractor.

Uncontrolled releases of asbestos in contaminated soil and C&D materials may potentially arise in a variety of circumstances. Such an uncontrolled release might be construed to be a situation where the controlled collection of samples, or a controlled earthworks or remediation operation, leads to asbestos-contaminated material being spilled in an area not subject to asbestos controls and where it is highly desirable to undertake immediate clean-up in order to minimise the spread of asbestos fibres and reduce the potential for employees and members of the public to be exposed.

The clean-up of asbestos materials where the fibres are firmly linked in a matrix and that are essentially in good condition (i.e. mostly intact), e.g. asbestos cement, bitumen products, papers, textiles etc. will probably not require a LARC. Similarly, clean-up of small-scale release of AIB where it is in relatively discrete pieces and undamaged will probably not require a LARC.

The HSE's Asbestos Essentials guidance contains details of suitable methods to follow when carrying out remedial clean-up and decontamination for a number of different asbestos materials found in/on buildings. Although Asbestos Essentials specifically does not describe methods specific to soil and/or C&D materials, other than on fly tipped waste, it may serve as a useful basis for the development of appropriate and case-material-specific procedures to be followed in external settings.

Asbestos Essentials task sheet "A38: How to deal with fly tipped asbestos waste" provides an outline of safe working methods which might be applied to deal with an uncontrolled release in the external environment, subject to the risk assessment determining that such work is Non-Licensed Work.

Task sheet A38 also points to additional guidance that should be followed in such circumstances, including:

- a0: advice on non-licensed work with asbestos, Introduction to 'Asbestos essentials' task sheets;
- em6: personal protective equipment (PPE);
- em8: personal decontamination; and
- em9: disposal of asbestos waste.

What to do if there is a release

In all cases, where there has been an uncontrolled release of asbestos materials into the workplace, the following steps shall be adopted:

- warn people who may be affected;
- exclude people from the area, who are not needed to deal with the release;
- identify the cause of the uncontrolled release;
- regain adequate control as soon as possible.

In particular employers must make sure that:

- anyone in the work area affected who is not wearing PPE, including RPE, leaves that area immediately;
- arrangements are made to decontaminate anyone who is contaminated;
- any clothing or PPE is decontaminated or disposed of as contaminated waste;
- measures are taken to contain and reduce fibre release.

For any employee who was not wearing adequate RPE or has been potentially exposed to asbestos fibres in an incident, a note that the exposure has occurred must be made on that employee's health record. If the employee does not have a health record, the note must be made on that employee's personal record.

How to clean up after a release

If contamination is severe, the work is most likely going to be licensed work. Consequently, a LARC and an accredited asbestos analyst should be employed to thoroughly clean and check the area respectively. When cleaning up after a release, the employer must make sure that:

- the contaminated area is thoroughly cleaned of visible debris or ground that may have become contaminated by asbestos fibres;
- employees doing this work wear appropriate PPE, including RPE;
- employees use equipment and procedures appropriate for the task and have appropriate training and expertise;
- supervisors or managers make a careful check to make sure the work has been properly carried out;
- checks are made to make sure the area is thoroughly cleaned and safe for normal work operations to recommence.
- only those people essential for carrying the work are allowed into the affected area (other than emergency services).

For non-licensed work, including NNLW, detailed guidance on the general principles to be followed in order to prevent/minimise exposure while working with asbestos is available in Asbestos Essentials and for licensed work in the licensed contractors' guide, HSG247.

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- Consequently, a LARC and an accredited asbestos analyst should be employed to thoroughly clean and check the area respectively. When cleaning up after a release, the employer must make sure that:
- the contaminated area is thoroughly cleaned of visible debris or ground that may have become contaminated by asbestos fibres;
- employees doing this work wear appropriate PPE, including RPE;
- employees use equipment and procedures appropriate for the task and have appropriate training and expertise;
- supervisors or managers make a careful check to make sure the work has been properly carried out;
- checks are made to make sure the area is thoroughly cleaned and safe for normal work operations to recommence.
- only those people essential for carrying the work are allowed into the affected area (other than emergency services).

