

Vaux Development Site

Site-wide Detailed Remediation and Verification Strategy

Siglion Developments LLP

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1.0

Introduction

1. Introduction

1.1 The Site

Siglion Developments LLP (the Client) are proposing to re-develop an irregular shaped parcel of land north of Sunderland city centre. The centre of the site is located at approximately NGR 439350, 557230. Figure 1 gives the site's location.

Figure 1: Site Location Plan



1.2 Development Proposals

The overall development scheme is not fully defined at this stage, but is understood to potentially comprise the construction of:

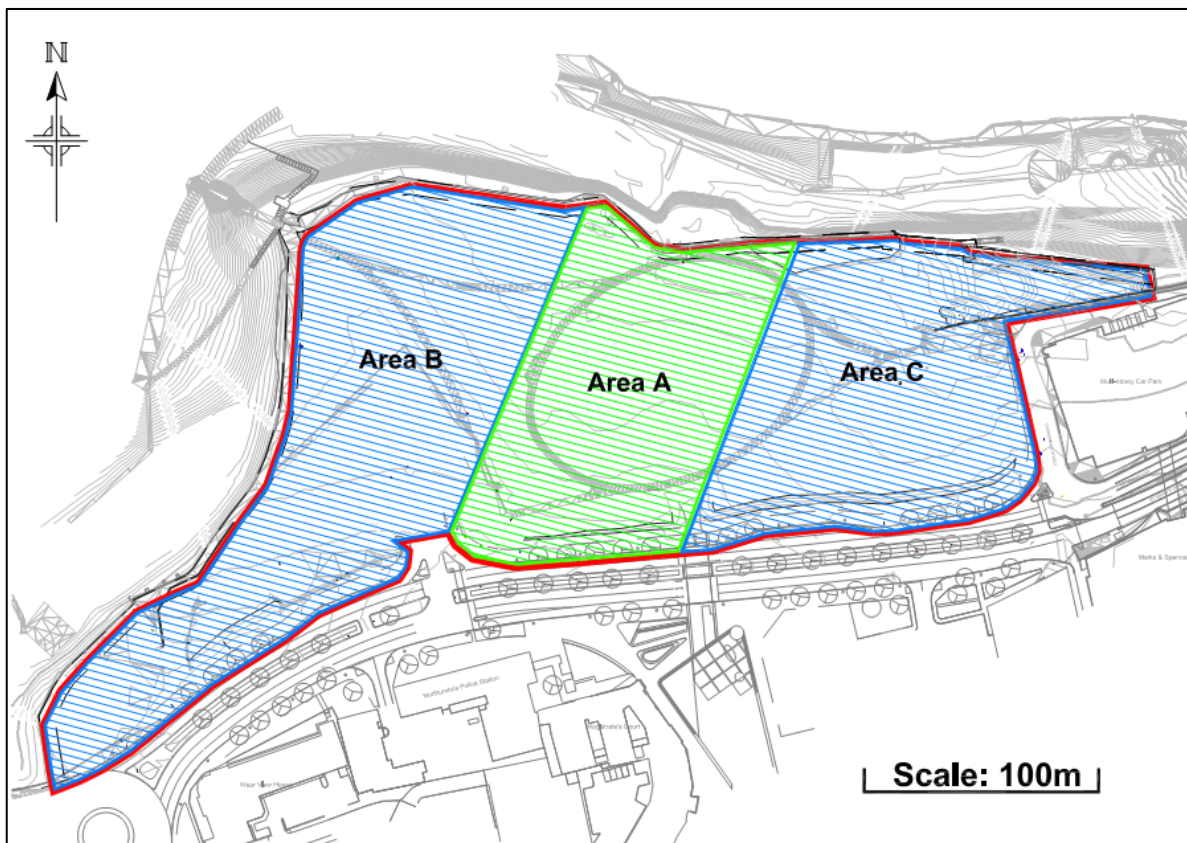
- Office space
- Leisure space
- Residential buildings
- Hotel
- Car parking
- Associated infrastructure and public realm

1.3 Context and Brief

Two Geoenvironmental Assessments for the site were issued by Cundall (report reference 1007347.GL.RPT.004 and 1007347.GL.RPT.005), dated January and February 2016 respectively. The Geoenvironmental Assessments reported on the site in two areas, Area A (1007347.GL.RPT.004) and Areas B & C (1007347.GL.RPT.005), as shown in Figure 2. The assessments presented outline recommendations for the remedial measures required associated with the existing made ground on site.

Subsequent to this and in support of the planning application Cundall was commissioned by the Client to prepare a Detailed Remediation and Verification Strategy for the whole site.

