Geo-Environmental

REMEDIATION METHOD STATEMENT

for the site at

HAVANT RETAIL PARK, PORTSDOWN HILL ROAD,

BEDHAMPTON, HAMPSHIRE PO9 3NA

on behalf of

LINDEN HOMES SOUTHERN LIMITED

Report:	**REMEDIATION METHOD STATEMENT**
Site:	**HAVANT RETAIL PARK, PORTSDOWN HILL ROAD, HAVANT PO9 3NA**
Client:	**LINDEN HOMES SOUTHERN LIMITED**
Date:	**07/05/2014**
Reference:	**GE9752-RMS-140507**
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Prepared by:	
	GAVIN ROBERTS CGeol, BEng (Hons), MSc, FGS **TECHNICAL DIRECTOR**
Reviewed by:	
	GLYN EVANS BSc, PGDip, MSc, FGS, MIEnvSc **MANAGING DIRECTOR**

Geo-Environmental Services Limited
Unit 7, Danworth Farm, Cuckfield Road, Hurstpierpoint, West Sussex, BN6 9GL
+44(0)1273 832972 www.gesl.net

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1.0 INTRODUCTION

1.1 General

Following completion and submission of a Ground Investigation Report, ref. GE8756-GIR-AUG12 and Supplementary Ground Investigation Report, ref. GE9752-SGIR-140425, Geo-Environmental was instructed by Linden Homes Southern to prepare a Remediation Method Statement for the proposed residential development located at Havant Retail Park, Surrey (see Figure 1). This report sets out the remediation measures and associated verification/validation works to be undertaken to support the proposed residential use.

1.2 Objectives

The above referenced investigation reports prepared by Geo-Environmental identified the presence of a potential soil based contamination hazard and through a risk assessment process, a series of pollutant linkages were identified which required action to mitigate or otherwise reduce the risk to human health. This Remediation Method Statement (RMS) sets out the proposed remedial works to be undertaken on site to support its development for a residential end use and also to be protective of other receptors such as controlled waters and the built environment.

1.3 Planning Permission

The following conditions was set as part of the planning decision notice issued by Havant Borough Council in relation to the planning application reference APP/13/00266. Condition 12 is a pre-commencement condition, whilst Conditions 13 and 14 are pre-occupation and 'ongoing' conditions, respectively.

12. Prior to each phase of development approved by this planning permission no development (or such other date or stage in development as may be agreed in writing with the Local Planning Authority), shall take place until a scheme that includes the following components to deal with the risks associated with contamination of the site shall each be submitted to and approved, in writing, by the Local Planning Authority:

1) A preliminary risk assessment which has identified:
- *All previous uses*
- *Potential contaminants associated with those uses*
- *A conceptual model of the site indicating sources, pathways and receptors of potentially unacceptable risks arising from contamination at the site.*

2) A site investigation scheme, based on (1) to provide information for a detailed assessment of the risk to all receptors that may be affected, including those off site.

3) The results of the site investigation and detailed risk assessment referred to in (2) and, based on these, an options appraisal and remediation strategy giving full details of the remediation measures required and how they are to be undertaken.

4) A verification plan providing details of the data that will be collected in order to demonstrate that the works set out in the remediation strategy in (3) are complete and identifying any requirements for longer-term monitoring of pollutant linkages, maintenance and arrangements for contingency action.

13. No occupation of any part of the permitted development shall take place until a verification report demonstrating completion of works set out in the approved remediation strategy and the effectiveness of the remediation shall be submitted to and approved, in writing, by the local planning authority. The report shall include results of sampling and monitoring carried out in accordance with the approved verification plan to demonstrate that the site remediation criteria

have been met. It shall also include any plan (a "long-term monitoring and maintenance plan") for longer-term monitoring of pollutant linkages, maintenance and arrangements for contingency action, as identified in the verification plan. The long-term monitoring and maintenance plan shall be implemented as approved.

14. *If, during development, contamination not previously identified is found to be present at the site then no further development (unless otherwise agreed in writing with the Local Planning Authority) shall be carried out until the developer has submitted a remediation strategy to the Local Planning Authority detailing how this unsuspected contamination shall be dealt with and obtained written approval from the local planning authority.*

In addition to the Local Authority's Planning Condition, it is anticipated that Land Quality Conditions will be set by the NHBC. It is envisaged that the risk mitigation measures and verification process set out herein would facilitate the discharge of NHBC Land Quality Conditions as well as Planning Conditions.

2.0 BACKGROUND

This Remediation Method Statement (RMS) has been developed following a review of the Ground Investigation Report, ref. GE8756-GIR-AUG12 and the Supplementary Ground Investigation Report, GE9752-SGIR-140425, prepared by Geo-Environmental for this site. The Supplementary Ground Investigation Report incorporated the analytical and monitoring data from the original investigation so as to provide a single overall updated assessment of the site.

A brief overview of salient findings of the reports are presented below. For further information, the Reports should be referred to directly.

2.1 Former site use

The site comprised an irregularly shaped parcel of generally flat and level land within a former chalk quarry. With reference to the site topographical survey, ground levels were generally around 23.7m to 24.5m AOD, albeit with a slight rise to c. 25.75m AOD at the entrance with Portsdown Hill Road. The site extended to approximately 2.1Ha and was located at NGR 469690, 106430.

At the time of the original site walk over survey, June 2012, the site was occupied by two portal-framed buildings used as a bowling alley and DIY store. However, at the time of the supplementary investigation, February to March 2014, both business had closed down, with the DIY store comprising an empty building and the bowling alley undergoing final strip out of equipment.

External areas comprised tarmac covered car parking to the north-east of the buildings and a concrete covered service road and yard area to the south and west of the buildings. A marginal strip of scrub/soft landscaping was present along the western boundary of the site and an infestation of Japanese Knotweed was identified within this portion of the site. It was understood that the Japanese Knotweed had been sprayed with a targeted herbicide as part of an eradication plan. However, new growth was observed as shoots sprouting during the latter portion of the supplementary investigation period.

An electricity substation was present in a wooded area on the southern boundary to the rear of the DIY store. The substation remained live, both in terms of incoming feed to the site and outgoing supply to the two units. In addition, it was understood that the substation would be retained as part of the proposed development.

The north-western, south-eastern and southern boundaries were marked by near vertical chalk cliffs varying in height from approximately 2-3m up to 8-10m, remnants of the former use of the site as a chalk quarry. A chain-link fence was present along the toe (offset from the toe by c. 2-5m), presumably to act as a 'catch fence' for chalk which come free from the exposed face. In several areas, a debris slope formed by smaller fragments of chalk was present at the toe of the exposed face. In addition,

some areas of recent spalling/rock fall were observed at the time of the supplementary investigation. Vegetation was also present on the chalk faces and in some locations, roots were observed to be growing into the exposed chalk face.

The highest portion of exposed chalk face formed the site's northern boundary and it appeared that a bench step was present towards the toe of the exposed face.

The site was bounded to the north by Portsdown Hill Road; to the east by houses fronting on to Portsdown Hill Road; to the south by gardens and houses fronting on to Bedhampton Hill; and to the west by a vegetated slope falling c. 3-5m down to the A3(M). The site was accessed from Portsdown Hill Road.

