



Geo-Environmental

REMEDIATION STRATEGY & VERIFICATION PLAN

for the land at

MANOR FARM, LOWER ROAD,

BEDHAMPTON

on behalf of

BARGATE HOMES





Remediation Strategy & Verification Plan

Report:	REMEDATION STRATEGY & VERIFICATION PLAN
Site:	MANOR FARM, LOWER ROAD, BEDHAMPTON
Client:	BARGATE HOMES
Date:	13/08/2021
Reference:	GE20525-RSVP-AUG21
Version:	1.0
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AMENDMENT RECORD

Revision ref.	Date	Reasons for amendment	Author	Reviewed By	Authorised by
1.0	13/08/2021	First issue	JG	GR	FG

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1.0 INTRODUCTION

1.1 General

Following a combined Phase I Desk Study and Phase II assessment of the site undertaken by Geo-Environmental Services Limited ('Geo-Environmental'), detailed within report listed below, Geo-Environmental was appointed by Bargate Homes ('the Client') to formulate a Remediation Strategy and Verification Plan in relation to the proposed development on land at Manor Farm, Lower Road, Bedhampton herein referred to as 'the site' (see Figure 1).

The site has been the subject to a combined Phase I Desktop Study and Phase II intrusive investigation works undertaken and reported within the Ground Appraisal Report by Geo-Environmental (GE16507-GAR-NOV17, November 2017).

The remedial strategy and verification plan has been developed to reflect the findings from all phases of the assessments undertaken on this site and revisions to the development layout as now set in the planning process. Based on the findings of the investigations and updated development layout, it is considered that remedial action would be required with respect to soil contamination identified within the existing farm track.

1.2 Objectives

The Remediation Strategy & Verification Plan (RSVP) sets out the proposed remedial works to be undertaken on the subject site to support its development for a proposed residential end use with private gardens and communal open spaces.

1.3 Planning

The proposed development is understood to have been subject to appeal through the planning process with the appeal decision recorded as 'Allowed' dated 13th July 2021 by Havant Borough Council. The planning application ref. is APP/19/00427 and appeal reference W/20/3259067. A search of the LPA's planning portal has not identified a specific planning condition relating to contaminated land under this decision notice, or previous decisions prior to appeal. Nonetheless, a formal and structured approach following common contaminated land conditions is considered prudent and has been assumed in the formulation of this document.



2.0 BACKGROUND

This Remediation Strategy & Verification Plan (RSVP) has been developed from the findings of the various phases of assessment and consideration of the updated development layout.

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

2.1 Overview

Historic mapping from 1868 showed that the site to have comprised an open field, part of a larger field which extended to the east and west. A track was shown to cross the site from north to south and a railway line in a cutting was shown on the site's southern boundary. The site was not noted to have changed significantly over the period for which mapping was reviewed.

The surrounding land usage was primarily agricultural land usage. Other land uses distant from the site included chalk pits, a mill, sewage works and a retail park. Two tanks which were noted to the west and northwest, were believed to be associated with agricultural uses. Residential development occurred to the north of the site and was noted to extend significantly over the mapping period reviewed.

The ground conditions encountered during the intrusive investigation works comprised a mantle of topsoil overlying soils inferred to be clay and sand of the superficial River Terrace Deposits, overlying a bedrock of Chalk. Made Ground was found in one location associated with the extant track.

Made Ground was encountered within one exploratory hole (WS4). The Made Ground was encountered to a depth of 0.9m bgl in WS4 and comprised grey and white silty sand and brown clay with gravel of flint and brick.

Groundwater was not encountered during the investigation. Monitoring wells were installed within WS1, WS2, WS3, WS4, WS5 and WS6 and groundwater was encountered during the return monitoring visits undertaken between 19th October 2017 and 2nd November 2017, between 3.14m bgl and wells being recorded as dry.

The exploratory holes were located to provide general coverage of the site area, the results of the sample analysis were compared to the Tier 1 screening criteria, where available. The Tier 1 contamination assessment identified one location (WS4) where reported concentrations of several PAH compounds were elevated or exceeded the Tier 1 screening criteria within the shallow soils (Made Ground) beneath the track.