Figure 2: Areas A and B & C



1.4 General Limitations

The opinions provided and recommendations given in this report are based on the information contained within the previous Geoenvironmental Assessments, which have been based on the visual site inspection, reference to accessible referenced historical records, the information provided by third parties, the results of the ground investigations as detailed in the text and factual data provided by the specialist ground investigation contractor. Whilst every effort has been made to interpret the conditions between the investigation locations, such information is only indicative, and liability cannot be accepted for its accuracy. There may be exceptional ground conditions elsewhere on the site which have not been disclosed by the previous investigations and which have therefore not been taken into account in this report. The test results that are available can only be regarded as a likely representative sample range, assessed against current guidelines. The possibility of the presence of contaminants, possibly in higher concentrations elsewhere on the site or the presence of encountering ground conditions at variance with the logs elsewhere on the site cannot be discounted. If during construction, ground conditions vary from those revealed by the previous investigations undertaken at the site or the proposed site layout is revised, Cundall reserves the right to carry out further assessments and revise their recommendations in line with the revised scheme details.

2.0

Background Information

2. Background Information

2.1 Sources of Information

This Detailed Remediation and Verification Strategy is principally based upon the conclusions and recommendations of the two Cundall Phase II Geotechnical & Geoenvironmental Assessments for Areas, A and B & C (report reference 1007347.GL.RPT.004 and 1007347.GL.RPT.005) together with liaison with Sunderland City Council. This Remediation Strategy has also been based upon the findings of the Asbestos Sampling Exercise; Cundall (6 January 2017) Vaux Development Site, Asbestos Grid Sampling Exercise, Report Reference 1007347.RPT.GL.007.

2.2 Geological and Environmental Setting of the Site

2.2.1 Geology

Ground conditions comprise (locally significant) made ground (including relic foundations) underlain by laterally discontinuous firm to stiff glacial clay deposits, in turn rested on the Roker Formation (Magnesian Limestone).

2.2.2 Hydrology and Hydrogeology

The nearest recorded surface water feature is the River Wear approximately 35 m to the north. The site is underlain by Unproductive Strata/Unknown Strata (Glacial Till and made ground), overlying a Principal Aquifer. The site does not lie within any groundwater Source Protection Zones.

3.0

Proven Ground Conditions

3. Background Information

3.1 Soil Stratigraphy

A simplified ground model based on the findings of the two 2016 ground investigations is presented below in Table 1. It is recommended that this summary is read in conjunction with the Phase II Geotechnical and Geoenvironmental Assessments and relevant factual reports, which, contain full details of the ground conditions recorded together with the detailed exploratory hole logs.

Table 1: Summary of Site Ground Conditions

Strata	From (m bgl)	To (m bgl)	Thickness (m)	Locations Encountered
Made Ground (Topsoil)	GL	0.3	0.3	Encountered predominately towards the centre and west of the site.
Made Ground (cohesive)	GL	1.4	1.4	Encountered predominately towards the east of the site.
Made Ground (granular)	GL	3.0	3.0	Encountered across the site.
Made Ground (concrete)	1.2	2.4	1.2	Encountered mainly towards the east; however cannot be ruled out to exist across the site.
Glacial Till	0.4	3.1	2.7	Generally encountered across the site.
Roker Formation	1.0	15.0	14.0	Generally encountered across the site though note the full thickness / depth of this stratum has not been fully quantified by the investigations.

4.0

Site Contamination Status

4. Site Contamination Status

4.1 Identified Contaminants of Concern

4.1.1 Asbestos

Initially a total of 38 samples of made ground were analysed for asbestos as part of the Phase II Geotechnical and Geo-environmental Assessments for the site. Of the 38 samples, 20 tested positive for asbestos as either Chrysotile or Amosite fibre bundles and/or 'clumps'. Quantification testing was undertaken on five of the samples which tested positive for asbestos. The results of the quantification testing revealed mass percentages of between <0.001% (below detection limit) and 0.004%.

Subsequently a total of 224 samples of made ground were analysed for asbestos during the Asbestos Grid Sampling Exercise. Of the 224 made ground samples a positive asbestos identification was encountered in 82 of the made ground samples. Quantification analysis was undertaken on all the positive samples with the presence of asbestos fibres generally close to or below 0.001%, locally up to a maximum of 0.013%.

It is considered that asbestos fibres are considered to be generally ubiquitous within the made ground across the site, although at generally low quantum.

