Remediation Method Statement

Adur Civic Centre, Ham Road, Shoreham by Sea,
West Sussex, BN43 9SA

Prepared for:
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Geo-Environmental

Remediation Method Statement (RMS)

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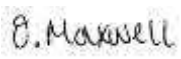
Checked by:	O. Maxwell	**Date:**	27/04/23	**Signature:**	
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1 INTRODUCTION

1.1 Background

This Remediation Method Statement (RMS) has been prepared by Omnia following the findings of environmental site investigations carried out by Soils Limited at the site of the Adur Civic Centre, Ham Road, Shoreham by Sea, West Sussex, BN43 9SA.

A site location plan is presented in Appendix III Figure 1.0.

1.2 Proposed Development Plan

The proposed development is to comprise two (2no.) multi storey residential apartment buildings with a commercial ground floor in both. Soft landscaping areas are proposed within the north, east, south and centre of the site. A planning application was submitted to Adur & Worthing Councils in August 2021 (ref: AWDM/1450/21)

The proposed site plan is included within Appendix III as Figure 2.0.

Given the proposed residential use of the buildings, the mitigation measures proposed within this document are based on a residential without home grown produce end use.

1.3 Report Objectives

The purpose of the Remediation Method Statement is to identify and evaluate feasible remedial technologies and to validate the successful implementation of a site remediation programme to ensure the safe, cost effective and regulatory compliant re-development of the site.

The RMS is based on the proposed development layout presented in Figure 2.0. Should the proposed development layout change then this RMS document should be revised, and the required extent of risk mitigation measures should be re-assessed.

1.4 Scope of Works

With regard to the proposed development of the site, the main aims of the remedial works are as follows:

- To provide a remediated site that is suitable for future redevelopment i.e. residential and commercial development;
- To provide a landform/ground surface which can accommodate the design;
- To ensure that construction/groundworkers are not put at an unacceptable short-term risk during the remediation and/or redevelopment of the site; and,
- To satisfy the requirements of the regulatory authorities (i.e. the Local Planning Authority).

1.5 Previous Works

The results of the previous phases of site investigation are contained within the following report references:

- Soils Limited – Preliminary Investigation Report – Adur Civic Centre, Ham Road, Shoreham by

Sea, West Sussex, BN43 9SA – November 2019 – Ref: 17882/PIR_R26
- Soils Limited – Main Investigation Report – Adur Civic Centre, Ham Road, Shoreham by Sea, West Sussex, BN43 9SA – November 2019 – Ref: 17882/MIR_R27;
- Soils Limited – Soil Gas risk Assessment – Adur Civic Centre, Ham Road, Shoreham by Sea, West Sussex, BN43 9SA – March 2020 – Ref: Q21827
- Soils Limited – Supplementary Report – Adur Civic Centre, Ham Road, Shoreham by Sea, West Sussex, BN43 9SA – July 2020 – Ref: 17882/MIR_R27; and
- Soils Limited – Main Investigation Report – Adur Civic Centre, Ham Road, Shoreham by Sea, West Sussex, BN43 9SA – October 2022 – Ref: 20392/MIR Rev1.0

This RMS is based upon the findings of the above reports, and it is therefore recommended that the RMS is read in conjunction with these reports, however a brief summary of the previous reports has been included below;

Soils Limited – Preliminary Investigation Report – Adur Civic Centre, Ham Road, Shoreham by Sea, West Sussex, BN43 9SA – November 2019 – Ref: 17882/PIR_R26

A desk-based assessment of the site was carried out by Soils Ltd, with a conceptual site model for the site produced based on the findings. A number of potential contaminative sources were identified both on-site and off-site that required further assessment. These included:

- Plastic Moulding Works;
- Works and Tanks
- Engineering Works
- Tarmacadam Works;
- Made Ground
- Timber Yard;
- Railway
- Goods Yard;
- Builders Yard;
- Car Park and Garage;

Soils Limited – Main Investigation Report – Adur Civic Centre, Ham Road, Shoreham by Sea, West Sussex, BN43 9SA – November 2019 – Ref: 17882/MIR_R27

An intrusive ground investigation was carried out by Soils Limited at the site in October 2019 and comprised eight (8no.) windowless sampler boreholes, eight (8no.) dynamic probes, three (3no.) machine excavated trial pits, four (4no.) cable percussion boreholes with three (3no.) installed for groundwater sampling and gas/groundwater monitoring and fourteen (14no.) in-situ CBR tests using a dynamic cone penetrometer.

Soils Limited Soil and Groundwater Assessment

Following an assessment of soil samples sent for laboratory analysis, elevated concentrations of PAH, Lead and Asbestos in Made Ground were recorded above the human health assessment criteria for a residential end use without home grown produce.

It should be noted that Soils Ltd have reported an asbestos detect within WS1, however following review of the laboratory test results, no asbestos was detected within WS1, and asbestos was instead detected within WS4, and was identified as loose chrysotile fibres. This result was not quantified.

In addition, groundwater sampling did not identify any elevated concentrations of contaminants, therefore Soils Limited established that that there was no risk to the groundwater receptor.

Soils Limited Ground Gas Assessment
The report presents findings of one (1no.) gas monitoring visit with five (5no.) further visits required.

Soils Limited – Soil Gas risk Assessment – Adur Civic Centre, Ham Road, Shoreham by Sea, West Sussex, BN43 9SA – March 2020 – Ref: Q21827

Six (6no.) ground gas monitoring visits were undertaken as part of the investigation. The monitoring recorded concentrations of methane below the detectable amount and a maximum carbon dioxide concentration of 2% with a maximum recorded flow rate of 0.02l/hr. Soils Limited concluded the site fell into a Characteristic Gas Situation 1 (CS1) classification and gas protection measures would not be required.

Soils Limited – Supplementary Report – Adur Civic Centre, Ham Road, Shoreham by Sea, West Sussex, BN43 9SA – July 2020 – Ref: 17882/MIR_R27
A supplementary ground investigation was carried out by Soils Limited at the site in March 2020 and comprised concrete coring at five (5no.) locations, five (5no.) windowless sampler boreholes and two (2no.) hand excavated trial pits for foundation exposure.

Soils Limited Soil and Groundwater Assessment
Following an assessment of soils samples sent for laboratory analysis, elevated concentrations of PAH and Lead in Made Ground were recorded above the human health assessment criteria for a residential end use without home grown produce within one further sample.

Soils Limited – Main Investigation Report – Adur Civic Centre, Ham Road, Shoreham by Sea, West Sussex, BN43 9SA – October 2022 – Ref: 20392/MIR Rev1.0
Further intrusive works were undertaken at the site by Soils Limited in September 2022 comprising two (2no.) cable percussive boreholes.

No further contamination was identified during this phase of the investigation within the near surface soils on site.

1.6 Summary of Parties Involved

Name of Party	Function / Interest
PMC Construction	Principal Contractor
Omnia	Geo-Environmental Consultant
Adur & Worthing District Council	Local Planning Authority

1.7 Limitations

The limitations of this report are presented in Appendix I.

1.8 Confidentiality

Omnia has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party

wish to use or rely upon the contents of the report, written approval must be sought from Omnia; a charge may be levied against such approval.

2 SITE SETTING

2.1 Site Details

Table 2-1 Site Details

Site Address	Adur Civic Centre, Ham Road, Shoreham by Sea, West Sussex, BN43 9SA
National Grid Reference	522047, 105163
Site Area	0.627 Ha

All acronyms used within this report are defined in the Glossary presented in Appendix II.