In addition, the samples submitted for laboratory testing were also screened for asbestos. No asbestos was identified within any of the samples submitted for testing.

Given that the Made Ground soils forming the access track have been shown to include PAH compounds at concentrations of concern, i.e. either exceeding the S4UL or the C4SL, it was considered that these soils would not be suitable for retention under gardens and thus it was recommended that this impacted Made Ground soils be excavated and removed from any proposed areas of gardens or soft landscaping.

It should be noted that the original assessment assumed that WS4 was located within a residential garden and that risk mitigation recommendations presented in the Ground Appraisal Report were based on a residential garden end use. Based on the updated development layout and the position of the extant farm track WS4 now falls within an area of proposed public open space adjacent to a residential setting. As such, the risk assessment was revised to reflect this change in end use, with the reported concentrations for Benzo(b)fluoranthene, Benzo(a)pyrene and Dibenzo(a,h)anthracene at 0.1m bgl in WS4 exceeding the assessment criterion for open space



in a residential setting. As such, whilst the end use has changed since the original assessment, the requirement for remedial action remains.

The proposed development included the re-routing of the access track around the eastern and southern perimeter. Whilst the original assessment considered an option for excavation and re-use of the Made Ground from the extant track as sub-base or general fill beneath a wearing course on the new track, it was unclear whether this option remained feasible on technical and commercial grounds. As such, the remedial strategy was developed for excavation and removal of near surface Made Ground from around WS4 and its subsequent disposal from site.

Excavations of Made Ground soils in this site should be undertaken in accordance with an approved Remediation Method Statement and include verification inspections and reporting.

On the basis of the testing undertaken, it is considered that Topsoil on site would be suitable (in chemical terms) for reuse in the proposed gardens and soft landscaped areas and thus should be stripped and placed in a segregated stockpile for re-use, if/where it could be otherwise be disturbed or lost during the proposed development.

2.3 Proposed Site Use

Planning consent has been granted for construction of a residential development with private garden areas, areas of soft landscaping, access road and other associated development infrastructure, as summarised in Section 1.3 of this document.

2.4 Conceptual Site Model

Assessment of the investigation findings have identified particular hazards, or potential hazards which were considered to require intervention (remediation) to mitigate the risk of harm. Remediation works are proposed to break the identified plausible pollutant linkages associated with respect to contaminants of concern above respective assessment criteria within open space soft landscaped areas proposed thereby mitigating the associated risk of harm to human health.

This would be undertaken as several phases of works on site:

- 1) Excavation of the Made Ground at and around the position of WS4. The full depth of Made Ground is not proposed to be removed, but the depth zone in which the contaminant exceedance would be excavated, and the reduced dig progressed to sufficient depth to facilitate placement of Topsoil of c. 0.3-0.4m thickness to be placed in due course. The impacted soils are proposed to be removed from site for appropriate disposal.
- 2) Following excavation of the Made Ground soils (under observation by Geo-Environmental), the base and sides of the excavation would be sampled and laboratory testing undertaken to ascertain the concentrations of PAH compounds in the soils exposed in the base and sides of the excavation. It is possible that some further excavation may be required following this sampling exercise and the same verification sampling and testing process would be repeated.
- 3) Following excavation and testing of the reduced dig area, it is understood that Topsoil would be placed to a minimum thickness of 0.3-0.4m to form the open space ground surface level. Whilst site won Topsoil might be placed to a greater thickness, the upper 0.3-0.4m would be considered as Topsoil.



4.0 SOILS

The ground conditions on the site have been established through several phases of assessment. Encountered soils comprised a mantle of topsoil overlying soils inferred to be clay and sand of the superficial River Terrace Deposits, overlying a bedrock of Chalk. Made Ground was found in one location associated with the track.

Made Ground was encountered within one exploratory hole (WS4). The Made Ground was encountered to a depth of 0.9m bgl and comprised grey and white silty sand and brown clay with gravel of flint and brick.