Accidents, incidents or emergencies involving licensed work

Most of the information below is primarily aimed at LARCs working on soil remediation projects on sites where other construction-related activities are being undertaken. In order to ensure consistency, LARCs would be expected to integrate their own asbestos control measures etc. with general emergency procedures in place on the wider site.

When carrying out any licensed work on e.g. soil remediation projects, employers must have prepared procedures to put into effect if there is an accident, incident or emergency, which could put people at risk, because asbestos is present.

Employers must also make sure information about emergency procedures is given to anyone who may be affected, including employees, others and the emergency services. Employers should give employees enough information and instruction to properly protect themselves. This should include procedures for:

- raising the alarm;
- evacuation of enclosures and asbestos areas – and these drills should be tested regular intervals;
- communicating within and between asbestos work areas;
- contacting the emergency services;
- personal decontamination;
- clean-up of unintended asbestos releases.

Employers need to take account of the need to integrate procedures with general emergency precautions for the wider work site and plan for any additional risks, e.g. not hearing alarms because of RPE and the siting of enclosures.

Employers must ensure employees are given enough information and instruction about the prepared procedures and arrangements if there is an emergency or a fire, including;

- details of the nature of the emergency alarms and/or systems;
- details of the communications systems, including how to raise the alarm;
- the location and means of escape to and from the area of the emergency.
- Knowing the location and safe means of escape from an asbestos enclosure or work area on a complex remediation/construction site will be particularly important if the work area (or

personal decontamination /hygiene facility) is located in a part of the site where other significant hazards may be present, e.g. large excavations, water bodies, heavy plant and equipment, dangerous structures, etc..

Contacting the emergency services

For licensed work, there should be arrangements in place for contacting the emergency services if they are needed, e.g. in the event of a fire affecting the asbestos enclosure/work area, a collapse of earthworks, employees being overcome by noxious gases, the discovery of unexploded ordnance, etc.

If there is an incident, accident or other emergency, employers must ensure sufficient information is available to the relevant accident and emergency services so they can prepare their own response procedures and precautionary measures. This includes:

- communication arrangements on site;
- the type, condition and location of the asbestos;
- details of relevant hazards;
- arrangements for evacuation;
- decontamination procedures;
- the asbestos clean-up procedure.

For licensed work, pre-planned procedures, hazard information, drills, and special warning or communication systems will not be required if the quantity or the condition of the asbestos in the workplace presents only a slight risk to the health of employees.

3.13 Prevention/ Reduction of the Spread of Asbestos (Regulation 16)

Employers should select and use work methods that will reduce the disturbance and release of asbestos fibres to minimise the risk of spread of asbestos from the controlled work area to other areas, e.g. by using low intensity methods, wherever possible, and by using appropriate dust suppression and decontamination techniques.

If ACMs are collected from the surface of a site, all asbestos waste should be bagged or wrapped promptly after removal and the waste should be removed from the work area regularly.

The Principal Contractor will be responsible for outlining and implementing measures to ensure any plant or equipment, vehicles and ancillary equipment etc. which is used in connection with works on or in the close proximity of the contaminated material is thoroughly decontaminated prior to moving to other areas on site or for disposal.

Any equipment utilised, which by its nature cannot be thoroughly decontaminated should be cleaned so far as reasonably practicable and then suitably wrapped or otherwise sealed to prevent release of asbestos fibres.

The outer surface of the wrapping or seal should be thoroughly decontaminated before the plant or equipment is moved for use elsewhere on site or for disposal. Such plant or equipment should not be unwrapped or unsealed other than in a manner which complies with the duties to prevent or reduce exposure, and to prevent or reduce the spread of asbestos.