A site location plan is presented as Figure 1.0 (Appendix III).

2.2 Current Site Use

Omnia have not completed a site walkover as part of this RMS. The following site description is taken from the Soils Limited reports and a review of satellite imagery and online street view.

The site is located to the south of Ham Road and is approximately rectangular in shape, which narrows to the east and widens to the west. At the time of the earlier investigations, Soils Limited noted the site to be predominantly hardstanding with approximately one third of the area covered by gravel and weeds. The site also contained a demolished public building, at this time the site was unused. The topography was noted to be gently sloping towards the south.

A review of satellite imagery and streetview (2023) confirms the site has remained unchanged since Soils Limited completed their most recent site walkover in March 2020 (ref: 17882/MIR_R27) with the exception of the site being secured with fencing to prevent public access; the site also appeared to have been used for car parking.

2.3 Geology and Hydrogeology

The British Geological Survey (BGS) map for the site (Brighton and Worthing, Sheet 318/333, Solid and Drift Edition at a scale of 1: 50,000) indicates that the site is underlain by the following geological sequence:

Table 2-2 - Published Geological Sequence

Geological Unit	Classification	Description	Aquifer Classification
Superficial	Head	Clay, silt, sand and gravel	Secondary
Bedrock	Newhaven Chalk Formation	Chalk	Principal

2.4 Ground Conditions

The ground investigations generally confirm the published geology, with ground conditions comprising Made Ground directly underlain by superficial deposits of Head deposits further underlain by bedrock deposits of the Newhaven Chalk Formation.

Ground conditions encountered during the preceding ground investigations are summarised below:

Review of all available exploratory hole logs for the site indicates that the geological succession beneath the site consists of Made Ground up to 2.80m thick overlying superficial Head Deposits, overlying bedrock deposits of the Newhaven Chalk Formation.

Made Ground was found to be a mixture of granular and cohesive material and ranged from 0.60m (WS7) to 2.80m (BH2) in thickness. Made Ground generally comprised greyish brown very sandy slightly clayey GRAVEL or soft dark brown gravelly sandy SILT/CLAY. Sand was fine to coarse. Gravel was angular to subrounded fine to coarse concrete, limestone, tarmac, brick, tile, clinker, cement, slag and ash. Rare cobble of tarmac and concrete. Occasional rootlets.

Immediately underling the Made Ground were superficial Head Deposits. Head Deposits were encountered in all intrusive locations except BH05, TP1 and TP2 to proven depths between 2.20m bgl (WS6) and 6.00m bgl (BH3). Head Deposits generally comprised soft to stiff light yellowish brown/orange, brown slightly gravelly slightly sandy CLAY. Sand was fine. Gravel was subangular to subrounded fine to medium chalk and flint.

Chalk bedrock was encountered immediately beneath the Made Ground/Head Deposits at depths ranging from 2.20 – 6.00m bgl and was identified to a maximum depth of 28.00m bgl (BH06) although the base of the Upper Chalk was not proven within any of the intrusive locations. A review of the geological logs indicated that the Chalk was recovered as structureless CHALK. Recovered as gravelly to very gravelly CLAY/SILT. Gravel was angular to subrounded fine to coarse weak and low density. Matrix was soft to firm cream and occasionally light orangish brown stained. Rare subangular to rounded fine to medium flint gravel. Inferred Grade Dm to Dc.

2.5 Summary of Contaminant Distribution

2.5.1 Tier I Risk Assessment Results

Previous phases of site investigation have concluded that elevated concentrations are present within the near surface which have the potential to pose a significant risk to human health and/or controlled waters.

Only those exceedances considered to pose a significant risk to human health have been included below.

Table 2-3 - Tier 1 Exceedance Summary

Contaminant	Location	Depth (m bgl)	Exposure Pathway
Benzo(a)pyrene	WS1	0.20	Ingestion of Soil & Indoor Dust
	WS4	0.40	
	WS2 (Supplementary)	0.90	
Dibenz(a,h)anthracene	WS1	0.20	Ingestion of Soil & Indoor Dust
	WS2 (Main)	0.40	
	WS4	0.40	
	WS2 (Supplementary)	0.90	
Benzo(b)fluoranthene	WS1	0.50	Ingestion of Soil & Indoor Dust
	WS4	0.40	
	WS2 (Supplementary)	0.90	
Lead	WS1	0.40	Ingestion of Soil & Indoor Dust
	WS2 (Main)	0.20	
	WS3	0.50	

Contaminant	Location	Depth (m bgl)	Exposure Pathway
	WS4	0.40	
	WS5	0.20	
	WS6	0.60	
	BH3	0.50	
	WS2 (Supplementary)	0.90	
Asbestos*	WS4	0.40	Inhalation of Fibres

*It should be noted that concentrations of asbestos were not quantified as part of the previous risk assessment, and therefore have been assessed on a worst-case basis.

A total of twelve (12no.) samples were screened for asbestos, and only 1 returned a positive asbestos ID, therefore it is considered the asbestos impact is limited in extent, to the area surrounding WS4.

Although six (6no.) out of the eight (8no.) positions that identified exceedances are located below proposed building footprints and roadways, it is considered that given the exceedances identified across the site (associated with PAH and Lead), are representative of the Made Ground, and due to the inherent variability of the Made Ground, that consideration should be given for the potential for exceedances to be present within areas of soft landscaping (in addition to WS4 and WS5). Given the contaminants identified, the exposure pathway is considered to remain present in areas of soft landscaping, however, will be severed beneath building footprints and hardstanding.

2.5.2 Exposure Pathways

The main exposure pathways for the proposed end uses where exceedances have been located are summarised in Table 2-3 above with the main exposure pathways present for residential properties with open green space being Ingestion of Soil and Indoor Dust and Inhalation of Fibres.

2.5.3 Groundwater

The site was not considered to have the potential to a significant risk to controlled waters.

2.6 Identified Development Constraints

Based on a review of Table 2.1 areas containing elevated concentrations of Lead, PAHs and Asbestos in near surface soils within proposed soft landscaping have been identified.

Based upon the information obtained, Table 2-4 demonstrates that each of the potential pollutant linkages based upon the contaminant-pathway-receptor model will need to be addressed by the proposed remedial works across the site.