The original assessment assumed that WS4 was located in a residential garden, but changes to the development layout have resulted in WS4 being located in public open space in a residential setting. An updated review of chemical analysis of the soil samples from WS4 was undertaken with the results being compared individually against the relevant GAC or C4SL for a proposed public open space residential (POS res). Individual exceedances above the respective assessment criteria were identified for Benzo(b)fluoranthene, Benzo(a)pyrene and Dibenz(a,h)anthracene as summarised in Table 4.1.

Determinand	Tier 1 Criteria mg/kg	Depth m bgl	Concentration mg/kg	Geology
Benzo(b)fluoranthene	7.2 (S4UL)	WS4 at 0.1	9.3	Made Ground
Benzo(a)pyrene	5.7 (S4UL)	WS4 at 0.1	10.3	Made Ground
Dibenz(a,h)anthracene	0.5 (S4UL)	WS4 at 0.1	2.1	Made Ground

Table 4.1 Summary of exceedances against Tier 1 assessment criteria (POS resi)

In addition, all samples were submitted for asbestos screening, asbestos was not identified within any soil samples collected and analysed from the eastern portion of the site.

Based on the above assessment it is considered that remedial action would be warranted to protect end users of a residential development on this site in relation to the presence of Benzo(b)fluoranthene, Benzo(a)pyrene and Dibenz(a,h)anthracene identified within the near surface Made Ground soils within the extant track. Remedial action to protect end users from impacted soil is discussed in Section 4.2 below.

4.1 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 2015, Health and Safety at Work Act and the Control of Substances Hazardous to Human Health regulations to protect the safety of persons in their employment. Additional guidance can be sought from the CIRIA publications entitled "A Guide for Safe Working on Contaminated Sites" and "Environmental Good Practice on site guide (fourth edition)".

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.

Separate canteen area and welfare facilities should be provided. 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, regular damping down of the surface of the site will be required to prevent the release of soil dust which could impact on site operatives or migrate off-site, thereby mitigating both off-site exposure and nuisance for neighbours.

4.2 End Users

The tier 1 contamination assessment has identified a location where reported concentrations were either elevated or exceeded the Tier 1 screening criteria within the Made Ground associated with the extant track.

Partial depth excavation and removal of Made Ground from the vicinity of WS4 is proposed such that Made Ground is excavated and removed from the near surface (depth zone in which the exceedance was recorded) and to enable the placement of Topsoil (0.3-0.4mm thick) to restore the area to the final development level.

The excavation works are to be undertaken under the supervision/observance of a Geo-Environmental Engineer (Geo-Environmental) so that the composition and condition of Made Ground can be recorded, the formation layer inspected and recorded, and samples can be collected from the excavations for verification testing. Excavations will be recorded by the Geo-Environmental Engineer observing the works. In addition, a total of eight soil samples will be collected from the base and sides of the excavation for remediation verification testing.

During the excavation process excavated soils will be placed on polythene sheeting prior to removal from site to prevent any cross contamination. Excavated soils are to be removed from site for disposal at a suitable facility. Relevant documentation to demonstrate removal from site is to be maintained by the Client's Contractor for the works.

4.3 Inspection/Validation

Verification of remediation measures shall be required through regular inspection at key stages of the works to include:

- Made Ground excavation for track area, including sampling and testing of underlying formation soils.
- Review of verification test results.
- The placement of uncontaminated subsoil and a minimum 300mm thickness of Topsoil to provide suitable growing media.

Details of these works would be presented within a verification report for the site.

Two stage verification reporting is proposed, i.e. the first verification report addressing the Made Ground excavation works, removal of Made Ground, inspection and sampling of formation layer within the POS area; and a second report stage on completion and verification of the placement of uncontaminated subsoil and Topsoil.



5.0 WASTE

5.1 Waste Classification and Segregation

Waste may be defined as any substance or object in Annex 1 of the Waste Framework Directive which the holder discards, intends to discard, or is required to discard. The holder of waste is anyone in possession of waste or generates it and therefore both the contractor and ultimately the developer are responsible for safe disposal of waste.

The following information is provided for preliminary guidance purposes, as different facilities or operators may have differing acceptance criteria and further Waste Acceptance Criteria (WAC) analysis may be required to confirm the exact classification.