2.2 Proposed site use

The proposed site use comprises the construction of a residential development incorporating houses, flats, gardens, communal soft landscaping and associated infrastructure. A total of 86 units are proposed to be built on the site.

It is anticipated that the development works will commence with the demolition of the existing buildings and hardstanding, concrete crushing, construction of estate roads and drainage prior to construction of buildings. Given that some of the houses require piled foundations, it is proposed to utilise site won crushed concrete in the construction of a working platform for the piling plant, as well as for other uses within then development of the site.

2.3 Conceptual Site Model

The conceptual site model (CSM) developed following the investigation works reported (as referenced in Section 2.0) identified particular hazards, or potential hazards which were considered to require intervention (remediation) to mitigate the risk of harm.

The investigation and CSM identified a requirement to protect end users from sporadic contamination within near surface Made Ground within some areas of the site. Whilst the remedial strategy varies for blocks of gardens, some form of risk mitigation is proposed for all gardens (including communal gardens). The CSM did not identify requirement for remedial action in relation to ground gas or controlled waters.

2.4 Approach for Remediation, Monitoring and Validation

The overall development strategy included for waste minimisation and as such, the remedial strategy was developed from a position of soils being left in-situ wherever possible. As such, remediation works are proposed to break the identified pollutant linkages, thereby mitigating the associated risk of harm to human health.

3.0 SOILS

The ground investigations identified the presence of concentrations of metals and Polyaromatic Hydrocarbon (PAH) in near surface Made Ground in several areas of the site which exceeded the site specific assessment criteria derived for the proposed development on this site. In addition, asbestos (chrysotile and amosite) was identified within near surface Made Ground in some areas of the site. It should be noted that the asbestos identified was entrained within the soil mass rather than as pockets of loose or easily friable material.

Refinement of the CSM and consideration of plot specific end use has been used to determine the scope of remedial action to be protective of human health. Where buildings and/or permanent hard cover are to be constructed, this would serve to block exposure pathways and thus break the pollutant linkages with end users. Thus, the area requiring remedial action would be focused on gardens and

soft landscaping where exposure to contaminated soils, whether through direct contact (e.g. dermal contact, soil particle ingestion or inhalation) or indirect contact (e.g. soil being tracked back into houses and subsequently inhaled).

3.1 Site Workers

It is the responsibility of the Principal Contractor and their appointed sub-contractors to implement and manage safe systems of work, prepare their own risk assessments in accordance with Health and Safety legislation in order to protect persons in their employ, as well as mitigate the risk of harm to others due to works in their control. Special consideration should be given to the provisions of the Construction (Design & Management) Regulations 2007, Health and Safety at Work Act and the Control of Substances Hazardous to Human Health regulations in order to protect the safety of persons in their employment. Additional guidance can be sought from the CIRIA publication entitled "A Guide for Safe Working on Contaminated Sites".

In addition to the safe systems of works to be implemented alongside appropriate risk assessments and method statements, all site personnel shall benefit from on-site hygiene facilities including wash area, toilets and drying room.

A separate canteen area will be provided. Smoking anywhere within this construction site is not permitted in line with UK legislation. All eating and drinking should be restricted to the canteen area and only once site personnel have removed outer PPE and washed exposed skin.

In the event of dry spells, or where the exposed surface becomes dry, the surface of the site will require to be regularly damped down to prevent the release of soil dust which could impact on site operatives or migrate off-site and thereby mitigate both off-site exposure and nuisance for neighbours.

3.2 End Users

On the basis of the soil contamination assessment set out in the Supplementary Ground Investigation Report, it is considered that risk mitigation measures will be required to protect human health. It was acknowledged within the report that whilst this could possibly be achieved by undertaking action on individual plots, this could lead to onerous site controls and an increased potential for failing to achieve the remedial objectives. As such, remedial measures are to be implemented for specific groups of gardens/areas of the site.

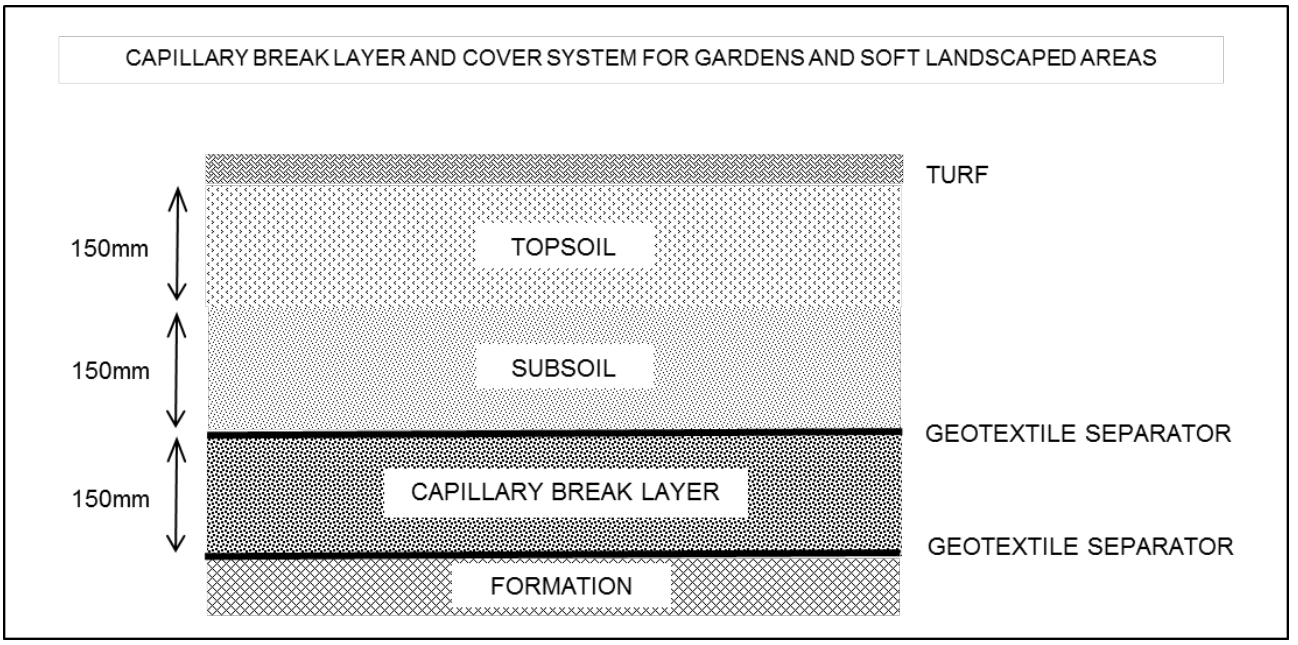
The contamination assessment did not identify any soil contamination within the overall footprints to Plots 1 to 16 or Plots 84-86. As such, the gardens to these plots are to be completed by placing imported subsoil and topsoil to a minimum thickness of 150mm for each soil type (i.e. minimum overall cover thickness of 300mm).

The following engineered cover system is to be implemented in the remaining gardens, i.e. Plots 17-46 and the amenity soft landscaping for Plots 50-83:

- Removal of hardstanding for off-site disposal or crushing (concrete) to reveal the top of the Made Ground;
- Lay a basal geotextile separator to prevent cover system mixing with Made Ground;
- Place 0.15m thick layer of crushed concrete to act as a capillary break layer and physical dig barrier;
- Lay a second geotextile separator over the crushed concrete to prevent infiltration by subsoil;
- Place subsoil (certified uncontaminated subsoil only) to a minimum thickness of 0.15m;
- Finish to ground level with certified uncontaminated (chemically and physically) Topsoil with a minimum thickness of 0.15m.