Table 2-4 - Pollutant Linkage Assessment

Source	Receptor	Potential Risk	Current Residual Risk	Mitigation
Concentrations of asbestos contained within near surface soils at location WS1	Human Health	Inhalation of fibres	YES	**Construction Phase** The presence of asbestos fibres within near surface Made Ground at location WS1 (0.20m bgl) is considered to have the potential to present a risk to construction workers during the construction phase. It is also considered that there is a risk of asbestos fibres from near surface soils becoming airborne due to ground disturbance during construction and groundworks activities which have the potential to impact off-site receptors. Therefore, the presence of asbestos across the site should be highlighted to the Principal Contractor who should prepare a task-based risk assessment and asbestos management plan in line with the Control of Asbestos Regulations (2012). This should be undertaken for tasks due to be undertaken in the affected areas prior to the construction and groundworks phase to ensure the provision of suitable PPE for construction workers and to ensure that adequate mitigation measures, which may include damping down and perimeter fibre monitoring, are in place to mitigate against and monitor for airborne fibre release.
				Post-Development Elevated concentrations of asbestos have been identified in near surface Made Ground across the site that are considered to have the potential to present a significant risk to human health within proposed areas of soft landscaping post-development if left in situ. Therefore, to mitigate this risk it is recommended that remedial works are undertaken within areas of proposed soft landscaping where a pollution linkage is considered likely to remain active post-development.
Elevated Concentrations of Lead and PAH within		Ingestion of Soils and Dust	YES	**Construction Phase** During excavation, construction workers are likely to be within direct contact with

Source	Receptor	Potential Risk	Current Residual Risk	Mitigation
near surface soils				elevated concentrations of Lead and PAH within impacted soils across the site. However, it is considered that the risks to construction workers will be mitigated through the management of their exposure through the use of suitable PPE and hygienic working practices as required under HSE/CDM regulations. **Post Development** Elevated concentrations of Lead and PAH are considered to have the potential to pose a significant risk to human health within proposed areas of soft landscaping where an exposure pathway is considered likely to remain post-development. It is therefore recommended that remedial works will be required within all areas of proposed soft landscaping to sever the exposure pathway and render the pollution linkage inactive.

3 REMEDIATION STRATEGY

3.1 General

The main aims of the remediation strategy are as follows:

- To provide a final ground surface suitable for the proposed Residential end use of the site;
- To comply with the requirements of the Local Planning Authority and their Environmental Health Department to ensure future users of the site are not put at risk from any chemical contamination arising from its former use(s) or nature of materials present; and,
- To ensure construction workers are not put at an unacceptable short term risk in redeveloping the site.

3.2 Remedial Measures Summary

Based on the findings of the site investigations and the development constraints listed above, the following remediation strategy has been devised for the site. The proposed scope of the works is summarised below and detailed in the subsequent sub-sections. Full details of the methodology are set out in Section 6.2. In summary this comprises:

1) Implementation of a discovery strategy for previously unidentified contamination;
2) Implementation of an Asbestos Watching Brief;
3) Implementation of a clean cover system within all areas of proposed soft landscaping
    a) Excavation of materials under proposed areas of soft landscaping to remove impacted near surface soils;
    b) Placement of a 150mm thick engineered no-dig layer and/or hi-visibility geotextile marker layer where required as detailed below;
    c) Installation of a 300mm thick clean cover system, within areas of proposed soft landscaping

4 REMEDIAL WORKS

4.1 Discovery Strategy - Previously Unidentified Contaminants (Point 1)

A discovery strategy should be implemented as part of the development process for any previously un-encountered contamination.

Should any additional significant visual or olfactory evidence of unexpected contamination be identified during the development then works should be halted in the affected area and contact made with a suitably qualified and experienced Environmental Consultant to determine an appropriate course of action, which may include additional investigation, and as necessary, variation to the agreed RMS.

Contact should be made with the regulator to confirm the proposed scope of works and any variation to the RMS.

The following list is not exhaustive, but should be used as guidance with regards to what should be considered indicative of soil contamination that may require remedial works:

- Free-phase contamination (liquid oils or fuels);
- Loose fibrous materials or cement bound materials (PACM);
- Visually significant staining of soils;
- Evidence of invasive plants such as Japanese Knotweed, Himalayan Balsam, Marestail or Giant Hogweed; and,
- Olfactory evidence of hydrocarbon contamination.

4.2 Implementation of an Asbestos Watching Brief (Point 2)

The presence of asbestos within near surface soils is considered to have the potential to present a significant risk to construction workers during the construction phase.

Therefore, it is recommended that an Asbestos watching brief is implemented during the enabling works and construction works phases when the existing soil stockpile is understood to be moved and that an asbestos management strategy is produced by the Principal Contractor.

If suspect materials such as loose fibrous materials, cement bound materials or degraded insulation board are encountered, then works in the vicinity should be halted and contact made with a suitably qualified and experienced Environmental Consultant.

Works should be conducted in line with the Control of Asbestos Regulations (2012), with risk assessment completed in relation to site activities.

Mitigation measures including asbestos fibre boundary monitoring and dampening down of excavations during dry weather should be considered by the Principal Contractor in order to manage risks.

4.3 Installation of a Clean Cover System in All Areas of Proposed Soft Landscaping (Points 3a, 3b & 3c)

A clean cover system should be installed within all areas of proposed soft landscaping as set out in the following sections. At this stage it is understood an illustrative landscape masterplan (Drawing Number 2890-LA-01 dated 09/02/23) has been approved as part of the planning application. It is understood that planting will comprise a mixture of trees, low shrubs, climbing plants, grass and low clipped hedge. As such, it is recommended that minimum cover system thickness of 450mm for grass, 600mm for ornamental shrubs and 900mm for trees in accordance with guidance set out in BS3882:2015.

Due to the potential for the underlying Made Ground in areas surrounding WS4 to contain elevated concentrations of asbestos which exceed Hazardous Waste threshold of 0.1% (as samples were not quantified during the previous investigation), the clean cover system should incorporate a 150mm thick engineered no-dig layer to sever the pollution linkage and render the exposure pathway inactive in this area (as detailed on Figure 5.0).

4.3.1 Excavation of Impacted Soils from Areas of Proposed Soft Landscaping (Point 3a)

Soils within all areas of proposed soft landscaping should be excavated to a minimum depth of 300mm below finished ground levels (bfgl) across the site, and 450mm below finished ground levels (bfgl) in the area surrounding WS4, with all excavated soils removed for off-site disposal at a suitably licenced waste disposal site via a registered waste carrier.

It is recommended that excavations are locally deepened to a minimum of 900mm bfgl to form 'Tree Pits' in the location of proposed tree planting in accordance with guidance set out in BS3882:2015.

Following the excavation of impacted soils, material will need to be removed and disposed of off-site to a suitably licensed waste disposal or soil treatment facility.

Given that concentrations of asbestos have not been quantified, mitigation measures including asbestos fibre boundary monitoring and dampening down of excavations during dry weather should be considered by the Principal Contractor in order to manage risks.

If impacted soils are required to be stockpiled prior to disposal, soils should be sheeted to minimise dust generation and placed on an impermeable membrane to prevent impacting soils beneath stockpile locations.

Areas requiring the implementation of a clean cover system are shown on Figure 5.0.

4.3.2 Installation of a Hi-Visibility Geotextile & Engineered No-Dig Layer (Point 3b)

Upon excavation of proposed soft landscaping areas to a minimum depth of 450mm bFGL in the areas surrounding WS4, a 150mm layer of clean crushed stone or gravel should be emplaced to act as a no-dig layer. Soils emplaced to form the no-dig layer should be clean and comply with the chemical suitability criteria set out in Table 5.2.

A high-visibility geotextile (Terram Hi-Vis, or equivalent) should be emplaced to act as a marker layer and to prevent the intermixing of clean imported soils with underlying soils containing potentially elevated concentrations. The geotextile membrane should be placed above the clean crushed stone, or at the base of the 300mm bFGL excavation across the remainder of the site.

A cross-section of the clean cover system proposed for the area surrounding WS4 is shown in Figure 4-1 below, and a cross-section of the clean cover system proposed for the remainder of the site is shown in Figure 4-2 below.