The geochemical laboratory test results of the Made Ground encountered within WS4 were run through CATWASTE software which characterised the results as non-hazardous waste for the purpose of disposal.

Once soils for disposal have been identified it is recommended that further testing, e.g. WAC tests, of these specific soils be undertaken in order to confirm the above assessment.

In the event of dry spells, or where the exposed surface becomes dry, it is recommended that the surface of the site is regularly damped down to prevent the release of soil dust which could migrate off-site and thereby mitigate both off-site exposure and nuisance for neighbours.

In accordance with CL:AIRE Code of Practice (2011) materials are only considered waste if 'they are discarded, intended to be discarded or required to be discarded by the holder'. Current guidance recommends the retention and re-use of site won soils where there is a need for the materials and where the risk is acceptable.

The Code of Practice therefore allows soils to be reused on site where the following criteria are met:

- Pollution of the environment and harm to human health is prevented and not increased in reusing the excavated materials;
- The material are suitable for use (without any further processing);
- There is certainty of use; and
- The quantity that is absolutely necessary (and no more) is used.

In order to comply with the Code of Practice, a Material Management Plan (MMP) that confirms the above criteria are met has to be prepared. The material management plan must be reviewed by a 'Qualified Person' who then issues a declaration to the Environment Agency. Geo-Environmental can provide this service should it be required.

Where materials do not meet the required criteria, it may be possible to treat them under an environmental permit so that they may be re-used on site.

Should material be required and reused under the Definition of Waste Code of Practice, the reuse of material will need to be fully documented and included within the Verification Report produced on completion of the works.



6.0 DISCOVERY STRATEGY

Whilst an intrusive investigation has been undertaken on the site, it remains possible that unexpected ground and/or groundwater conditions may be encountered during the process of construction.

Should previously undiscovered contamination or unforeseen ground conditions be encountered during construction by the ground workers, this must be reported to the Site Manager immediately in order that the Consultant is notified.

Where deemed necessary, the Consultant shall attend the site to inspect the discovery and provide recommendations on the further actions required, if any. Where necessary the regulatory authority shall be informed. Post any additional investigation or laboratory testing the results and any proposed remedial measures shall be reported to the regulatory authority or other appropriate organisation for consent, before proceeding or implementing the remedial measures.

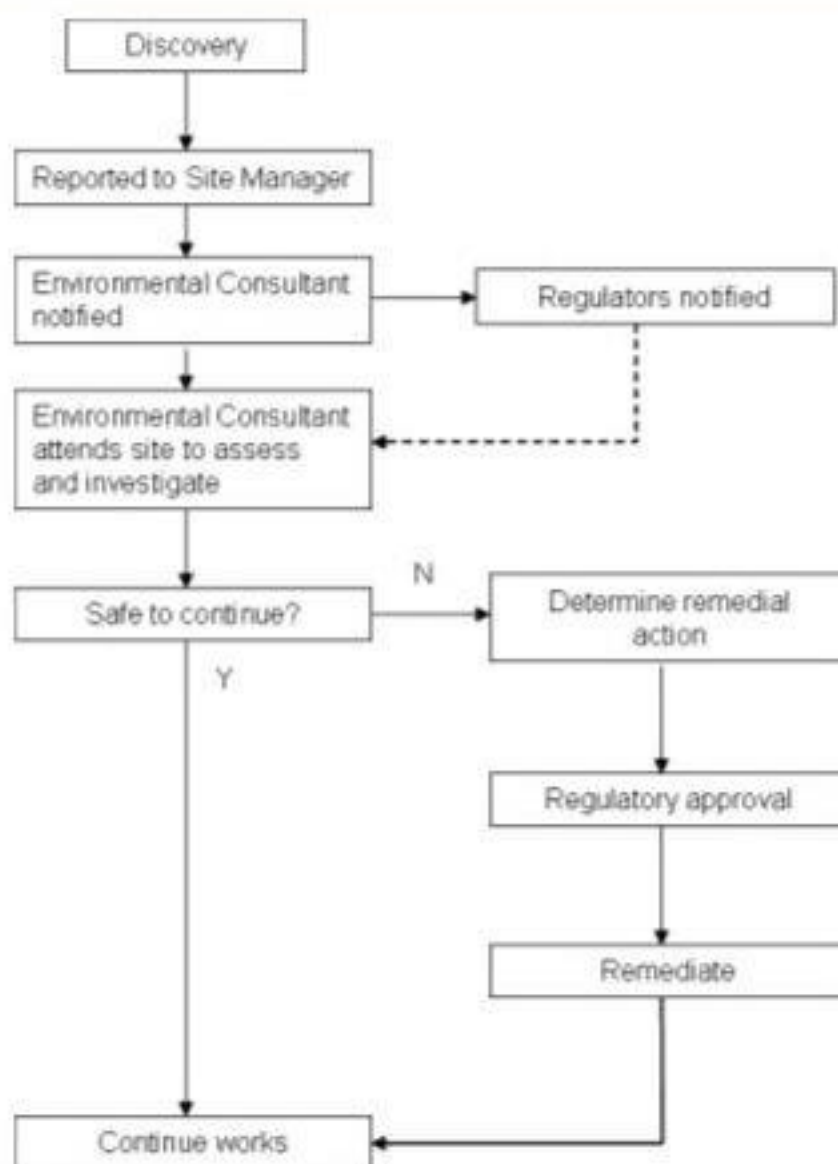
A copy of the discovery strategy must be lodged on site, and provisions made to ensure that all workers are made aware of their responsibility to observe, report, and act on any potentially suspicious, abnormal, unforeseen or contaminated ground and/or groundwater conditions they may encounter.