The depth of soil cover for both solutions may need to be increased where planting is proposed, e.g. for tree pits.

A schematic section through the engineered cover solution is shown below.



In the event that naturally occurring Chalk is encountered directly beneath the current hardcover, then placement of a clean soil cover solution (as described for Plots 1-16 and 84-86) would be appropriate.

Figure 2 shows the gardens and soft landscaping where the above measures should be applied.

Where a working platform is required, e.g. for piling, this could be retained to form the capillary break layer.

Where the end use comprises permanent hard cover, e.g. roads, parking and houses, this hard cover would serve to block exposure pathways and thus break the potential pollutant linkages. As such no further action would be required in hard landscaped areas.

Given the absence of Topsoil and subsoil on the site, it will be necessary to import Topsoil and subsoil on to the development. Prior to importation, the chemical, physical and nutritional suitability of all Topsoil and subsoil should be verified. Importation of topsoil or subsoil from unverified or unsuitable sources would require their removal from site and replacement with suitable materials. All topsoil and subsoil to be placed in gardens and soft landscaping must be able to support plant life. Materials such as aggregate are not suitable for use either as Topsoil or subsoil. As a matter of good practice, it is recommended that the location, approximate extent and thickness of any imported subsoil and/or topsoil are recorded and presented in the Validation/Verification Report to be prepared by the Environmental Consultant. A copy of the recommended specification for imported subsoil and topsoil is provided in Appendix A.

3.3 Soft Landscaping - Phytotoxicity

The ground investigations identified the presence of concentrations of copper and zinc which are considered phytotoxic. However, application of the cover systems as set out to protect human health, and deepened for tree pits if required, would also serve to protect plant life.

3.4 Built Environment

Whilst no specific remediation was required to protect the built environment, a requirement for barrier pipe was identified to protect drinking water supply pipes. This is subject to confirmation by the local water utility undertaker.

4.0 TREATMENT OF REDUNDANT SOAKAWAY CHAMBERS

4.1 Background

The existing development incorporates several soakaway chambers located beneath existing parking areas. These chambers were estimated to be between 3-4m in diameter and 4-6m deep. With reference to the ground investigation information, it is anticipated that each of these chambers terminates within intact Chalk, but with a substantial unsaturated zone, i.e. groundwater at least 5-10m below the base of the chambers. As part of the redevelopment of the site it will be necessary to disconnect these chambers from the current drainage system and then backfill each chamber.

At the time of writing, the preferred engineered solution is to place and compact suitable site won fill from the base to the top of each chamber, or cut-off level to suit construction. An alternative option of filling each chamber with only nominal compaction has also been considered but would require additional engineering/construction to mitigate possible settlement issues impacting the performance/serviceability of the development.

Whichever option is instigated, the fill used will be required to comply with physical and chemical suitability criteria. Given that chemical suitability criteria relate to the protection of controlled waters, verification of the fill materials and placement process used will be included within the validation of remediation and risk mitigation measures undertaken as part of the development on this site.

4.2 Specification

The backfilling process is to be undertaken in accordance with an Earthworks Specification developed in line with the Specification for Highway Works, 600 Series. A copy of the Earthworks Specification is presented in Appendix B and sets out requirements, scope and compliance criteria for preparation, backfilling and verification of the process.

At this stage, it is anticipated that site won crushed concrete will be used as the backfill materials, subject to meeting the relevant compliance criteria.

5.0 WASTE

5.1 Waste Classification and Segregation

The proposed development incorporates a waste minimisation strategy which extends to reusing surplus spoil, where suitable, and thus minimising the volume of soil to be removed from site. In line with the CL:AIRE Code of Practice on the ‘Definition of Waste’, it may be prudent to prepare a Materials Management plan and associated exemption assessment/declaration to be undertaken by a ‘Qualified Person’ as defined with the code of practice.

Waste Acceptance Criteria (WAC) testing was undertaken on selected samples of Made Ground. The tests indicate that a range of Inert to Hazardous Waste could be produced if surplus soils are not retained as part of the development. The Hazardous Waste threshold was exceeded in two samples (WS4 at 0.5m and WS154 at 1.5m) and only for Total Organic Carbon. Given the marginal exceedances and lower TOC values from other samples analysed, it is possible that the waste classification can be re-evaluated by the receiving/disposal site. If the soils at these locations are to remain undisturbed, then their classification becomes irrelevant as they do not comprise waste.

It is recommended that a materials management and handling plan is developed for the construction works on this site. This should include contingency plans in case asbestos is encountered during the development.

Other materials disposed of from site as part of the demolition or remediation process may require disposal separately. All excavated and/or surplus materials containing dangerous substances e.g. tar or bitumen, asbestos, mercury, hydrocarbons and PCBs are likely to be classified as Hazardous Waste and therefore susceptible to the relevant legislative controls.

Current Environment Agency guidance suggests that Inert waste soils and soils exempted from waste controls may be re-used on site where there is no risk of pollution, it is undertaken in accordance with a planning permission, suitable for that use without further treatment and that only the necessary quantity is used. Excess arisings may be placed within building voids or as engineering fill, where proven to be required and subject to geotechnical constraints in order to reduce the volume of materials disposed of. Materials exhibiting hydrocarbon contamination or strong odours will not be re-used on site but disposed of to a suitable waste treatment hub or landfill. However where re-use of materials is proposed on site, this should be supported by a materials management plan for the site under the CL:AIRE Definition of Waste Code of Practice.

6.0 EXCAVATION AND STOCKPILING OF MATERIAL

6.1 Excavation Process

In line with the proposed measures to protect human health, there are no specific proposals for the excavation of contaminated soils on this development. Nonetheless, some excavation works will be required as part of the construction of foundations, drainage and the like.

6.2 Stockpiling of Soils

All stockpiles of contaminated soil, where required shall be constructed no larger than 250m^3 and no higher than 1.8m. Stockpiles shall be placed on stable and level ground, with a perimeter bund overlain by a polythene liner for run-off control. The liner will extend across the full base area of the stockpile. The stockpile shall also be covered by a second polythene (or similar) sheet to prevent the ingress of rainfall into the stockpile and the emission of odours from the stockpile. This upper sheet shall be weighted down or otherwise secured to the stockpile.

Prior to placement of material the bund will be inspected to ensure that it is impermeable and as such will be sufficient to retain surface runoff during the period of storage. Should water be noted to be building up within the bund it will be pumped out of the bund and disposed of under the appropriate duty of care.

On completion of on-site remediation works and removal of the stockpiles, the bund and liner materials will be removed to enable development of this portion of the site to continue. At this stage, the exposed ground will be inspected to confirm/validate that no leakage occurred from the stockpile. Any such new impact would be dealt with under the Discovery Strategy set out in Section 6 of this report.

6.3 Confirmatory Sampling of Stockpiles

Materials placed in stockpiles will not be reused in gardens but could be retained on site, subject to waste exemption confirmation or they will be removed to an appropriately licensed disposal facility.