Static Air Sampling/air monitoring

Air monitoring to reduce risks from spread of asbestos is required to:

- measure the prevailing concentration of asbestos fibres in the work area prior to work on asbestos commencing, to provide a baseline against which subsequent monitoring results may be compared, this is called background sampling;
- measure background fibre levels inside any enclosure when the asbestos work is complete, to ensure that it has been thoroughly cleaned and decontaminated before dismantling; when the asbestos work is licensed, this will be clearance sampling;
- measure background fibre levels outside any enclosure, particularly when the enclosure is adjacent to other, non-asbestos work areas or close to occupied premises or areas
- where the public may be near; this is called leak testing;
- ensure that the residual fibre concentrations are below the limit of quantification or the background level after work on asbestos has been completed; this is often termed reassurance sampling;
- near-source static sampling, to assess the release and spread of asbestos fibre concentrations near sources (e.g. work without an enclosure, near activities which involve disturbance of asbestos in soil or C&D materials);
- far-source / perimeter sampling conducted around the perimeter of the site where there may be other workers, public access or residential and commercial buildings.

Further guidance on air sampling/monitoring during work with asbestos is provided in HSG248

3.14 Cleanliness of Premises and Plant (Regulation 17)

The Principal Contractor will be responsible for outlining and implementing measures to ensure any plant or equipment, vehicles and ancillary equipment etc used, in connection with the works, are kept in a clean state.

To aid the process of cleaning and to prevent the spread of asbestos working methods and equipment must be chosen to prevent the build-up of asbestos containing materials on surfaces and within the working area(s).

Where ACMs are being removed from the surface of a site, e.g. by hand-picking, asbestos waste should be wetted, if deemed necessary, and transferred directly into approved and suitable asbestos waste bulk bags as workers remove asbestos materials.

Where soil and C&D materials contaminated with asbestos are being removed from site, they should be handled as little as possible. Wherever practicable, they should be excavated and placed directly into the appropriate waste receptacle, such as a polythene-lined skip or approved asbestos waste bulk bags.

Procedures for cleaning premises and plant will need to take account of the need for cleaning following an accidental and uncontrolled release of asbestos.

Further Measures

Procedures will need to be set up for cleaning:

- working areas, including transit and waste routes;
- plant and equipment;
- personal decontamination/hygiene facilities.

Dustless methods of cleaning should always be used. This includes, wherever practicable, providing dedicated Class 'H' (BS 8520-3:2009) vacuum cleaning equipment fitted with suitable tools.

Procedures for cleaning should make clear:

- the items and areas to be cleaned;
- how often they need to be cleaned;
- the cleaning methods, which should not create dust;
- any special precautions which need to be taken during cleaning, including the low-dust technique to be used, and the measures to take to reduce the spread of dust.

Dry manual brushing, sweeping or compressed air must not be used to remove asbestos dust.

Care should be taken if wet methods are used for the decontamination of plant and equipment, such that the spread of asbestos is minimised.

Procedures for cleaning premises and plant will need to take account of the need for cleaning following an accidental and uncontrolled release of asbestos.

Clean up when work finishes

When work with soil and C&D materials contaminated with asbestos comes to an end, the surface of the work area should be thoroughly cleaned to remove all visible traces of ACMs and asbestos debris and a thorough visual inspection carried out.

Where the work is licensed and has been conducted inside an external enclosure, then the four-stage clearance procedure (as set out in L143) will not normally have to be carried out prior to the enclosure being dismantled.

In such circumstances, a certificate for reoccupation will not need to be issued, although checks will still have to be made to ensure that the work has been completed satisfactorily (this may include reassurance sampling). A Statement of Cleanliness will need to be issued.

Where licensed work is done outdoors and not inside an enclosure, then clearance air sampling will not be needed, although it may be desirable to undertake reassurance sampling. In such situations, a Statement of Cleanliness should be issued.

Clearance air sampling is not required for non-licensed work, although it may be desirable to undertake reassurance sampling. A written Statement of Cleanliness will be required for the asbestos work area.

3.15 Designated Areas (Regulation 18)

This regulation requires employers to make sure that areas where asbestos work is being carried out are separated, clearly marked, and restricted to those required to work in the area. It also requires the employer to provide suitable facilities for employees to eat and drink.