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 shall be reviewed on a 'discovery' specific basis and in conjunction with consultation with the client, other technical personnel and/or regulatory/approval organisations.

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

- 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 Consultant;
- Following notification from the Site Manager, the Consultant shall discuss the discovery with the Local Authority and/or other relevant parties and if considered necessary, arrange to meet on site to view the discovery;
- The 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 Consultant and held on site (with copies held by the Consultant, Client and Local Authority/other relevant organisation), 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 summarised overleaf:





7.0 VERIFICATION

Verification is required to be undertaken throughout the course of the remediation works. The Verification Report will be submitted to the Client for forwarding to regulators or others as necessary.

The Verification Report will refer to the works as set out within this RSVP and as required by any relevant planning conditions. The report will present the remediation site record (prepared by the Geo-Environmental Engineer), results of verification testing, waste removal documentation (to be supplied by the Client or their Contractor) and any other pertinent information. At this stage it is assumed that site won Topsoil will be used for restoration to the final ground level in the public open space area. Nonetheless, if Topsoil is to be imported on to the site, a specification is presented in Appendix A, compliance against which should be confirmed prior to importation. A summary of verification proposals is presented in Table 7.1 below.

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



Reference	Principal requirements	Design or construction related	Site visit required by Qualified Geo-Environmental Engineer	Supporting documentation
1.0 Verification general principles	Geo-Environmental have been commissioned to supervise remedial works at Manor Farm, Lower Road, Bedhampton. These works require excavation of impacted Made Ground and placement of uncontaminated subsoil and/or Topsoil to provide suitable growing media within an area of public open space. The aforementioned work is in line with the approach adopted for site investigation and updated risk assessment undertaken by Geo-Environmental in respect of the development.	Construction	Yes – See below	Details of construction programme to be provided by client/contractor.
2.0 Excavation of Made Ground	Made Ground excavation to remove near surface impacted Made Ground within the track area to be overseen and verified by Geo-Environmental.	Construction	Yes – 5 days' notice required	Visit to site required to confirm works as they are being undertaken, confirm depth of Made Ground removal, validation sampling from the base and sides of the excavation following removal of the impacted material (minimum of 8 samples). Verification reporting stage 1.
3.0 Topsoil and subsoil backfill	Backfill of Topsoil and subsoil by the ground workers and inspected by the Environmental Consultant	Construction	Yes - 5 days' notice required	Any off site source of Topsoil and subsoil to be used are to be evidenced by the groundworks contractor with chemical testing certificates provided to the Environmental Consultant for review prior to importation of the material. Samples to be taken and chemical test results presented in the report. If site won Topsoil is to be used, testing to date has not identified contamination in Topsoil and supports re-use in the remediation area. Verification reporting stage 2.