Where test results are not already available, stockpiled soils will be sampled for Waste Acceptance Criteria (WAC) analysis to determine whether the materials represent Inert, Non-Hazardous or Hazardous waste in order for them to be disposed of at an appropriate facility. In general, stockpile sampling shall be such that a minimum of 3 No. Samples shall be taken each of approximately 2kg weight for WAC analysis. Where stockpiles do not exceed 50m^3, a single sample may be taken.

Sampling shall be undertaken by Geo-Environmental's Site Representative in such a manner, as determined on site, in order that the sample is representative of the stockpile mass. Where possible this material will be sampled prior to excavation in order to allow for direct excavation to disposal from site without the need for a stockpile.

6.4 Validation Sampling from Excavations

Excavation of contaminated soil and validation of the reduced dig is not proposed as part of the remediation works on this site. However, if during development such measures are required, then for small areas a sample shall be taken from each face and two from the base, whilst for larger areas sampling shall be undertaken every 10m of exposed face and on a 10m grid across the excavation base. Sampling frequency may be varied by Geo-Environmental's Site Representative to account for variation in the soils exposed.

6.5 Backfilling

All gardens and soft landscaped areas will require backfilling in compliance with the measures set out in Section 3.2 of this report. All such measures will be subject to site inspection and laboratory analysis to verify compliance and suitability.

Subsoil and Topsoil shall not be imported to site without prior acceptance of provenance and chemical suitability. Import suitability criteria are presented in Appendix A. Where materials are to be imported on to the site for use as subsoil and Topsoil, these shall be derived from one of two sources, i.e. natural or processed. Where natural sourcing is proposed, the provenance of the material shall be determined by confirmation of the source site's history to confirm no previous potentially contaminative use, coupled with analysis of soils at a minimum rate of 3No. samples per source site (up to 250m^3) and 1 sample per 250m^3 thereafter. Where Topsoil or subsoil are derived from a manufactured source, testing would be undertaken at a rate of 1 sample per 50m^3. With regards to physical and nutritional composition and minimum testing regime of 1 sample per 250m^3 is recommended for either source.

Subsoil shall be placed with nominal compaction provided from excavator movement in garden and soft landscaped areas.

All subsoil and Topsoil imported on to the development shall comprise a loam type soil suitable for sustaining plant growth, as well as compliant with criteria for the protection of human health. Aggregates or soils with high stone content would not be considered suitable as subsoil or Topsoil.

7.0 DISCOVERY STRATEGY

The site has undergone a phased investigation and risk based assessment and as such it is considered unlikely that undetected gross contamination would be encountered during the process of clearance and construction. However in line with best practice, a discovery strategy shall be set in place for the duration of the development. Where appropriate and necessary the Remediation Method Statement will be updated accordingly. Details of any works required under the discovery strategy will be documented in the Validation Report.

Examples may include oily pockets within the soil, brick concrete, charcoal, clinker, metal glass and wood or soils exhibiting strong odours.

Should previously undiscovered contamination be encountered during construction, this should be reported to the Site Manager immediately in order that any necessary inspection may be made.

A watching brief approach is to be adopted during the various phases of the site's development such that in the event of suspicious conditions or materials being encountered, the Environmental Consultant can attend site to inspect the 'discovery'.

Records should be kept and samples submitted for analysis where conditions encountered are not as anticipated. The results of any such testing should be sent to the Local Authority for consultation.

Depending on the type, nature and extent of any such 'discovery', it may be necessary to halt works in that location until such time as the assessment has been completed. This should be reviewed on a 'discovery' specific basis and in conjunction with regulatory consultation.

As a general guide, where such unexpected conditions are encountered the following approach is recommended:

- All discoveries are to be reported to the Site Manager immediately and works at that location are to halt until further notice;
- The Site Manager is to report any such discoveries to the Client and the Environmental Consultant;
- Following notification from the Site Manager, the Environmental Consultant shall discuss the discovery with the Local Authority and if considered necessary, arrange to meet an Officer on site to view the discovery;
- The Environmental Consultant shall attend the site to record the location, extent and nature of the discovery and implement an appropriate sampling and analysis regime, taking due account of the type and nature of the discovery, known and probable land uses in that area of the site;
- Where remedial action is required, regulatory consultation and approval will be sought;
- A record will be produced by the Environmental Consultant and held on site (with copies held by the Environmental Consultant, Client and Local Authority), detailing the discovery, assessment works undertaken, findings thereof, confirmation either of no action required or detailing the remedial action taken and validation thereof.

The process is shown below.

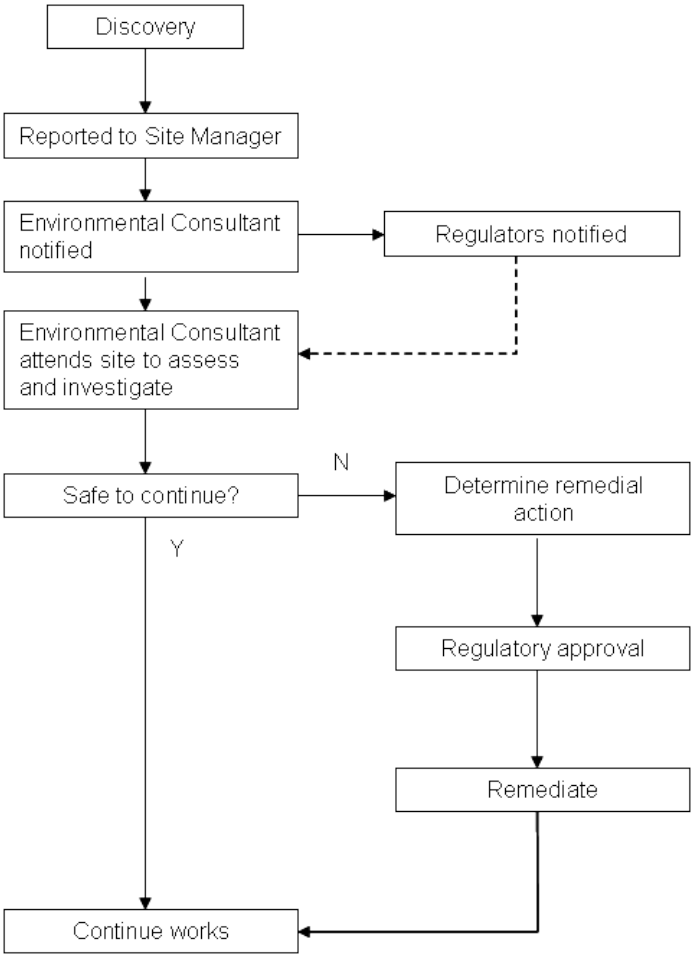


Chart 1 Discovery Strategy Process

A copy of the discovery strategy will be lodged on site and provisions made to ensure that all workers are made aware of their responsibility to observe, report and act on any potentially suspicious or contaminated materials they may encounter.

8.0 VALIDATION

On completion of the main ground works phase of the development, a Validation Report will be prepared for the remedial works undertaken. The report will be submitted to the Client in the first instance for forwarding to the Local Authority and NHBC in pursuance of satisfying relevant conditions as set out in Section 1.3

Given that the final phase of validation relates to the placement of subsoil and topsoil in gardens, this would follow the build out of the site and thus validation of the final stages of the risk mitigation measures would be reported either for individual plots, or for groups of plots as and when they are nearing completion. As such, it is anticipated that staged or managed discharge of relevant pre-occupation conditions would be required by the Local Planning Authority and NHBC.