Figure 4-1 - Engineered Clean Cover System – Soft Landscaping in the area of WS4

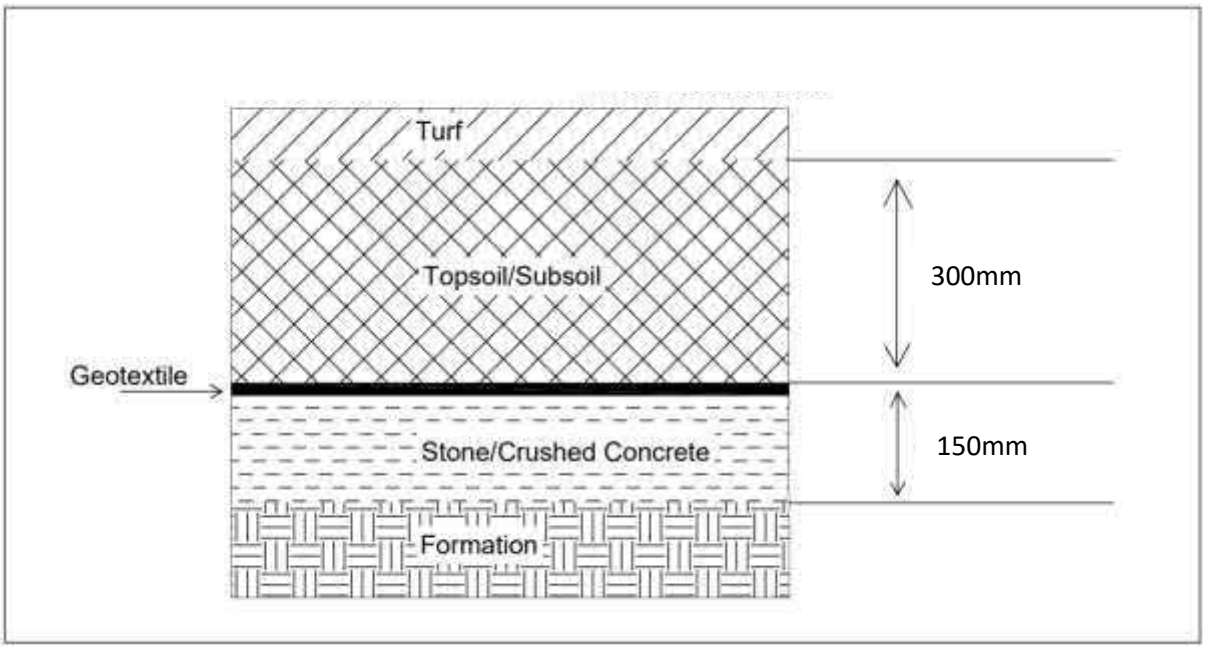
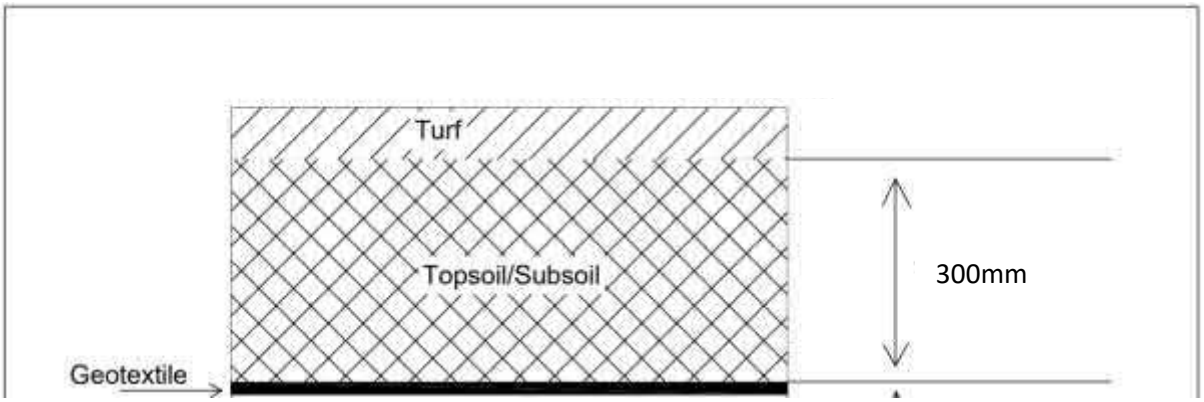


Figure 4-2 - Clean Cover System – Soft Landscaping site wide



4.3.3 Placement of Clean Soils in Areas of Proposed Soft Landscaping (Point 3d).

As stated in Section 4.3.1 the thickness of the cover system should be increased to a minimum of 900mm to form 'Tree Pits' where tree planting is proposed in accordance with guidance set out in BS3882:2015. Consideration should be given to tree stabilisation where trees are planted above a geotextile, through discussion with an Arboriculturist.

The thickness of topsoil should not normally exceed 300mm.

All soils utilised for the installation of the clean cover system should conform with the chemical suitability criteria set out in Table 5.2. Imported soils should be obtained from clean source with a BS3882 supply certificate in the case of topsoil.

4.4 Underground Utilities Pipework

Given the brownfield nature of the site, it is recommended that reference is made to UKWIR Guidance for the selection of potable water supply pipework. Confirmation should be sought from the potable water supplier (Southern Water) to ensure that potable water supply pipework is selected in accordance with the requirements of the local Water Authority.

5 VALIDATION

In order to determine that all remedial works have been completed in accordance with the RMS, validation will need to be undertaken to confirm that the exposure pathway has been severed and the pollution linkages rendered inactive.

5.1 Validation of Clean Cover System Within Areas of Proposed Soft Landscaping

In order to confirm that the remedial works set out in Section 4.0 have been fully implemented and the pollution linkages have been successfully broken, validation works are required as follows:

5.1.1 Validation of Capping Thickness

In order to determine that sufficient soil capping has been placed validation of the excavation depth should be undertaken post placement of soil capping.

Photographic evidence should be obtained confirming the excavation depth within areas of proposed soft landscaping have reached a minimum depth of 300mm bfgl.

Photographic evidence should then be obtained confirming the thickness of the placed engineered layer. Photographic evidence will need to be obtained prior to placement of the geo-textile membrane and clean capping soils.

5.1.2 Validation of Geotextile Membrane Placement and Clean Cover System

Once capping has been placed, hand excavated pits should be advanced to a depth of 300mm bfgl in areas of soft landscaping to validate the placement of a geotextile membrane and the correct implementation of the clean cover system.

Samples should be taken from the excavated material and analysed for key contaminants of concern for confirmation of chemical suitability.

Upon receipt of successful laboratory results a validation report should be produced to demonstrate that:

- Imported chemically suitable clean soil has been used in the placement of the clean cover system;
- The correct cover system thickness has been installed;
- Summary table cross referencing the quantity of soil imported (tonnes or /volume), area being capped (m^2), capping system thickness; and,
- To confirm the installation of the geotextile membrane.

5.2 Sampling Frequency of Imported Soils

The sampling frequency for materials to be managed under the Remediation Strategy is presented within Table 5-1 below, with chemical results compared to the guidance levels listed in Appendix IV.

Sample frequency has been set out in line with current guidance provided within 'Verification Requirements for Cover Systems – Technical Guidance for Developers, Landowners and Consultants – Yorkshire and Lincolnshire Pollution Advisory Group June 2021'. It is noted that although Adur District Council (ADC) are not listed as a Council adopting this guidance, in the absence of specific guidance within ADC, this guidance has been adopted. It should be noted that if both topsoil and subsoil are imported that both materials will require testing for chemical suitability.