Reference	Principal requirements	Design or construction related	Site visit required by Qualified Geo-Environmental Engineer	Supporting documentation
4.0 Waste Management	Waste soils arisings from the Made Ground will be disposed of appropriately. WAC testing is to be undertaken on the excavated soils. The results should be presented to the disposal facility prior to removal for confirmation of the classification.	Design and Construction	No (unless further testing required where 5 days' notice required)	Chemical test results (WAC)
	Waste tickets for the removal of arisings should be compiled for submission as part of the verification report for each phase of the development. The waste tickets will be required to demonstrate that the approximate amount of material being removed is equal to the summed volume on the waste tickets.			Waste tickets (to be provided by the Contractor)
	Where it is demonstrated that there is a need for materials to be re-used on site and that the risk is acceptable, soils may be re-used on site under the Definition of Waste Code of Practice under a Materials Management Plan for the site.			Records of material movements on site to be provided by the Contractor for inclusion in the validation report. (Assumed to be recorded by the groundworks contractor, if not then independent inspections will be required.)
5.0 Imported Soils	It is anticipated that site won Topsoil will be used to restore ground levels in the remediation area and testing already undertaken demonstrates chemical suitability for this use. However, if Topsoil is to be imported for deposition in the remediation area, pre-import testing is required to demonstrate suitability and further	Construction	Yes	Pre-import certification verifying the chemical quality of the topsoil and subsoil to be provided to the Environmental Consultant for review prior to Importation.



Reference	Principal requirements	Design or construction related	Site visit required by Qualified Geo-Environmental Engineer	Supporting documentation
	sampling/testing of any soils imported onto site for landscaping purposes may be required after placement at a frequency of one sample per 50m ³ or a minimum of 3No. samples (whichever is the smallest) with comparison of results to assessment criteria for residential public open space end use.			

Table 7.1 Details of verification visits required on site



FIGURES





Project:	Manor Farm, Lower Road, Bedhampton			Title	Site Location Plan	
Client:	Bargate Homes			Geo-Environmental Services Ltd Unit 7 Danworth Farm, Cuckfield Road Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net  Geo-Environmental		
Ref No:	GE20525	Revision:	1.0			
Drawn:	GR	Date:	11/08/2021			
Figure:	1	Scale:	Not To Scale			

Manor Farm- Bedhampton

NOTES

01. New Entrance
02. Proposed Track for Land Owner to Access Adjacent Fields
03. Communal Green Space
04. New Boundary Planting
05. Reinforce Planting Along Boundary
06. "Village Green" with Rain Garden (dashed)
07. Potential New Access
08. Area for Rain Garden (dashed)
09. Future Building

PARKING

- 1 bed flat - 1 space
- 3 bed house - 2 spaces
- 2 bed house/bungalow - 2 spaces
- 4 bed house - 3 spaces

(Parking Standards to be with Local Authority)

ACCOMMODATION SCHEDULE

PRIVATE

- 2 Bed House x 10 @ 764sqft
- 3 Bed House (wide fronted) x 4 @ 1000sqft
- 3 Bed House (semi & detached) x 6 @ 850sqft
- 3 Bed House (with study) x 1 @ 1250sqft
- 4 Bed House x 1 @ 1400sqft
- 2 Bed Bungalow x 1 @ 992sqft

TOTAL 36 UNITS

AFFORDABLE (pink)

- 1 Bed Flat x 2 @ 550sqft
- 2 Bed House x 3 @ 750sqft
- 3 Bed House x 4 @ 900sqft
- 2 Bed Bungalow x 4 @ 550sqft