4.1.2 Heavy Metals and Hydrocarbons

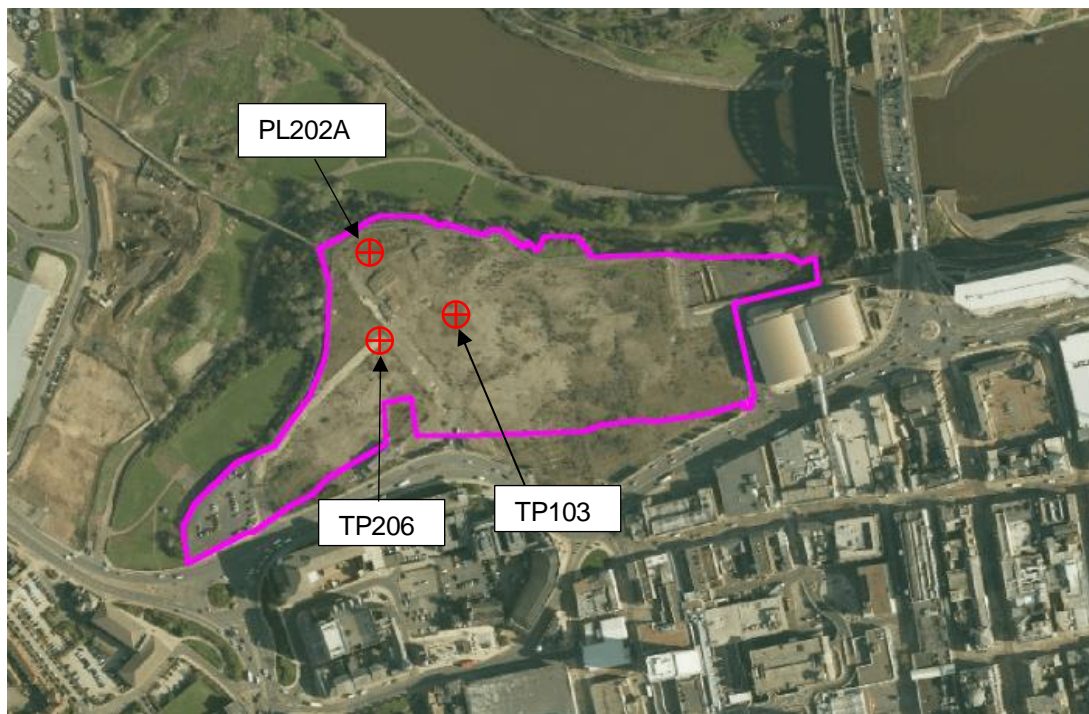
Nineteen samples across the site were tested for heavy metals with elevated concentrations of Lead recorded within two of the samples (TP206 at 0.2 m and TP210 at 0.4 m) as shown within Figure 3.

Figure 3: Locations of Elevated Lead



Nineteen samples across the site were analysed for PAHs. Elevated concentrations of benzo(a)pyrene (PL202A at 0.3 m, TP206 at 0.2 m and TP103 at 0.3 m), benzo(b)fluoranthene (PL202A at 0.3 m and TP103 at 0.3 m), dibenzo(ah)anthracene (PL202A at 0.3 m, TP206 at 0.2 m and TP103 at 0.3 m), benzo(a)anthracene (TP103 at 0.3 m) and Indeno(123cd)pyrene (TP103 at 0.3 m) were identified within the made ground. The locations are shown in Figure 4.

Figure 4: Locations of Elevated PAH

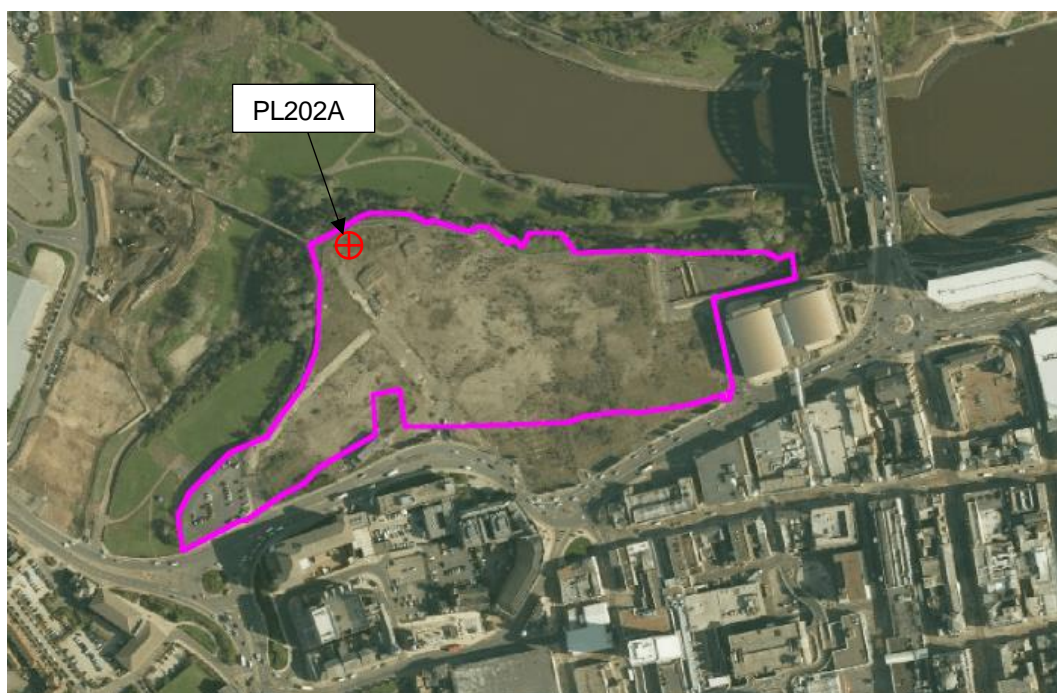


Full details of the laboratory results can be seen in the Geoenvironmental Assessment Reports detailed in section 2.1.