Imported soils should be obtained from a known clean source, and in the case of topsoil should be supplied with BS3882 supply certificates.

Imported materials should be used to backfill excavation promptly upon receipt of successful validation test certificates to ensure the stability of excavations and to make safe.

Table 5-1 - Chemical Validation Schedule

Purpose	Area	Testing Frequency		Chemical Analysis
Validation Testing of subsoil and topsoil	Soft Landscaping	Greenfield Soil Source	1:250m^3 (min 3 samples per source)	Full CLEA Metals Inorganic Compounds; Speciated Polycyclic Aromatic Hydrocarbons; TPH CWG; BTEX; Asbestos Identification. Soil Organic Matter
		Brownfield Soil Source	1:100m^3 (min 6 samples per source)	
Validation testing of engineered no dig crush layerl	Soft Landscaping	6F2 Crushed Aggregate (Site won or imported)	1:500m^3	Full CLEA Metals Inorganic Compounds; Speciated Polycyclic Aromatic Hydrocarbons; TPH CWG; BTEX; Asbestos Identification.

* It is recommended that topsoil is compliant with BS3882:2015 to certify its suitability as a plant growing medium. If this is not required, then testing can be excluded from chemical analysis.

5.3 Validation Criteria

The criteria set out within Appendix IV should be met for the implementation of the backfill of all excavations associated with the removal of the Made Ground and for all soils emplaced as part of the clean cover system within areas of soft landscaping. It is considered that the values set out within Appendix IV will be suitably protective of the identified receptors.

The origin of the validation screening values set out above is presented within Appendix IV. It is recommended that imported topsoil should be accompanied by a BS3882:2015 supply certificate, should be free from visual and olfactory evidence of contamination and should contain no visual evidence of invasive weeds.

Upon receipt of successful lab results a validation report will be created showing imported clean fill has been used in the clean cover system.

Remedial works undertaken should be documented in a site diary with a photographic record of works undertaken maintained.

6 RECORD KEEPING & VERIFICATION

6.1 Record Keeping

During the course of the remediation and site enabling works, the Principal Contractor (PC) should undertake the following record keeping protocols:

- Detailed daily site diary including material movements and photographs of the excavation works; and,
- A record of clean imported soil delivery notes and waste transfer notes for all materials disposed of off-site.

Record keeping on site, in particular movements of impacted and clean natural soils should be retained by the Developer with records remaining on site during the course of site development works.

6.2 Verification

The records listed should then be incorporated into a Validation Report on completion of the remediation works.

The Validation Report will include the following:

- Copies of BS3882 Supply Certificates for all imported topsoil;
- Tables cross-referencing the types and amounts of soil imported with the area being capped and cover system thickness;
- Details of any areas where near surface Made Ground has been stripped;
- Copies of consignment notes for any topsoil or subsoil imported;
- Copies of any consignment notes relating to the movement of wastes to licensed waste management facilities where available;
- Detailed drawings showing all validation sampling locations;
- Detailed information relating to the verification of remedial works or recommendations for further work;
- Summary table cross referencing the quantity of soil imported (tonnes or /volume), area being capped (m^2), capping system thickness; and,
- Photographs of the excavation works and validation sampling locations.

The findings of the validation exercise should be presented within a Validation Report and submitted to the Local Authority for approval.

6.3 Supervision and verification of works

All works as set out within this RMS are to be supervised by a suitably qualified and experienced Environmental Consultant. The level of attendance should be agreed with the Client and should involve the validation and sampling of the clean cover system.

6.4 Discovery Strategy - Previously Unidentified Contaminants

A discovery strategy should be implemented as part of the development process for any previously un-encountered contamination.

Should any additional significant visual or olfactory evidence of unexpected contamination be identified during the development then works should be halted in the affected area and contact made with a suitably qualified and experienced Environmental Consultant to determine an appropriate course of action, which may include additional investigation, and as necessary, variation to the agreed RMS.

Contact should be made with the regulator to confirm the proposed scope of works and any variation to the RMS.

The following list is not exhaustive, but should be used as guidance with regards to what should be considered indicative of soil contamination that may require remedial works:

- Free-phase contamination (liquid oils or fuels);
- Loose fibrous materials or cement bound materials (PACM);
- Visually significant staining of soils;
- Evidence of invasive plants such as Japanese Knotweed, Himalayan Balsam, Marestail or Giant Hogweed; and,
- Olfactory evidence of hydrocarbon contamination.

APPENDIX I - LIMITATIONS

1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between Omnia and the Client as indicated in Section 1.2.

2. For the work, reliance has been placed on publicly available data obtained from the sources identified. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information, it has been assumed it is correct. No attempt has been made to verify the information.

3. This report has been produced in accordance with current UK policy and legislative requirements for land and groundwater contamination, which are enforced, by the local authority and the Environment Agency. Liabilities associated with land contamination are complex and requires advice from legal professionals.

4. During the site walkover reasonable effort has been made to obtain an overview of the site conditions. However, during the site walkover no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown, or the location of the area has not been made known or accessible.

5. Access considerations, the presence of services and the activities being carried out on the site limited the locations where sampling locations could be installed and the techniques that could be used.

6. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities.

7. Where mention has been made to the identification of Japanese Knotweed and other invasive plant species and asbestos or asbestos-containing materials this is for indicative purposes only and do not constitute or replace full and proper surveys.

8. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.

9. Omnia cannot be held responsible for any use of the report or its contents for any purpose other than that for which it was prepared. The copyright in this report and other plans and documents prepared by Omnia is owned by them, and no such plans or documents may be reproduced, published or adapted without written consent. Complete copies of this may, however, be made and distributed by the client as is expected in dealing with matters related to its commission. Should the client pass copies of the report to other parties for information, the whole report should be copied, but no professional liability or warranties shall be extended to other parties by Omnia in this connection without their explicit written agreement there to by Omnia.

10. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.

APPENDIX II – GLOSSARY

AST	Above Ground Storage Tank
BGS	British Geological Survey
BSI	British Standards Institute
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CIEH	Chartered Institute of Environmental Health
CIRIA	Construction Industry Research Association
CLEA	Contaminated Land Exposure Assessment
CSM	Conceptual Site Model
DNAPL	Dense Non-Aqueous Phase Liquid (Chlorinated Solvents, PCB)
DWS	Drinking Water Standard
EA	Environment Agency
EQS	Environmental Quality Standard
GAC	General Assessment Criteria
GL	Ground Level
GSV	Gas Screening Value
HCV	Health Criteria Value
ICSM	Initial Conceptual Site Model
LNAPL	Light Non-Aqueous Phase Liquid (Petrol, Diesel, Kerosene)
ND	Not Detected
LMRL	Lower Method Reporting Limit
NR	Not Recorded
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Poly-Chlorinated Biphenyl
PID	Photo-Ionisation Detector
QA	Quality Assurance
SGV	Soil Guideline Value
SPH	Separate Phase Hydrocarbon
TPH (CWG)	Total Petroleum Hydrocarbon (Criteria Working Group)
SPT	Standard Penetration Test
SVOC	Semi Volatile Organic Compound
UST	Underground Storage Tank
VCCS	Vibro Concrete Columns
VOC	Volatile Organic Compound
WTE	Water Table Elevation