The Validation Report will refer to the works as set out within the RMS and include relevant site based information such as records from site inspections, photographs of specific remedial or waste handling measures, material datasheets, QA certification (where relevant) and an audit trail for imported subsoil and topsoil, such as source, provenance, analytical results, placement location and thickness.

In addition the validation report will include, but not be limited to, the following:

- Details and records of the reduced dig operation to expose the Made Ground soils in soft landscaped areas.
- Placement of the capillary break layer (where required).
- Placement of subsoil and topsoil cover in gardens and soft landscaping.
- Details on potable water supply pipe protection measures (awaiting confirmation from utility undertaker).
- The location and results for validation samples collected from the base and sides of excavations and submitted for laboratory analysis (if required, e.g. following a discovery).
- The location and results of bulk samples taken from stockpiled material to identify the materials suitability for re-use/disposal.

The remedial works will be inspected and validated by the Environmental Consultant (Geo-Environmental).

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FIGURES

Project:	Havant Retail Park, Portsdown Hill Road PO9 3NA			**Title**	Site Location Plan
Client:	Linden Homes Southern Limited			**Geo-Environmental Services Ltd** **Unit 7 Danworth Farm, Cuckfield Road** **Hurstpierpoint, West Sussex BN6 9GL** **01273 832972 www.gesl.net**	Geo-Environmental
Ref No:	GE9752	**Revision:**	0		
Drawn:	GR	**Date:**	07/05/2014		
Figure:	1	**Scale:**	Not To Scale		

NOTE:

Crushed concrete capillary break layer and clean soil cover

Soil cover

Depth of soil cover in tree pits and amenity landscaping are to be determined by the Landscape Architect

Project:	Havant Retail Park, Portsdown Hill Road PO9 3NA			**Title**	Remediation Plan
Client:	Linden Homes Southern Limited			**Geo-Environmental Services Ltd** **Unit 7 Danworth Farm, Cuckfield Road** **Hurstpierpoint, West Sussex BN6 9GL** **01273 832972 www.gesl.net**	Geo-Environmental
Ref No:	GE9752	**Revision:**	0		
Drawn:	GR	**Date:**	07/05/2014		
Figure:	2	**Scale:**	Not To Scale		

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APPENDIX A

Imported Soil Specification

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IMPORTED SOIL SPECIFICATION

For

HAVANT RETAIL PARK, PO9 3NA

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1.0 Introduction

This documents sets out the requirements for cover systems and imported materials for any project undergoing redevelopment or other works where capping work is required.

Within the specification reference has been made to topsoil and subsoil. Topsoil relates to the top layer of natural soil that can support healthy vegetation growth. Subsoil relates to the layer of soil immediately below the topsoil to the depth of the underlying broken rock or geological parent material.

The specification considers the chemical, nutritional and physical properties of soils that are to be imported onto site, in order to ensure materials used are suitable for their intended use and do not introduce any new hazard or pollutant linkage on to the site.

2.0 Chemical Composition

The chemical criteria listed below are based on published CLEA Soil Guideline Values (SGVs), generic assessment criteria calculated using UK policy compliant software or by reference to current guidance and best practice. From time to time these values may change in line with regulatory or UK policy changes. Such changes will require revision and re-issue of this document.

At the time of preparation, where SGVs have not been published, generic assessment criteria (GAC) published in 2009 by the Chartered Institute of Environmental Health and Land Quality Management have been used. Where SGVs or GAC are published for a range of Soil Organic Matter (SOM) values, these ranges and their respective SOM values have been presented and would be considered when assessing compliance with this Specification.

2.1 Method of Analysis

Samples should be analysed using UKAS or MCERTS accredited laboratories. For TPH analysis sample preparation must not include air drying.

2.1.1 Poly Aromatic Hydrocarbon (PAH)

The PAH analysis must include the EPA priority 16.

2.1.2 Total Petroleum Hydrocarbons (TPH)

The analysis for TPH should be undertaken on the ‘as received’ sample and not be subject to any pre-treatment and include aliphatic and aromatic carbon banding split.

2.2 Topsoil (0-300mm depth)

Table 1 provides a list of the maximum acceptable concentrations for imported topsoil.

Parameter	Maximum concentration (mg/kg)
Inorganic	
Arsenic (total)	<32
Boron (water soluble)	<291
Cadmium (total)	10 (SOM=6%)
Chromium (total)	<130
Copper (total)	<2330
Cyanide (total)	<250
Lead (total)	<450
Mercury (total inorganic)	<8
Nickel (total)	<130 (SOM=6%)
pH	5.5 – 7.8
Selenium (total)	<350 (SOM=6%)
Sulphate (total)	<2000
Zinc (total)	<3750
Organic	
Soil Organic Matter (SOM)	
Phenols (total)	<420 (SOM=6%)
Poly Aromatic Hydrocarbon (speciated)	See Table 1a
Total Petroleum Hydrocarbon (speciated)	See Table 1b

Table 1: Chemical Specification for Topsoil

	Maximum Concentration (mg/kg)		
	1% SOM	**2.5% SOM**	**5% SOM**
Acenaphthene	210	480	1000
Acenaphthylene	170	400	850
Anthracene	2300	4900	9200
Benz(a)anthracene	3.1	4.7	5.9
Benzo(a)pyrene	0.83	0.94	1.0
Benzo(b)fluoranthene	5.6	6.5	7.0
Benzo(ghi)perylene	44	46	47
Benzo(k)fluoranthene	8.5	9.6	10
Chrysene	6.0	8.0	9.3
Dibenz(ah)anthracene	0.76	0.86	0.9
Fluoranthene	260	460	670
Fluorene	160	380	780
Indeno(1,2,3CD)pyrene	3.2	3.9	4.2
Naphthalene	1.5	3.7	8.7
Phenanthrene	92	200	380
Pyrene	560	1000	1600

Table 1a: Topsoil Specification for Speciated PAH

	Maximum Concentration (mg/kg)		
	1% SOM	**2.5% SOM**	**5% SOM**
Aliphatic			
EC 5-6	30	55	110
EC >6-8	73	160	370
EC >8-10	19	46	110
EC >10-12	93	230	540
EC >12-16	740	1700	3000
EC >16-35	45000	64000	76000
EC >35-44	45000	64000	76000
Aromatic			
EC 5-7 (benzene)	65	130	280
EC >7-8 (toluene)	120	270	611
EC >8-10	27	65	151
EC >10-12	69	160	346
EC >12-16	140	310	593
EC >16-21	250	480	770
EC >21-35	890	1100	1230
EC >35-44	890	1100	1230
Aliphatic and Aromatic			
EC >44-70	1200	1300	1300

Table 1b: Topsoil Specification for Speciated TPH

2.3 Subsoil (300-1000mm depth)

Table 2 provides a list of the maximum acceptable concentrations for imported subsoil.