4.1.3 Blue Billy

Blue Billy (a cyanide compound) was recorded at a single location in a sample within PL202A at 0.7 m bgl (in a granular form) as shown within Figure 5. It is considered, at this stage, that as this material has not been recorded elsewhere on the site its represents a localised occurrence only.

Figure 5: Location of Blue Billy



4.1.4 Ground Gas

The site was classified as CS-1, under which scenario no specific ground gas protection measures are required.

4.1.5 Potable Water Supply Pipes

It is considered that Polyethylene (PE) pipes were likely to be unsuitable where new potable water supply pipes are to be established within Made Ground soils. Consultation with the Statutory Water Provider (Northumbrian Water Ltd.) is also required prior to development to determine their requirements.

4.1.6 Summary

On the basis of section 4.1 it is considered that the elevated concentrations of Lead and PAH are generally very localised but are not spatially restricted to a particular area of the site. Subsequently it is possible that other areas of the site may locally be subject to previously unrecorded elevated concentrations of contaminants.

5.0

Control Measures Introduction

5. Site Contamination Status

5.1 Introduction

As much of the site is not fully quantified in terms of exact development proposals, a range of options are given subsequently to mitigate the identified geoenvironmental risks, depending on the proposed use (whether temporary or permanent). In addition, recommended control measures during construction are also detailed.

5.2 Objectives of the Strategy

The objective of this Detailed Remediation and Verification Strategy is to ensure that both during and following the works, the identified geoenvironmental risks will have been adequately mitigated. This Detailed Remediation and Verification Strategy has been developed in accordance with current contaminated land guidance and planning guidance, regulations and legislation.

This document provides both generic and site-specific methods and relevant information combined in one document. It has been prepared in order to:

- Satisfy the Planning Authority that upon completion of the remedial works, the identified geo environmental risks will have been adequately mitigated.
- Ensure construction workers are not put at an unacceptable short term risk during the works at the site.
- Provide a Verification Strategy for the works. This is required in order to verify that the remedial works undertaken are implemented in accordance with the agreed Remediation Strategy.

This document must be submitted to the Planning Authority for their approval and for the discharge of the relevant part(s) of the planning condition.

It is anticipated that the Main Contractor will be responsible for arranging all necessary permissions and licences and consents to complete the works, and, that they will issue their own detailed Health & Safety plan in accordance with current good practice and legislation as appropriate.

The Contractor must be conversant with and adhere to the Control of Asbestos Regulations (2012) where appropriate.

6.0

Control Measures – Temporary (Meanwhile) Uses

6. Control Measures – Temporary (Meanwhile) Uses

6.1 Introduction

The areas of the site that will have a temporary use as open spaces, which will allow for public access during the development of the building plots will require mitigation measures to protect the users of the site in the short term. This may form either:

- A cover system comprising the following:
 - Placement of a 600 mm thick clean cover layer comprising a 'no dig' layer at the base (made up of either a geotextile barrier such as the 'Alert' barrier).
 - An erosion mat construction (such as the 'NAUE Secumat' or similar geotextile that minimises soil mixing but allows free drainage overlapped by at least 200mm and suitably secured where placed in parallel layers to provide continual protection) together with an appropriate thickness of topsoil growing medium (typically 150 mm).
- Importation of uncontaminated aggregate.
- Use of artificial turf/grass or bark
- Hoarding around the areas of open space to prevent public access.

Any imported materials should be tested in accordance with the requirements in Table 2 and Table 3 of this report. Table 2 summarises the testing regime and suites of analysis required, and Table 3 summarises the acceptable threshold concentrations.

7.0

Control Measures – Temporary (Meanwhile) Uses

7. Control Measures – Construction Phase

7.1 Mitigation Measures

7.1.1 Prior to Works Commencing (Risk Assessment)

The Contractor may need to undertake a risk assessment in accordance with the Control of Asbestos Regulations (2012) prior to works commencing, and, in the event that previously unrecorded asbestos impacted soils or asbestos containing materials are encountered, this risk assessment may require revision / amendment.

In the event such an assessment is required, the Health and Safety Executive (HSE) state that this risk assessment must be undertaken by persons who “have a sufficient level of knowledge, training and expertise. This is to make sure that they understand the risks from asbestos (and general risks) to enable them to make

informed decisions about the risks and identify the appropriate action required to reduce them. They will also need to be able to estimate the expected level of exposure to help them decide whether or not the control limit is likely to be exceeded.”