UNITS

M	Metres
KM	Kilometres
%	Percent
%V/V	Percent Volume in Air
MB	Milli Bars (Atmospheric Pressure)
L/HR	Litres Per Hour
µG/L	Micrograms Per Litre (Parts Per Billion)
PPB	Parts Per Billion
MG/KG	Milligrams Per Kilogram (Parts Per Million)
PPM	Parts Per Million
MG/M^3	Milligram Per Metre Cubed
M BGL	Metres Below Ground Level
M BCL	Metres Below Cover Level

MAOD	Metres Above Ordnance Datum (Sea Level)
KN/M^2	Kilo Newtons Per Metre Squared
µM	Micrometre

APPENDIX III - DRAWINGS

Key

Site Boundary

0 0.25 0.5 km

Scale	Paper Size
1:25,000	A4

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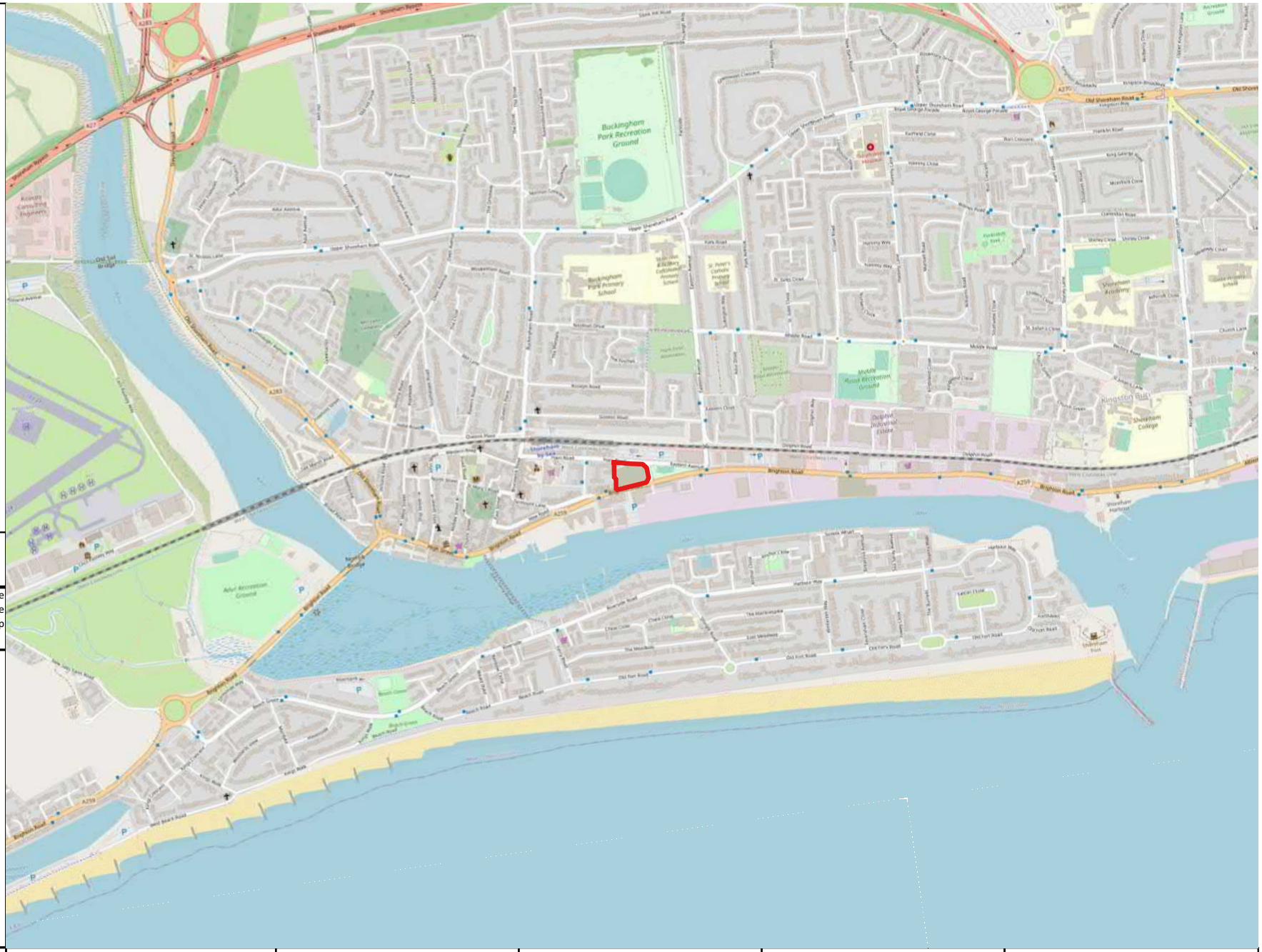

Job Title:	Client:	Project Number:	Date:	Drawing Title:
Adur Civic Centre, Shoreham	PMC Construction	A12064	26/04/2023	Figure 1.0 - Site Location Map
		Drawn By: T.Holloway	Authorised By: O.Maxwell	

Key

0 10 20 m

Scale	Paper Size
1:800	A4

Drawing provided by PMC Construction

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OMNIA	Job Title: Adur Civic Centre, Shoreham	Client: PMC Construction	Project Number: A12064	Date: 26/04/2023
			Drawn By: T.Holloway	Authorised By: O.Maxwell

Drawing Title: Figure 2.0 - Proposed Development Map

Key

- Site Boundary
- Intrusive Locations - Main Investigation
  Ref: 20392/MIR Rev1.0
- Intrusive Locations - Supplementary Investigation
  Ref: 17882/MIR_R27