Parameter	**Maximum concentration (mg/kg)**
Inorganic	
Arsenic (total)	<32
Boron (water soluble)	<291
Cadmium (total)	10 (SOM=6%)
Chromium (total)	<130
Copper (total)	<2330
Cyanide (total)	<250
Lead (total)	<450
Mercury (total inorganic)	<8
Nickel (total)	<130 (SOM=6%)
pH	5.5 – 7.8
Selenium (total)	<350 (SOM=6%)
Sulphate (total)	<2000
Zinc (total)	<3750
Organic	
Soil Organic Matter (SOM)	
Phenols (total)	<420 (SOM=6%)
Poly Aromatic Hydrocarbon (speciated)	See Table 1a
Total Petroleum Hydrocarbon (speciated)	See Table 1b

Table 2: Chemical Specification for Subsoil

	Maximum Concentration (mg/kg)		
	1% SOM	**2.5% SOM**	**5% SOM**
Acenaphthene	210	480	1000
Acenaphthylene	170	400	850
Anthracene	2300	4900	9200
Benz(a)anthracene	3.1	4.7	5.9
Benzo(a)pyrene	0.83	0.94	1.0
Benzo(b)fluoranthene	5.6	6.5	7.0
Benzo(ghi)perylene	44	46	47
Benzo(k)fluoranthene	8.5	9.6	10
Chrysene	6.0	8.0	9.3
Dibenz(ah)anthracene	0.76	0.86	0.9
Fluoranthene	260	460	670
Fluorene	160	380	780
Indeno(1,2,3CD)pyrene	3.2	3.9	4.2
Naphthalene	1.5	3.7	8.7
Phenanthrene	92	200	380
Pyrene	560	1000	1600

Table 2a: Subsoil Specification for Speciated PAH

	Maximum Concentration (mg/kg)		
	1% SOM	**2.5% SOM**	**5% SOM**
Aliphatic			
EC 5-6	30	55	110
EC >6-8	73	160	370
EC >8-10	19	46	110
EC >10-12	93	230	540
EC >12-16	740	1700	3000
EC >16-35	45000	64000	76000
EC >35-44	45000	64000	76000
Aromatic			
EC 5-7 (benzene)	65	130	280
EC >7-8 (toluene)	120	270	611
EC >8-10	27	65	151
EC >10-12	69	160	346
EC >12-16	140	310	593
EC >16-21	250	480	770
EC >21-35	890	1100	1230
EC >35-44	890	1100	1230
Aliphatic and Aromatic			
EC >44-70	1200	1300	1300

Table 2b: Subsoil Specification for Speciated TPH

3.0 Nutritional Composition

The nutritional criteria listed below are based on BS 3882:2007 Specification for Topsoil. In the absence of published criteria, current guidance and best practice has been applied to derive appropriate criteria.

3.1 Topsoil & Subsoil

Table 3 details the minimum acceptable concentrations for imported topsoil and subsoil.

Topsoil/Subsoil	Parameter	Min Concentration
Topsoil	Phosphorous	16 mg/l
	Potassium	120 mg/l
	Magnesium	51 mg/l
	Nitrogen	0.15 %
Subsoil	Phosphorous	16 mg/l
	Potassium	120 mg/l
	Magnesium	51 mg/l
	Nitrogen	0.15 %

Table 3: Nutritional Specification for Topsoil and Subsoil

4.0 Physical Composition

The physical criteria listed below are based on BS 3882:1994 Specification for Topsoil. In the absence of published criteria, current guidance and best practice has been applied to derive appropriate criteria.

4.1 Topsoil

Table 4 details requirements for imported topsoil and subsoil.

Topsoil/Subsoil	Parameter	Specification requirements
Topsoil	Textural Classification	Sandy clay loam, sandy loam, loamy sand, sandy silt loam (as defined in BS 3882, Figure 1)
	Loss on Ignition	5-50%
	Maximum Stone content:	>2mm = 30% >20mm= 10% >50mm= 0%
Subsoil	Textural Classification	N/A
	Loss on Ignition	2-50%
	Maximum Stone content:	>2mm = 65% >20mm= 60% >50mm= 40%

NOTE: Topsoil and Subsoil must be free from glass, brick fragments etc and suitable as a growing medium for plants.

Table 4: Physical Specification for Topsoil & Subsoil

5.0 Source Requirements

5.1 Topsoil and Subsoil

The following will be provided with all soils imported to site:

- Location of site which is clean and has no history of potentially contaminative uses.
- A site plan detailing the location and address of the source site.

5.2 Manufactured soils

Where natural soils are unavailable manufactured soils may be utilised the following should be provided:

- Details of the soil manufacturing process, including criteria for received soils, quality control procedure and validation protocol.
- Soils should be tested at a minimum ratio of one sample per 50m^3.

6.0 Testing Rates and Compliance

6.1 Topsoil

Where natural sourcing is proposed, the provenance of the material shall be determined by confirmation of the source site's history to confirm no previous potentially contaminative use, coupled with analysis of soils at a minimum rate of 3No. samples per source site (up to 250m^3) and 1 sample per 250m^3 thereafter.

Where Topsoil is derived from a manufactured source, testing would be undertaken at a rate of 1 sample per 50m^3.

With regards to physical and nutritional composition and minimum testing regime of 1 sample per 250m^3 is recommended for either source.

6.2 Subsoil

Where the source of the material is known and a due diligence review has established no previous contaminative use associated with the proposed subsoil, validation sampling should be undertaken at a minimum rate of 3 sample per source (up to 250m^3) and 1 sample per 250m^3 thereafter.

Where the source of the material is not known the validation sampling should be undertaken at a minimum of 1 sample per 50m^3.

6.3 Manufactured soils

Soils should be tested at a minimum ratio of one sample per 50m^3.

6.4 Sample failure

In the event that a sample fails to meet the specified criteria for any parameter the Environmental Consultant should be contacted for advice on the suitability of the materials.

Further testing may be required to provide reassurance that the exceedances are not representative of the soil.

6.5 Timing

Sampling and analysis undertaken by a manufactured topsoil supplier shall be no earlier than two weeks from the date of import, any results which are older than two weeks will be deemed not to be representative of the soils to be imported and rejected.

Imported Soil Suppliers and Groundworks Contractors are required to take reasonably practicable measures to ensure that compliance with this Specification does not hinder formal completion of individual plots or developments.

6.6 General Compliance

All analytical suites shall correspond with the chemical and nutritional compliance criteria (as set out in Tables 1 to 3). The soil supplier shall ensure that the analytical limits of detection are equal or lower than the compliance values presented within this Specification. Where either testing suites or limits of detection do not comply with this Specification, the entire set of results shall be rejected.

Geo-Environmental

APPENDIX B

Specification for backfilling soakaway chambers

EARTHWORKS SPECIFICATION FOR BACKFILLING OF SOAKAWAY CHAMBERS

All materials and workmanship for private (non-adopted) earthworks shall be in accordance with Series 600 of the Specification for Highway Works (SHW).

All materials and workmanship for earthworks to be adopted as part of Road Adoption Agreements shall be in accordance the relevant Adopting Authorities' guidelines.

The Contractor will be deemed to be fully conversant with these documents and to possess his own copies.

1.0 General

1.1 The classification and compaction requirements of acceptable earthworks materials is defined in Tables 6/1 and 6/4 of Volume 1 of the Specification for Highway Works, 600 Series Earthworks. The grading requirements are given in Table 6/2 of Specification for Highways Works, 600 Series Earthworks.