The contractor must also ensure that all site operatives must receive asbestos awareness training, to include (but not limited to):

1. An understanding of the properties of asbestos and its effects on health.
2. The types, uses and likely occurrence of asbestos and asbestos materials in soil and made ground.
3. Procedures to deal with an emergency.
4. How to avoid the risk of exposure to asbestos.

All site workers, subject to the findings of the asbestos risk assessment, will require appropriate PPE / RPE and protective clothing together with appropriate hygiene facilities. It is the Contractors responsibility to ensure that the correct construction phase mitigation measures are employed once they have undertaken their asbestos risk assessment.

Additionally, all site workers must be briefed in the form of a toolbox talk on good environmental working practice at the site, Health and Safety and CDM protocols and the procedures to be followed if previously unidentified contamination, including further asbestos or suspected asbestos, or any other unexpected ground conditions are encountered.

7.1.2 Prior to Works Commencing (Air / Fibre Monitoring)

Dust / fibre monitoring points shall be established at the work boundaries. These monitors should have detection limits that account for reasonable / realistic background levels, given the urban setting, and shall take into account the conclusions of the relevant risk assessments. The limits of detection for fibres typically would be set at the Control of Asbestos Regulations (2012) control limit of 0.01 f/cm³, however, this is dependent on the findings of the asbestos risk assessment undertaken by the Contractor, which may advise on an alternative limit of detection.

Note that this will require agreement with the Local Planning Authority prior to works commencing.

As a minimum, the monitoring points must be placed on all four aspects of the working boundaries, with additional monitoring points placed as to be lea-ward of the prevailing wind on any given day. Additionally, the technicians undertaking monitoring shall also be fitted with fibre monitoring on their person, with the limits of detection set at a level that reflects the RPE / PPE that they have employed.

7.1.3 During the Works (Earthworks)

Control measures shall be employed to prevent / minimise off-site migration of dust / fibres during earthworks, this should include, but not be limited to the use of damping down of stockpiles, wetting of materials and the sheeting of soil

stockpiles. Mobile water bowsers / water sprayers shall be used if required. Additionally, fibre and dust monitoring shall be undertaken daily during the excavation of Made Ground materials at all monitoring locations.

All remaining concrete and tarmac surfacing must be broken out and excavated prior to redevelopment together with any other relic perimeter masonry. Where it is suspected that contaminated materials are present, these must be excavated separately, stockpiled such as not to cause cross contamination (i.e. the use of bunds and physical sealing) and subjected to further analysis and assessment as appropriate. The Contractor must liaise with a geoenvironmental specialist where contamination is suspected and records must be retained with respect to what was encountered, what action was taken, together with relevant records of regulatory liaison / compliance. This will also apply to any previously unrecorded contamination encountered.

The Contractor must ensure that any remaining masonry / relic construction arising from grubbing out former foundations, structures and hardstanding are wholly segregated from any general Made Ground soils or any other potential contaminated material such as asbestos containing materials in order that waste materials are correctly managed.

7.1.4 Blue Billy

Cyanide (Blue Billy) was identified in a single location at the site (at 0.70 m bgl in PL202A in a granular form). It was recommended that this location be treated as a hotspot and the extent of the contaminant be delineated prior to either remediation / treatment or appropriate off-site disposal. Removal from site of the impacted soil will remove any site end user risk. It is recommended that the delineation and disposal operation is undertaken as follows:

- Excavate the visually identifiable Blue Billy material and a 'buffer zone' of 2 m to all aspects including beneath the material or until there is no longer visual evidence of Blue Billy. This material should be immediately disposed off-site to a suitably licensed landfill facility.
- Analyse the soils to all sides of the excavation and the base for cyanide. If elevated concentrations of cyanide are still recorded then the exercise above shall be repeated as required until cyanide is no longer visually present or chemically present at elevated concentrations.

7.1.5 Imported Fill

Section 10 details the control measures required for imported fill used during construction.

8.0

Control Measures – Waste Soils

8. Control Measures – Waste Soils

As discussed in section 6.1.3 it is essential that the Contractor manages surplus materials resulting from site works in an appropriate manner.

It is paramount that surplus materials are not mixed once excavated in order to minimise disposal costs and ensure materials are managed in their correct waste stream, and, where appropriate, determination of whether hazardous substances are present in accordance with WM3 will also be required, particularly with respect to the made ground soil arising.

It is recommended that all soil arising are re-assessed once excavated for the purposes of off-site disposal, and, that liaison is undertaken with licensed waste disposal operators at the earliest opportunity with respect to costs and options for removal of surplus soils from the site. Additional WAC testing will be required prior to any off-site disposal. The minimum frequency of testing will need to be agreed with individual landfill operators and must meet the requirements of current legislation and guidance.

Whilst asbestos has not been recorded above 0.1 % in site soils (where a material would be considered as having with 'hazardous properties' and thus rendering that material 'Hazardous'), early clarification should be sought from waste disposal facilities by Contractors to ensure agreement upon its classification.