Asbestos Area – this is an area where any employee would be liable to be exposed to asbestos.

Respirator Zone – this is an area where the risk assessment cannot clearly demonstrate that the control limit will not be exceeded.

The employer must not permit any employee, other than an employee who is required for work purpose to be in an area designated as an asbestos area or a respirator zone.

Work in Respirator Zones may only be carried out by Licensed Contractor or suitably trained and equipped trades working under their direct control and supervision.

Work in Asbestos Areas that are not respirator zones must only be undertaken by trained competent staff.

Designated areas must be segregated and marked with suitable notices as asbestos areas and/ or respirator zones including notices that PPE/RPE must be worn.

The initial assessment is that areas of the site that involve movement or excavation of made ground shall be designated Asbestos Areas. The designation will only change to Respirator Zone if bulk ACM in the form of identifiable asbestos coatings, asbestos insulation or asbestos insulating board are encountered or where air monitoring shows that a Control Limit or Short-Term Expose limit is, or is liable to be exceeded. At this point works must cease and the risk assessment re-evaluated.

3.16 Air Monitoring (Regulation 19)

CAR 2012 states that air monitoring should be undertaken to ensure the following:

- Confirmation that the RPE chosen is appropriate for the tasks undertaken;
- Confirmation that the appropriate control limit and or anticipated fibre levels are not exceeded;
- Check the validity and effectiveness of the control measures implemented to reduce the concentration of asbestos in air;

The Principal Contractor should instruct a UKAS accredited laboratory to provide representative on-site analytical air monitoring during stages of the work that will involve disturbance of ACMs identified or presumed to contain ACMs, such as excavation of made ground material/monitoring of the stockpiled material and activities as part of the subsequent relocation to a designated area(s) on site, activities involved in the placing of any cover systems onto the made ground material, in situ or following relocation to a designated area(s) on site and activities involved with the installation of suitable and sufficient perimeter segregation barriers. The findings of the Risk Assessment will determine when, where and how often the monitoring will be required.

In addition, representative on site analytical monitoring should be undertaken at periodic intervals following the placing of any cover systems. The findings of the Risk Assessment will determine when, where and how often the monitoring will be required.

In order to fulfil the requirements of these regulations, an experienced and qualified person familiar with monitoring techniques should determine the location of air monitoring equipment. In any case, personal (assessment) monitoring should be undertaken to persons within the immediate work area and adjacent to where disturbance works are being undertaken. This strategy may be changed at any time depending on results obtained from these tests. Additionally, reassurance monitoring should be carried out around the perimeter of the designated work areas and the site boundary to ensure no elevated fibre levels are being released from the site during the works and to provide reassurance to local stakeholders. It is reasonably practicable to expect that a proportion of air tests undertaken at the site boundary should be sampled and analysed so that a low LOQ is achieved, for example 0.001 f/ml to provide added reassurance for local stakeholders; however, it must be borne in mind that this will limit the number of air tests that can be carried out daily per analyst on site.

3.17 Washing & Changing Facilities (Regulation 23)

The Principal Contractor will be responsible for outlining and implementing measures to ensure that adequate washing, changing and storage facilities are provided

3.18 Storage & Labelling of Asbestos Waste

The Principal Contractor will be responsible for outlining and implementing measures to ensure that any asbestos containing material is disposed of as asbestos waste and removed from the site in a sealed container labelled as a product containing asbestos

4.0 Information to be Provided by the Contractor for Review

4.1 Independent Verification

As part of the verification of the Remediation Strategy, assurance monitoring will be undertaken of the Principal Contractor's activities by a Remediation Consultant independent to the Principal Contractor. Assurance monitoring will include independent air monitoring (over and above that required by the Principal Contractor and their competent team) to confirm adherence with the requirements of this AMP.

A draft Remediation Strategy has been prepared by Mott Macdonald for the site.