0 10 20 m

Scale	Paper Size
1:800	A4

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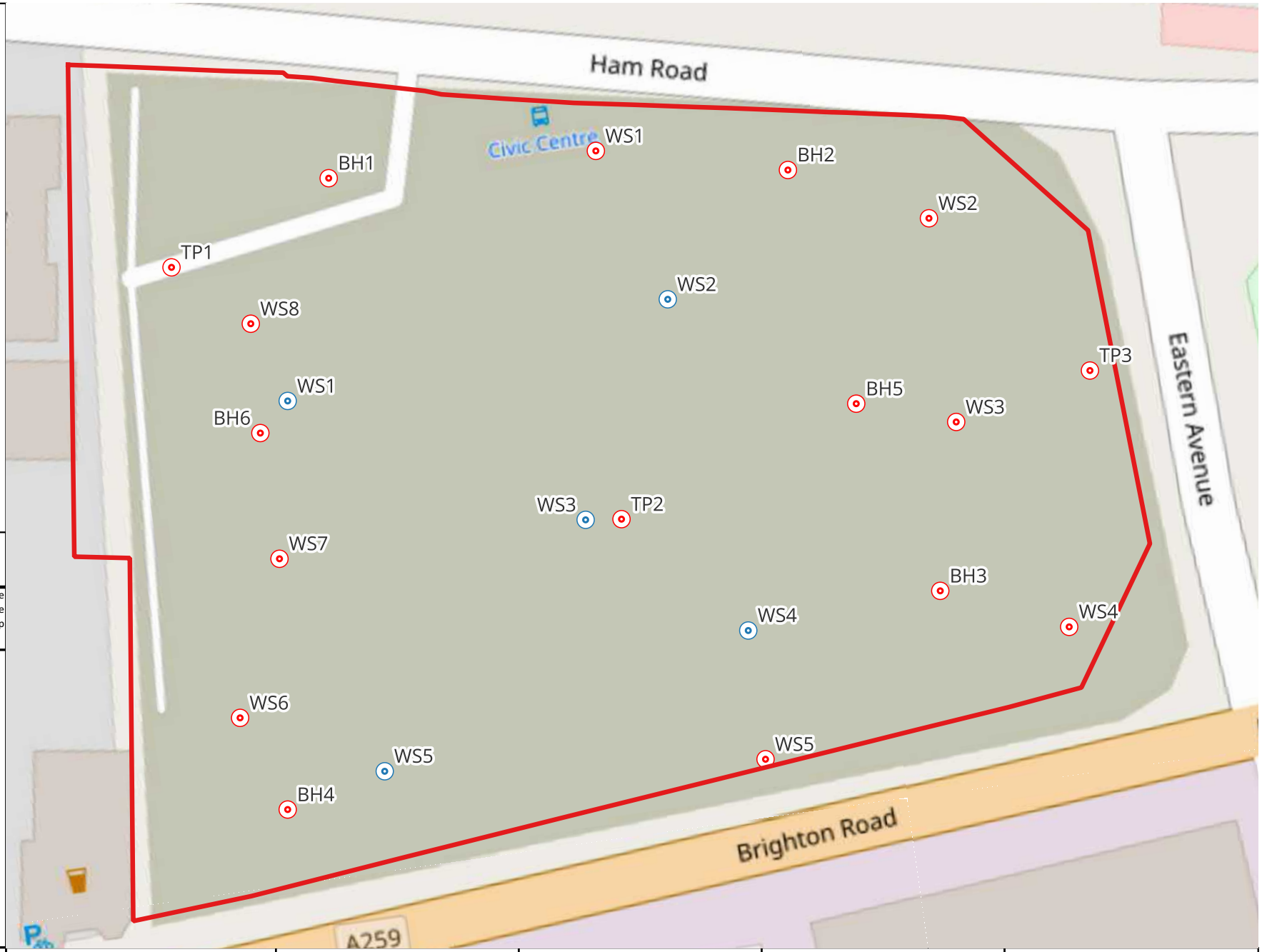

OMNIA

Job Title:	Client:	Project Number:	Date:	Drawing Title:
Adur Civic Centre, Shoreham	PMC Construction	A12064	26/04/2023	Figure 3.0 - Soils Intrusive Locations
		Drawn By: T.Holloway	Authorised By: O.Maxwell	

Key

- WS1 - PAH, Lead, Asbestos
- WS2 (Main) - PAH, Lead
- WS3 - Lead
- WS4 - PAH, Lead
- WS5 - Lead
- WS6 - Lead
- BH3 - Lead
- WS2 (Supplementary) - PAH, Lead

0 10 20 m

Scale	Paper Size
1:800	A4

Drawing provided by PMC Construction

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OMNIA	Job Title: Adur Civic Centre, Shoreham	Client: PMC Construction	Project Number: A12064	Date: 26/04/2023	Drawing Title: Figure 4.0 - Exceedance Locations
			Drawn By: T.Holloway	Authorised By: O.Maxwell	

Key

- Areas Requiring a Clean Cover System (300mm Clean Soil and Geotextile Membrane)
- Areas Requiring a Clean Cover System (300mm Clean Soil, Geotextile Membrane and 150mm Engineered No Dig)

Ref: RMS A12064/1.0

0 10 20 m

Scale	Paper Size
1:800	A4

Drawing provided by PMC Construction

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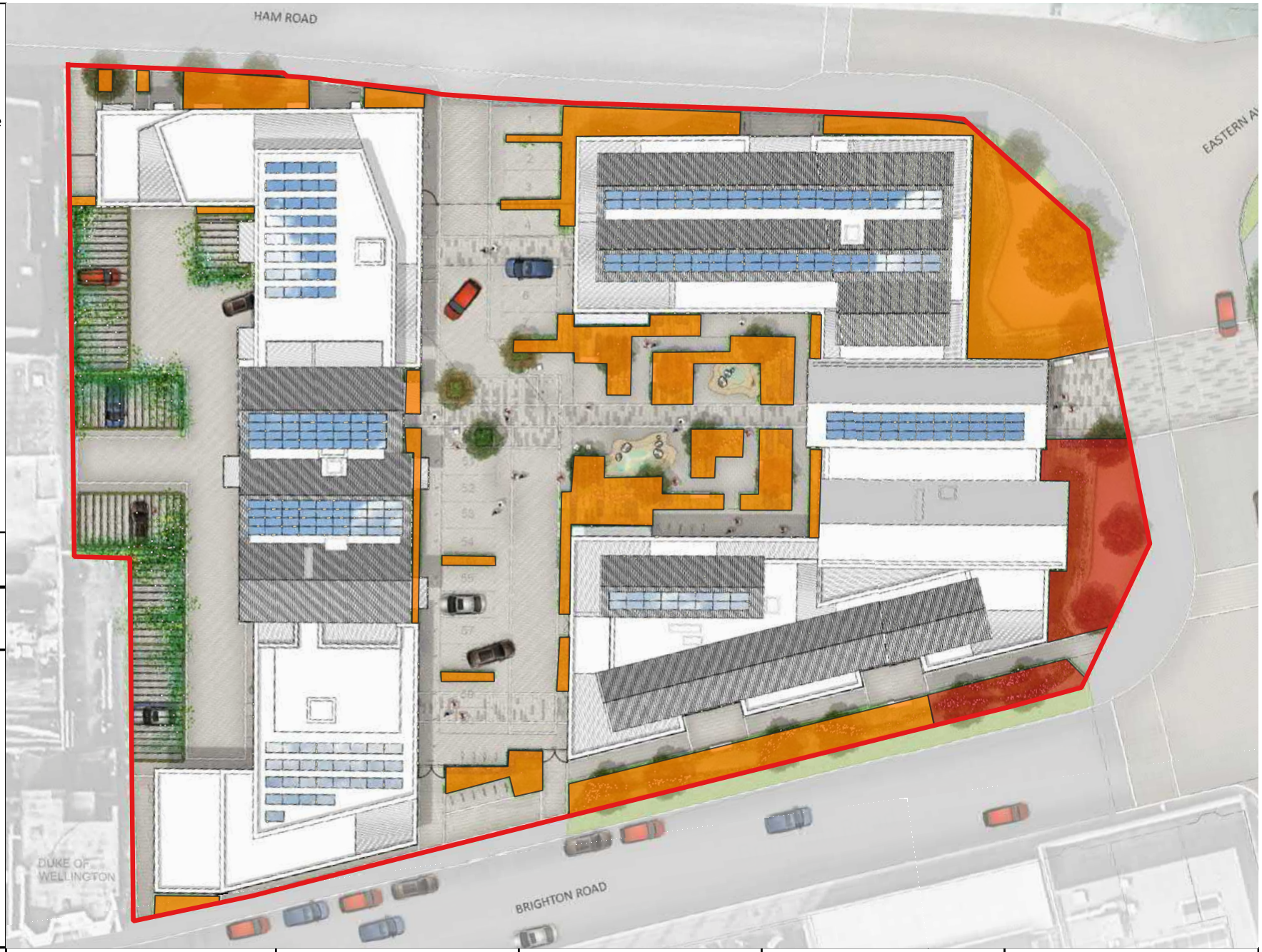

OMNIA

Job Title:	Client:	Project Number:	Date:	Drawing Title:
Adur Civic Centre, Shoreham	PMC Construction	A12064	26/04/2023	Figure 5.0 - Areas Requiring a Clean Cover System
		Drawn By: T.Holloway	Authorised By: O.Maxwell	