1.2 The testing frequencies, physical acceptability criteria for each class of material and chemical compliance criteria are defined in Appendix 1/5; Appendix 6/1, Table 6/1; and Appendix 6/14, respectively, of this Specification.

1.3 The Contractor shall be responsible for all materials testing and shall provide copies of all results to the Engineer for verification of material acceptability in accordance with the Specification.

1.4 Prior to undertaking any clearance or enabling works to prepare the soakaway chambers for backfilling, the Contractor shall install suitable edge protection to secure the area and prevent falls or unauthorised access to the working area. The Contractor shall be solely responsible for the safety of all excavations and for the sufficiency of all temporary supports thereto.

1.5 Given the depth of the soakaway chambers, they shall be comprise Confined Spaces and all operations shall be undertaken in such a manner as to avoid any requirement for personnel to enter, or work within the chambers.

2.0 Classification of Earthworks Materials

2.1 The classification and confirmation of acceptability of earthworks materials shall be carried out by the Contractor at the point of stockpiling for on-site materials and in the event of fill being imported, at the source site prior to importation. The testing required is listed in Appendix 1/5.

3.0 Unacceptable Material

3.1 Unacceptable materials include:

- all soils won from excavation of Made Ground;
- tarmac and other bituminous rich materials;
- material susceptible to spontaneous combustion;
- material having hazardous chemical or physical properties requiring special measures for its excavation, handling, storage, transportation, deposition and disposal;
- organic material of any nature
- materials in a frozen condition;
- all clay soils.

3.2 Where earthworks materials fail the relevant Acceptability Criteria for earthworks fill, i.e. U1A materials, the Contractor may consider treatment of U1A materials to render them suitable as earthworks material. Any such treatment would be subject to further verification testing to confirm acceptability and will require prior consultation with and agreement from the Engineer. The testing rate in such circumstances may be varied by the Engineer to provide greater confidence in the material's acceptability.

3.3 The site is located on brownfield land with sporadic contamination within Made Ground. As such, Made Ground is not suitable for use as earthworks fill to backfill soakaway chambers.

3.4 The Contractor will be required to determine the chemical suitability of the earthworks fill materials with respect to potential soil based contaminants.

3.5 Acceptability Criteria for the potential contaminant suite to be analysed are appended to this Specification.

3.6 Materials having chemical concentrations exceeding the relevant Acceptability Criteria shall be Class U2 and shall be disposed of by the Contractor in accordance with the Specification and relevant legislation to a suitably licensed facility.

3.7 Notwithstanding the results of any testing, bituminous bound materials, including tarmac, asphalt and the like shall be U2 and shall not be incorporated into the fills materials to be used for backfilling soakaway chambers.

3.8 If an authorised formation or material deposited as fill subsequently deteriorates due to inclement weather (or for any other reason) such that it would be reclassified as unacceptable and cannot be compacted in accordance with the Contract, the Contractor shall, at his own expense, either:

i) Cease work on the material until its condition is such that it can again be classified as acceptable.

ii) Make good by removing and disposing of the unacceptable material and replacing it with acceptable material.

4.0 Material Stockpiles

4.1 The earthworks could produce the following types of material stockpiles:

- Earthworks material excavated and awaiting use as earthworks fill on the scheme.
- Other Class U1 material stockpiled awaiting processing and/or treatment at locations to be agreed with the Client and the Engineer.
- Material awaiting off-site disposal as U2.

4.2 With regards to earthworks material, the soils are to be excavated from areas of the development and to depths as directed by the Developer.

4.3 The Contractor shall take all reasonable measures to ensure that stockpiled soils remain free from pernicious weeds. Where any such measures include the spraying or otherwise application of herbicides, the Contractor shall, prior to commencement, demonstrate to the Developer and their appointed representative(s) that any such herbicides are suitable for use and will not harm the wider environment. Where any licences are required for the application of herbicides, the Contractor shall provide evidence of their current and valid licence for the proposed works.

5.0 Groundwater

5.1 The Contractor shall allow and be responsible for the control of water (including groundwater, perched water and rainfall run-off) in all temporary excavations and in all temporary situations during the course of the works. Pumping water into existing drainage systems, sewers or the like shall only be permitted on provision of a detailed method statement and following approval from the relevant regulatory authorities. Formal evidence of such approval shall be provided to the Client prior to any pumping commencing.

5.2 The Contractor shall take all necessary measures to prevent any surface runoff from the construction works flowing directly into any drainage system, either existing or proposed, on the site. The Contractor shall provide measures to channel surface water runoff to specific discharge points where silt traps, screens and any other measures deemed necessary will be employed to prevent any excessive clouding of the drainage system.

5.3 Where water and/or sludge is present within the soakaway chamber, the Contractor shall arrange for the fluids to be pumped out. Any drainage connections into the chambers shall then be 'stopped up' or otherwise severed.

5.4 Any sludge or solid matter remaining in the chamber(s) shall be removed by the Contractor prior to commencing the backfilling operation.

5.5 Where earthworks have been adversely affected by the ingress of water, these works shall be removed and made good at the Contractor's expense.

6.0 Excavation

6.1 Excavation shall be carried out to the lengths, widths and depths as necessary, in accordance with the specification and drawings or to such other dimensions as may be instructed.

6.2 Any large obstructions or unexpected findings discovered during excavation shall be reported immediately to the Engineer.

6.3 Existing surface covering is to be excavated and removed to stockpiles for re-use or disposal depending on suitability. The top slab to the soakaway chamber shall then be removed for processing, crushing or other suitable treatment for material re-use.

6.4 If the chamber sides are damaged or otherwise result in unstable ground, the Contractor shall provide temporary excavation support or batter back excavation sides. The Contractor is to determine their own safe methods of temporary support and where necessary, shall excavate out any loose material.

6.5 Where areas of unsuitable ground are found at the bottom of excavations the Contractor shall excavate to such further depth as may be required. Such extra depth shall be filled with acceptable earthworks fill materials as required by the Engineer.

6.6 Following completion of the excavation, particular care must be taken to avoid deterioration of the excavated surface. The Contractor shall be responsible for protecting the excavations against damage.

7.0 Backfilling and Compaction

7.1 Earthworks fill material to be used as backfill for the soakaway chambers shall comprise SHW Class 1A General Granular Fill, or similar approved, as defined in SHW Series 600. Fill shall be

deposited and compacted in accordance with Clause 612 and Tables 6/1 and 6/4 of SHW Series 600.

7.2 Site won crushed concrete shall be considered suitable for use as Class 1A fill providing that it meets the grading requirements as set out in Table 6/2 of SHW Series 600 and any other compliance criteria as set out within this Specification.

7.3 The layer ('lift') thickness of fill and number of passes of the compaction plant shall be determined in accordance with Table 6/4, Method 2 of SHW Series 600. These values are dependent on the type and weight of plant used.

7.4 All compaction plant shall be remotely operated from ground level and shall be placed into and removed from the chambers using suitable lifting equipment compliant both with manufacturer's guidance and relevant legalisation, e.g. LOLER.