4.2 General

Prior to commencement of the various phases of work, the Principal Contractor and their specialists should provide the following documentation for review:

- The proposed master programme or a summary thereof showing the sequence and timing of the principal parts of the Works, including infrastructure, building and post development control phases.
- Sub-Contractors and Suppliers, if any, that are likely to come into contact with the made ground on site;
- Names of individual operatives and personnel, copies of any current medical certificates and asbestos training records including and together with who are expected to work or to be involved in the disturbance of asbestos impacted materials (including managers and those responsible for managing/ overseeing the works);
- A suitable and sufficient Plan of Work/ Method Statements in accordance with CAR 2012;
- A suitable and sufficient Asbestos Risk Assessment in accordance with CAR 2012; and
- A toolbox talk programme for all involved in the disturbance of asbestos impacted materials on the site.

4.3 On site Resources

Given the nature and extent of the asbestos encountered to date, it is considered that the use of competent personnel is appropriate for all ground disturbance works associated with the site works.

Any reference to competence, competent persons is a reference to a person or employee who has received adequate information, instruction and training for the task being done and can demonstrate an adequate and up to date understanding of the work, required control measures and appropriate law.

A competent person undertaking work on or with materials contaminated with asbestos ordinarily will be personnel who have received adequate information, instruction and training relevant to the type of project being undertaken.

A competent person will be able to demonstrate that they have sufficient practical experience to apply this knowledge effectively.

If suspect materials, high risk visible bulk ACMs or hot spots of asbestos contamination are encountered during ground disturbance works then works in that area should be halted and the on-site resource and working procedures reassessed.

5.0 Ongoing Asbestos Control Measures

Regulation 4 of CAR 2012 explicitly sets out the requirements for ongoing management of asbestos containing materials within non domestic premises. The requirements of Regulation 4 extend to any areas of ground materials in which asbestos containing materials will remain following on from the completion of works.

To minimise any potential exposures to end users controls should be implemented to protect any affected ground materials.

Procedures such as capping of contaminated materials with inert materials may be considered. The use of 'clean' channels for drainage and other utilities should also be considered to minimise disturbance of contaminated ground materials during future maintenance activities.

Proposed Controls

The proposed Mott Macdonald Remediation Strategy details;

- Capping by hardstanding or hard landscaping areas – Made ground in situ with an impermeable cap across the site where hard landscaping is the final surface.
- Removal of made ground from new areas of soft landscaping
- Installation of cover system in existing soft landscaping areas

All works will be required to be carried out in line with the Remediation Strategy and Asbestos Management Plan

Should contaminated grounds remain within the site demise following the completion of construction works a register of locations of contaminated ground should be produced. This should include a plan with locations of materials, including any contaminated grounds which has been used as backfill within the foundations of structures. The locations of any 'clean' areas or channels should also be detailed.

Should future works be planned which will involve excavation or disturbance of contaminated materials the principals and controls detailed within the Asbestos Management Plan should be reviewed and suitable control measures introduced to minimise any potential release of asbestos fibre.

6.0 Limitations

No ground assessment can purport to identify all ACMs that may be present within the site. It should be noted that the locations in which trial pits have been undertaken represent only a small area of the total area and should therefore only be used as a guide as to the likely extent of asbestos present. It is not uncommon therefore for additional ACMs to be discovered during earthwork programmes.