APPENDIX IV – CLEAN COVER VALIDATION REQUIREMENTS

OMNIA	Doc Ref	Document Name
	TECH11106	Tier 1 Screen for Imported Soils

Determinant	Unit	GAC	Exposure Pathway	Origin of Risk Assessment Value
Metals				
Arsenic	mg/kg	37	1	LQM CIEH Suitable for Use Levels (S4UL) 2015- Inorganic Arsenic
Beryllium	mg/kg	1.7	1	LQM CIEH Suitable for Use Levels (S4UL) 2015
Boron	mg/kg	290	1	
Cadmium	mg/kg	11	2	
Chromium (III)	mg/kg	910	1	
Chromium (VI)	mg/kg	6	2	
Copper	mg/kg	2,400	2	
Lead	mg/kg	200	1	Category 4 Screening Level (C4SL) utilising exposure parameters from CLEA SR3 Report
Mercury	mg/kg	40	1	LQM CIEH Suitable for Use Levels (S4UL) 2015- Inorganic Mercury
Nickel	mg/kg	180	1,2	LQM CIEH Suitable for Use Levels (S4UL) 2015
Selenium	mg/kg	250	1,2	
Vanadium	mg/kg	410	2	
Zinc	mg/kg	3,700	2	
General Inorganics				
Total Cyanide[1]	mg/kg	50	1	Dutch Intervention Values 2010
Asbestos	%	0.001% Chrysotile	6	Omnia Derived Value based on ICRCL
General Organics				
Phenol	mg/kg	280	2	LQM CIEH Suitable for Use Levels (S4UL) 2015 1%SOM
PAHs				
Naphthalene	mg/kg	2.3	2	LQM CIEH Suitable for Use Levels (S4UL) 2015 based on a sandy loam as defined in SR3 (EA 2009) 1% SOM
Acenaphthylene	mg/kg	170	2	
Acenaphthene	mg/kg	210	2	
Fluorene	mg/kg	170	2	
Phenanthrene	mg/kg	95	2	
Anthracene	mg/kg	Footnote 3	2	
Fluoranthene	mg/kg	280	1,2	
Pyrene	mg/kg	620	1,2	
Benzo(a)Anthracene[	mg/kg	7.2	1	
Chrysene	mg/kg	15	1	
Benzo(b)Fluoranthene	mg/kg	2.6	1	
Benzo(k)Fluoranthene	mg/kg	77	1	
Benzo(a)Pyrene	mg/kg	2.2	1	
Indeno(123-cd)Pyrene	mg/kg	27	1	
Dibenzo(a,h)Anthracene	mg/kg	0.24	1	
Benzo(ghi)Perylene	mg/kg	320	1	
Total PAH[2]	mg/kg	<1,000	N/A	To prevent the import of hazardous PAH containing material.
BTEX & MTBE				
Benzene	mg/kg	0.087	4	LQM CIEH Suitable for Use Levels (S4UL) 2015 1%SOM
Toluene	mg/kg	130	2,4	
Ethylbenzene	mg/kg	47	2,4	
Xylenes	mg/kg	56	2,4	LQM CIEH Suitable for Use Levels (S4UL) 2015 1% SOM o-Xylene
MTBE	mg/kg	49	4	Soil Generic Assessment Criteria for Human Health Risk Assessment (2010)
TPH-CWG				
Aliphatic				LQM CIEH Suitable for Use Levels (S4UL) 2015 based on a sandy loam as defined in SR3 (EA 2009) 1% SOM
Aliphatic EC 5-6	mg/kg	42	4	
Aliphatic EC >6-8	mg/kg	100	4	
Aliphatic EC >8-10	mg/kg	27	4	
Aliphatic EC >10-12	mg/kg	130(vap)	4	

OMNIA	Doc Ref	Document Name
	TECH11106	Tier 1 Screen for Imported Soils

Determinant	Unit	GAC	Exposure Pathway	Origin of Risk Assessment Value
Aliphatic EC > 12-16[3]	mg/kg	Footnote 3	4	
Aliphatic EC > 16-35[3]	mg/kg	Footnote 3	1	
Aliphatic EC >35-44[3]	mg/kg	Footnote 3	1	
Aromatic				LQM CIEH Suitable for Use Levels (S4UL) 2015 based on a sandy loam as defined in SR3 (EA 2009) 1% SOM
Aromatic EC 5-7	mg/kg	70	4	
Aromatic EC>7-8	mg/kg	130	4	
Aromatic EC> 8-10	mg/kg	34	4	
Aromatic EC> 10-12	mg/kg	74	2	
Aromatic EC> 12-16	mg/kg	140	2	
Aromatic EC> 16-21	mg/kg	260	2	
Aromatic EC> 21-35[3]	mg/kg	Footnote 3	1	
Aromatic EC> 35-44[3]	mg/kg	Footnote 3	1	
Banded TPH				
TPH EC 5-6[3]	mg/kg	42	4	LQM CIEH Suitable for Use Levels (S4UL) 2015 based on a sandy loam as defined in SR3 (EA 2009) 1% SOM, utilising the most conservative of the Ali/Aro chain lengths
TPH EC >6-8[3]	mg/kg	100	4	
TPH EC >8-10[3]	mg/kg	27	4	
TPH EC> 10-12[3]	mg/kg	74	2	
TPH EC> 12-16[3]	mg/kg	140	2	
TPH EC> 16-21[3]	mg/kg	260	1	
TPH EC> 21-35[3, 4]	mg/kg	Footnote 4	1	
TPH EC> 35-44[3, 4]	mg/kg	Footnote 4	1	
TPH EC> 35-44[3, 4]	mg/kg	Footnote 4	1	
Total TPH (EC>5-44)	mg/kg	<1,000	N/A	To prevent the import of hazardous TPH containing material.

Notes
Abbreviations: GAC = General Assessment Criteria, n = number of samples, MC = Maximum Concentration; Loc of Ex = Location of Exceedance.

Main Exposure Pathways: 1 = Ingestion of Soil & Indoor Dust, 2 = Consumption of Homegrown Produce & Attached Soil; 3 = Dermal Contact (Indoor & Outdoor); 4 = Inhalation of Vapour (Indoor & Outdoor); 5 = Inhalation of Dust (Indoor & Outdoor), 6 = Inhalation of Fibres

(1) Total cyanide Tier 1 GAC is taken from the Dutch Intervention Value (2010) for complex cyanide.
(2) The S4UL screenig value for individual compounds exceeds 1,000mg/kg and therefore the Total PAH limit of <1,000mg/kg must be adhered to in order to prevent hazardous PAH containing material from being imported to site
(3) The Tier 1 GAC for the banded hydrocarbon fraction is derived from the CIEH/S4UL assessment for petroleum hydrocarbons Criteria Working Group (CWG) for both aliphatic and aromatic compounds. OEC has utilised the lowest of the aliphatic and aromatic chain lengths in order to adopt a conservative approach, which is considered satisfactory for the protection of human health.
(4) The S4UL screenig value for individual compounds exceeds 1,000mg/kg and therefore the TotalTPH (EC>5-44) limit of <1,000mg/kg must be adhered to in order to prevent hazardous PAH containing material from being imported to site
(sol) – GAC presented exceeds the solubility saturation limit.