Note that any materials exported from site to landfill shall be hauled by a registered waste carrier in accordance with the requirements of the Duty of Care Regulations 1991, The Landfill Directive, and where appropriate, the Hazardous Waste Regulations 2005. A waste transfer note (WTN) shall be completed, signed and retained by all parties involved. The WTN shall state the volume of waste, the nature of the material and statement of its chemical composition. The WTN shall be kept by the Main Contractor and copies made available for inclusion in the 'Verification Report', if required.

9.0

Control Measures – Site End Uses

9. Control Measures – Waste Soils

9.1 Introduction

The proposed development is understood to comprise a mixed use development, comprising, commercial, retail and residential end uses. However the final development site layout has not been finalised. Subsequently the following mitigation measures are not given on a plot specific basis but cover the currently plausible end use scenarios for the site.

9.1.1 Areas of Buildings and Hardstanding

In areas of proposed buildings and hardstanding made ground impacted with elevated concentrations of PAH, Lead and Asbestos will be covered by floor slabs / hard standing areas thus breaking any plausible contaminant linkages to the site end users. Under this scenario no further action is necessary.

9.1.2 Areas of Soft Landscaping

In areas of proposed soft landscaping the risks to site end users from made ground impacted with elevated concentrations of PAH, Lead and Asbestos will need to be mitigated. Mitigation measures within the soft landscaping areas may form either:

1. An erosion mat construction (such as the 'NAUE Secumat' or similar geotextile that minimises soil mixing but allows free drainage overlapped by at least 200mm and suitably secured where placed in parallel layers to provide continual protection) together with an appropriate thickness of topsoil (as specified by the landscape architect) to allow for planting. A minimum thickness of 150mm is recommended.
2. A 600 mm thick cover layer, comprising a minimum of 450 mm of cohesive soils with the balance comprising topsoil to allow for planting as per the landscape architects requirements. Under this scenario a geotextile barrier / warning layer will be required to be placed at the base of the clean cover layer (such as the Geosynthetics 'Alert' barrier).

Section 10 details the control measures required for imported fill for the cover systems.

If the Contractor wishes to provide their own proposals for developing a clean cover system that differs from the two options provided, then this will require agreement of both the validating engineer and the Local Planning Authority prior to implementation. As a minimum any alternative design must take into account:

1. The type, amount, concentration and condition of the asbestos.
2. The effects of anticipated erosion due to physical wear, water runoff, wind etc.
3. The suitability of any geotextiles to ensure they are water permeable, resistant to degradation, chemically resistant and have a high tensile strength.

10.0

Control Measures – Imported Fill

10. Control Measures – Imported Fill

10.1 Control Measures for Imported Soils / Fill

It is anticipated that imported soils will be limited to materials required as clean cover / growing medium within the landscaping areas, temporary working platforms and general fill.

Any imported materials should be tested in accordance with the requirements in Table 2 and Table 3 of this report. Table 2 summarises the testing regime and suites of analysis required, and Table 3 summarises the acceptable threshold concentrations.

It is essential that fill imported for temporary working platforms is adequately separated from the underlying soils to prevent cross contamination. The physical separation shall be achieved by use of a geotextile separator layer. Where the imported fill is used for temporary works (i.e. piling mat) and subsequently requires removal from site the geotextile separator will also require careful disposal to ensure no cross contamination occurs.

Table 2: Import Sampling and testing Frequency

Type	No. of Samples	Testing Schedule
Virgin Quarried Material	1 or 2 depending on the type of stone utilised, to confirm the nature of the material.	Metals suite as prescribed in Table 3.
Crushed Hardcore, Stone, Brick	Minimum 3 per source or 1 per 250 m ³ (whichever is greater)	Metals suite, PAH suite and asbestos as prescribed in Table 3.
Greenfield / Manufactured Soils	Minimum 3 per source or 1 per 200 m ³ (whichever is greater)	Metals suite, PAH suite and asbestos as prescribed in Table 3.
Brownfield / Screened Soils	Minimum 6 per source or 1 per 50 m ³ (whichever is greater)	Metals suite, PAH suite and asbestos as prescribed in Table 3 plus additional analysis dependent on the source.