7.5 Base and fill levels shall be determined by measurement from ground level.

7.6 Unless stated to the contrary in Table 6/1, compaction of the fill shall be by Method Compaction.

7.7 A Nuclear Density Gauge (NDG) is permitted for use to measure bulk densities on site provided that it is calibrated, well maintained and shown to be suitable, to the Engineer's satisfaction for each of the materials being tested. However, for the determination of moisture content and hence the dry density, correlation against the 'oven dried' moisture content is required for each material type encountered.

7.8 The Contractor shall undertake a trial placement and compaction exercise at ground level using material representative of the general fill material to be used. The material shall be tested and classified in accordance with SHW to determine the optimum method of compaction. Post compaction testing, e.g. NDG, CBR or similar approved, shall be used to verify that the compaction methodology will achieve the required degree of compaction. These works shall be undertaken by the Contractor with the Engineer in attendance.

7.9 Further testing will be required during the course of the filling operation to check the material classification and, therefore, the method of compaction. The Contractor shall be responsible for undertaking such tests on a regular basis and at a minimum frequency of 1 test per 50m^3 for each source/type of fill material. Where a single source of fill material is to be used and is shown through testing to be consistent in meeting compliance criteria, then the Engineer shall consider relaxing the testing frequency.

7.10 A starter layer of earthworks fill material shall be placed, into the base of the chamber, from an excavator bucket and to a thickness of 150mm and compacted to form a level base from which to backfill.

7.11 Earthworks fill shall then be placed from a bucket to achieve the required lift thickness for the compaction plant being used.

7.12 The fill material shall be spread and compacted evenly over the full area, which requires filling.

7.13 Compaction shall be applied in accordance with SHW Table 6/4, Method 2 to each lift.

7.14 Fill shall continue to be placed and compacted until such time as the completion/formation level for that given location is achieved. The completion/formation level shall vary depending on location on site and end use, e.g. building footprint, foundation, road/parking, soft landscaping. Reference should be made to the relevant Engineer's drawings for confirmation of the completion/formation level at each location.

7.15 Filling shall be carried out by the Contractor in such a way as to avoid disturbance and/or damage to the Works, the surrounding ground, existing roads, pavements, buildings and services, etc. on and/or adjoining the site.

7.16 The classification and confirmation of acceptability of the earthworks materials shall be carried out by the Contractor at a UKAS accredited testing laboratory. The material properties required for acceptability, in addition to Table 6/1 of the SHW, will be finalised by the Engineer upon receipt of further material classification and moisture content results from the laboratory.

7.17 If the material alters in classification or becomes unacceptable for whatever reason during the course of the filling operations, the Contractor will be required to repeat the classification and acceptability tests.

7.18 The Contractor shall be responsible for removing from site any unacceptable material to licensed facilities and shall provide copies of Waste Transfer Notes to the Client and Engineer.

8.0 Alternative placement without compaction

8.1 In the event that the Client and Engineer agree that compaction is not required, and notify the Contractor formally of such agreement, the Contractor shall be permitted to place the earthworks fill material in to the soakaway chamber using a bucket with nominal compaction applied from the excavator bucket.

8.2 In order to minimise the potential for dust generation, end tipping shall not be permitted unless otherwise formally agreed by the Client.

8.3 Fill materials that have not been compacted to a specification and/or achieved compliance criteria are susceptible to some degree of settlement. As such, if backfill is not compacted, then the Contractor shall be required to excavate the upper metre of ground, or deeper if directed by the Engineer, and to a distance no less than 1m beyond the chamber edge. The Contractor shall then construct a reinforced concrete cap in accordance with en approved engineer design.

8.4 Following construction of a reinforced cap, ground level could be reinstated by placement and compaction of suitable earthworks fill or other approved surface treatment depending on end use.

APPENDIX 1/5 TESTING TO BE CARRIED OUT BY THE CONTRACTOR

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
601 631 640 644	Class 1A General Cohesive Material	Grading	1 per 50m^3 per fill source	Required	See SHW Table 6/2
		mc	1 per 50m^3 per fill source	Required	See Appendix 6/1, Table 6/1 for Limits of Acceptability
		Compaction (OMC and max dry density)	1 per 50m^3 per fill source	Required	
		CBR	1 per 50m^3 per fill source	Required	
		Chemical analysis	1 per 50m^3 per fill source	Required	See Appendix 6/15 for Limits of Acceptability

NOTE: All testing to be undertaken in accordance with relevant SHW Clauses, British Standards and in accordance with UKAS accreditation. Chemical analysis on soil samples is to be in accordance with MCERTs accreditation.

APPENDIX 6/1EARTHWORKS MATERIALS CLASSIFICATION

Table 6/1: Acceptable Earthworks Materials: Classification and Compaction Requirements

Class			General Material Description	Typical Use	Permitted Constituents (All subject to requirements of Clause 601 and Appendix 6/1)	Material properties required for Acceptability (In addition to Requirements on Use of Fill Materials in Clause 601 and Testing in Clause 631)				Compaction Requirements in Clause 612	Class		
						Property (See Exceptions in Previous Column)	Defined & Tested in Accordance With:	Acceptable Limits Within:					
								Lower	Upper				
1	A	-	Well graded granular material	General Fill	Any material or combination of materials, other than chalk or others unsuitable materials as defined in the Specification	(i) grading	BS 1377: Part 2	Tab 6/2	Tab 6/2	Tab 6/4 Method 2	1	A	-
						(ii) mc	BS 1377: Part 2	OMC – 2%	OMC + 2%				
						(iii) Maximum dry density (4.5kg hammer)	BS 1377: Part 4	TBC	TBC				
						(iv) CBR	BS 1377: Parts 4 & 9	5	15				

Footnotes to Table 6/1

1. App = Appendix
2. Tab = Table
3. Where BS 1377: Part 2 is specified for mc, this shall mean BS 1377: Part 2 or BS EN1097-5 as appropriate.
4. Where BS1377: Part 4, or Part 9 are referred to, this shall mean BS1377:Parts 4 or 9, or BS EN1997-2 as appropriate.
5. The limiting values of Class U1B material are given in Appendix 6/14

APPENDIX 6/14 LIMITING VALUES FOR POLLUTION OF CONTROLLED WATERS

The Contractor shall undertake leachability tests on the determinant list as set out in Schedule A and the limits of detection shall, as a minimum, be no greater than the respective maximum compliance concentration. Testing rates are set out in Appendix 1/5.

The Contractor shall advise the Engineer in the Contractor's sampling and testing method statement on the methods for sampling, containment, storage, transit, scheduling, testing and reporting. All testing shall be undertaken in accordance with UKAS accreditation.

Contaminant	**Compliance value (µg/l)**
Arsenic	10
Boron	1000
Cadmium	5
Chromium (Total)	50
Copper	2000
Lead	10
Mercury	1
Nickel	20
Selenium	10
TPH	10
PAH [2]	0.1
Benzo(a)pyrene	0.01
Sulphate	250,000
pH	6.5 – 9.5
Hardness [3]	-

Appendix 6/14
Schedule A Chemical Acceptability Criteria for Controlled Waters

NOTES:
1. Compliance criteria are derived from the EU Drinking Water Directive
2. PAH is the sum concentration of benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(ghi)perylene and indeno(1,2,3-cd)pyrene
3. Water quality indicators for which no specific acceptability criteria are set.