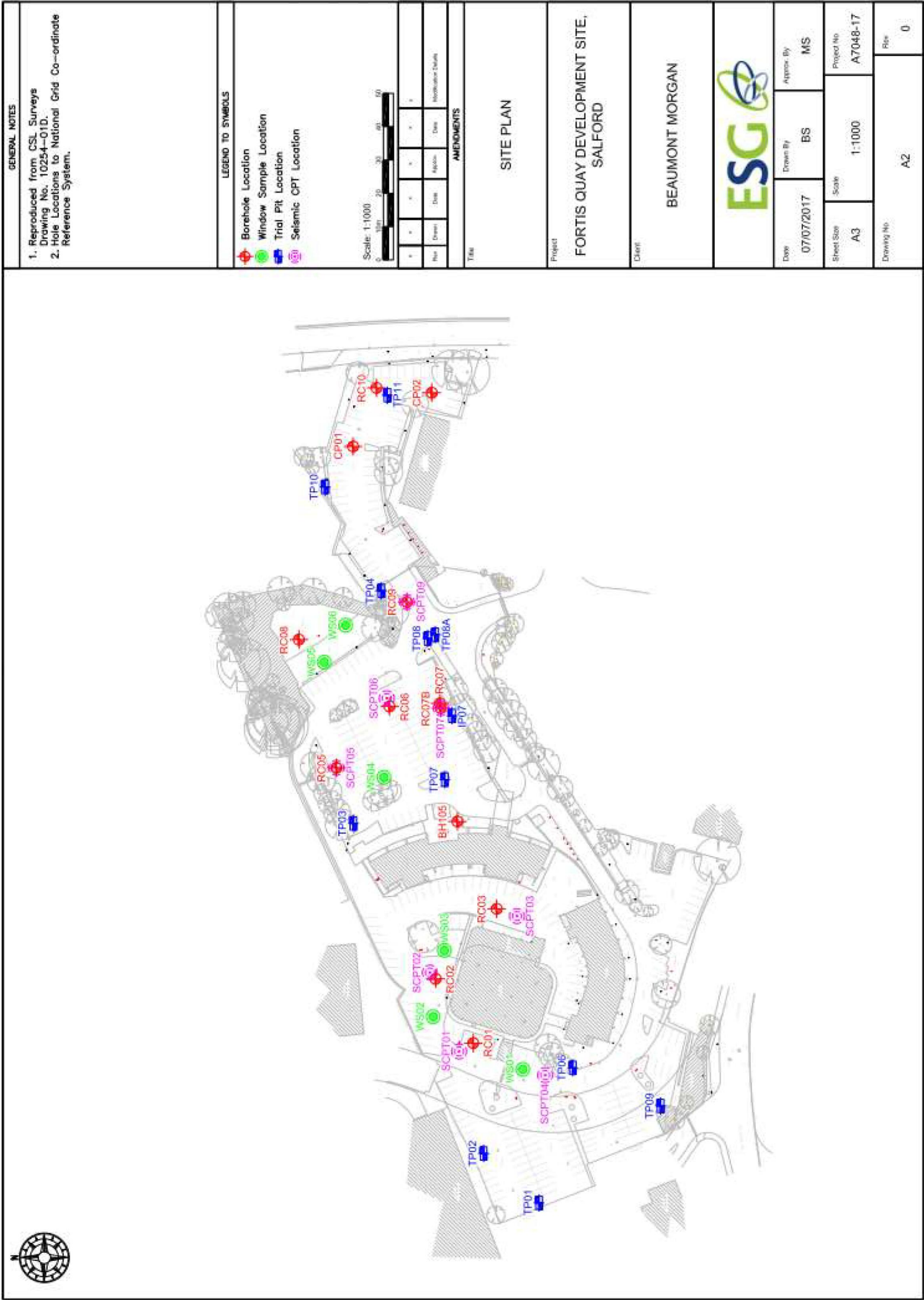


Consequently, as a precautionary measure, it is recommended that any contractor disturbing any made ground at the site provides suitable and sufficient risk assessments and method statements for the potential disturbance of ACMs.

WSP cannot be held liable for the content of information found in third party reports that may be referenced in this strategy document.

Appendix A

Site Location Plans



DO NOT SCALE: CONTRACTOR TO CHECK ALL DIMENSIONS AND
REPORT ANY OMISSIONS OR ERRORS

KEY



BOREHOLE



REV	DESCRIPTION	BY	CHK	APP	DATE
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Drawing Title:

EXPLORATORY HOLE LOCATION PLAN

Scale @	A3	Drawn	Date	Checked	Date	Approved	Date
1:1,000	CM		15.03.17				
Project No.	Office	Type	Drawing No.	Revision			
A102258	LDS	N	02				