Table 3: Material Import Suite of Analysis and Threshold Criteria

Contaminant	Units	Threshold Concentration
Metals, pH, asbestos		
pH	pH units	N/A
Arsenic	mg/kg	35 ¹
Cadmium	mg/kg	83.6 ¹
Chromium (III)	mg/kg	15500 ¹
Chromium (VI)	mg/kg	21 ²
Copper	mg/kg	8370 ¹
Nickel	mg/kg	130 ⁴
Lead	mg/kg	310 ²
Mercury (inorganic)	mg/kg	238 ⁴
Selenium	mg/kg	595 ⁴
Zinc	mg/kg	46800 ¹
Asbestos (inc quantification where fibres are detected)	fibres	presence
PAHs		
Acenaphthylene	mg/kg	2900 ³
Acenaphthene	mg/kg	4710 ¹
Anthracene	mg/kg	22000 ¹
Benzo(a)anthracene	mg/kg	5.42 ¹
Benzo(a)pyrene	mg/kg	5.3 ²
Benzo(b)fluoranthene	mg/kg	9.68 ¹
Benzo(ghi)perylene	mg/kg	102 ¹
Benzo(k)fluoranthene	mg/kg	99.7 ¹

Contaminant	Units	Threshold Concentration
Chrysene	mg/kg	852 ¹
Dibenzo(ah)anthracene	mg/kg	0.949 ¹
Indeno(123cd)pyrene	mg/kg	9.53 ¹
Fluoranthene	mg/kg	3110 ¹
Fluorene	mg/kg	3180 ¹
Naphthalene	mg/kg	0.598 ¹
Phenanthrene	mg/kg	1300 ²
Pyrene	mg/kg	2330 ¹
TPHs		
Aliphatic C5-C6	mg/kg	30.2 ¹
Aliphatic C6-C8	mg/kg	70 ¹
Aliphatic C8-C10	mg/kg	9.81 ¹
Aliphatic C10-C12	mg/kg	97.7 ¹
Aliphatic C12-C16	mg/kg	5210 ¹
Aliphatic C16-C35	mg/kg	146000 ¹
Aromatic C5-C7	mg/kg	0.0925 ¹
Aromatic C7-C8	mg/kg	219 ¹
Aromatic C8-C10	mg/kg	16 ¹
Aromatic C10-C12	mg/kg	97.7 ¹
Aromatic C12-C16	mg/kg	1800 ¹
Aromatic C16-C21	mg/kg	1330 ¹
Aromatic C21-C35	mg/kg	1330 ¹

N/A – Not applicable / No threshold value exists

PAHs & TPH assume 1% Soil Organic Matter (SOM), Metals assume 6% (SOM)

¹Atkins ATRISKsoil Soil Screening Values 1% SOM based on ‘residential without home grown produce’

²SP1010 Screening Levels from Assessment of Land Affected by Contamination (Residential without home-grown produce) Policy Comparison document Dec 2014 (C4SLs) S4ULs

³LQM/CIEH S4ULs (residential without plant uptake)

⁴Environment Agency SGVs (2009)

In addition to the testing to determine the suitability of imported soils for human health, the following measures are required to protect the wider environment:

- Soils are Non-hazardous (to avoid importation of a new hazard to site in contravention of the Definition of Waste Code of Practice) if applicable.
- Soils are such that they will not present a risk to controlled waters and future site users and building materials.
- Soils in landscaped areas are not phytotoxic (to avoid poor plant growth and demonstrate suitability for use).
- Topsoil is certified to British Standard BS3882:2015.
- Subsoil is certified to British Standard BS8601:2013.

Following discussions with the CLO, leachate testing is also recommended on any materials being imported to the site. The testing criteria is to be determined based on the possible chemicals of concern for the donor site and this shall be determined by the appointed validating consultant in agreement with Sunderland City Council’s Contaminated Land Officer.

11.0

Site Preparation and Organisation Requirements

11. Site Preparation and Organisation Requirements

11.1 Site Preparation Requirements

11.1.1 General

It is assumed that the earthworks will be undertaken using traditional excavation and re-compaction earthworks methods using readily available, conventional plant machinery. Where applicable piling rigs shall be used.

11.1.2 CDM Regulations (2015)

All design documentation / specifications must be approved in writing by the Principal Designer prior to works commencing.

11.2 Site Organisation Requirements

The site works shall be supervised by the site manager from the Main Contractor.

- Prior to the commencement of any works, the Main Contractor shall establish the boundaries of the site and working areas. The site boundary shall be secured to prevent unauthorised access to the site during the course of the works.
- Site offices and welfare facilities will be established at a location to be agreed with the Client's representative.
- Access to the site shall be from approved access points and routes to be agreed with the Client and Sunderland City Council .
- Vehicles leaving the site will pass through cleaning facilities, such as wheel wash and / or hose down area. Vehicles that are to be used for the haulage of any contaminated material from the site (including potential asbestos fibres) shall be sheeted, lapped and taped to prevent the release of fugitive dust / fibres.
- Airborne fibre sampling equipment will be set up as detailed in Section 6.1.2 of this report.
- If appropriate noise monitoring equipment will be set up in suitable areas of the site. The requirements of BS 5228:2009 'Noise and Vibration Control on Construction Sites' shall be adhered to at all times. All machinery shall be fitted with effective silencers. If appropriate, noise monitoring equipment will be set up in suitable areas of the site. Working hours shall be agreed with the Planning Authority and the Client prior to commencement of the works.
- Noisy operations, i.e. the use of hydraulic breakers shall be restricted to hours agreed with the Local Authority and the Client.
- Mobile water bowsers and sprayers shall be available on the site to water any haul routes / stockpiles of excavated soils to reduce dust / fibre emissions. The water spray may include chemical dust suppressants or wetting agents to improve dust control. Vapour masts shall be used if required. Regular inspections of the public roads adjacent to the site or within the site shall be carried out and if deemed necessary the roads shall be swept regularly to remove any mud, slurry or dust deposited by vehicles entering or leaving the site.
- Fuelling of any plant shall be undertaken in a designated area and all above ground fuel storage tanks shall comply with the requirements of the Pollution Prevention Guideline PPG 2.
- Waste oil, hydraulic fluid etc. should not be tipped directly or discharged onto the site.
- Waste oil may be a special waste and disposal shall be undertaken by a registered carrier in accordance with the Duty of Care Regulations.

The following site records of the works shall be maintained, as a minimum:

- Daily record sheets to include a summary of the day's activities.
- Weather conditions.
- Plan, personnel and visitors present.

- Aspects relating to Health and Safety, environmental control or non-compliance with the General Specifications and Method Statements.
- Waste transfer notes.

11.3 Health and Safety

Before site operations are commenced the necessary COSHH Assessments, Method Statements and Health and Safety Plans should be completed and issued by the Main Contractor.

The works shall be undertaken in accordance with all relevant legislation including, but not limited to:

- The Workplace (Health, Safety and Welfare) Regulations; 1992.
- The Management of Health and Safety at Work Regulations; 1999.
- The Control of Substances Hazardous to Health Regulations; 2002.
- The Construction (Design and Management) Regulations; 2007.
- The Asbestos (Licensing) (Amendment) Regulations; 1998.
- The Control of Asbestos Regulations; 2012.

This will be the responsibility of the Principal Contractor who should establish procedures in case of emergency.

During the construction phase of the site's re-development it will be necessary to protect health and safety of site personnel and other site users. In summary, the following measures are suggested to provide a minimum level of protection, however, it will be the Main Contractor's responsibility to determine exact requirements:

- All ground workers should be issued with protective clothing, hard hats, footwear and gloves. Personnel should be instructed as to how they are to be used.
- Personal Respiratory Equipment (PRE) shall be employed as required. Personnel should be instructed as to how they are to be used and shall be 'face-fitted' prior to use.
- Personnel shall always wear hard hats, high visibility clothing and protective footwear.
- Hand washing and boot cleaning facilities shall be provided.
- No smoking except in designated areas.
- Good practices relating to personal / site hygiene shall be adopted.

11.4 Environmental Good Practice on Site

The Main Contractor should be conversant with the following Pollution Prevention Guidelines (PPG) and Construction Industry Research and Information Association (CIRIA) documents. They provide advice and recommendations with respect to environmental good practice on site and the various activities likely to be carried out during redevelopment works. Key documents include the following (note that this list is not exhaustive and further documentation / guidance may require reference as appropriate);

- PPG 1 General guide to the prevention of pollution
- PPG 2 Above ground oil storage tanks
- PPG 6 Working at construction and demolition sites
- PPG20 Dewatering underground ducts and chambers
- PPG27 Installation, decommissioning and removal of underground storage tanks

11.5 Open Fires

No open fires or burning of waste materials shall be permitted at the site during any stage of the construction works at the site.

11.6 Odour

The works are not considered likely to give rise to any significant odour problems. However, previously unidentified odorous materials may be encountered during excavation. Should this occur, vapour masts may need to be used to provide odour control.

11.7 Variations to the Strategy

Any significant deviation from the agreed remedial strategy must be agreed in writing with the LPA and their CLO prior to implementation.

11.8 Verification Requirements

A suitably qualified, experienced and competent geoenvironmental consultant shall complete the Verification Report. On site monitoring from a geoenvironmental professional during site preparatory works is strongly recommended.

Any imported materials shall be accompanied with the relevant supplier certification and fall within the relevant acceptance criteria given in Table 2 and Table 3 of this report.

The 'Verification Report' should include the following information, as relevant:

- A description of the site and previous risk assessments and of the purpose and objectives of the remediation works.
- Locations of all fibre / dust monitoring points recorded by way of a survey drawing.
- A comprehensive set of dust / fibre monitoring data obtained during the works.
- Confirmation that either the correct thickness of 'clean cover' has been placed in the nursery lawn area / or that all made ground has been removed.
- A photographic record of the works as they progressed.
- A record of the volume of imported fill and the accompanying (at the relevant frequency) test certificates to verify the chemical suitability of any imported fill.
- All waste transfer notes and other certification and documentation (Duty of Care), as relevant including detail of each and every waste removed from the site including volumes.
- Details of any variations from the originally agreed remedial strategy (with the corresponding agreement from the relevant regulatory body).
- Any other information required by the regulators in agreement with the Client and geoenvironmental consultant.

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