TOTAL 18 UNITS



Revision: 01 First Issue 26.10.2017

HGP
ARCHITECTS

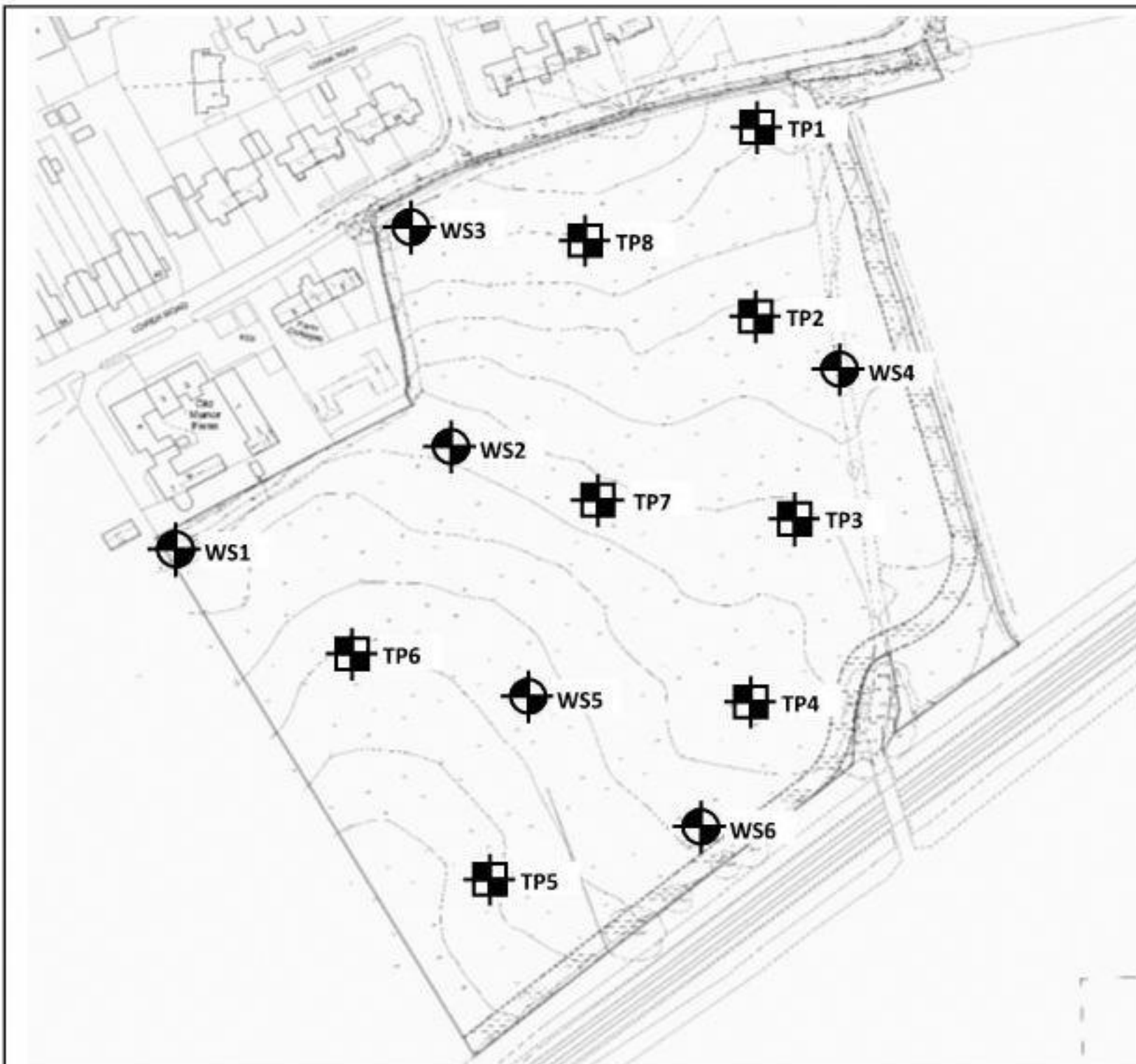
Frederick Faint
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Project Title
Manor Farm, Bedhampton
Scheme and Title
Proposed Site Plan - alternative layout
Drawing Title
1:500 @ A3
Drawing Date
Feasibility

Date
26.10.2017
Drawn by: J. Coleman
CWC

Drawing Number / Revision
17.043 SK101 Rev01

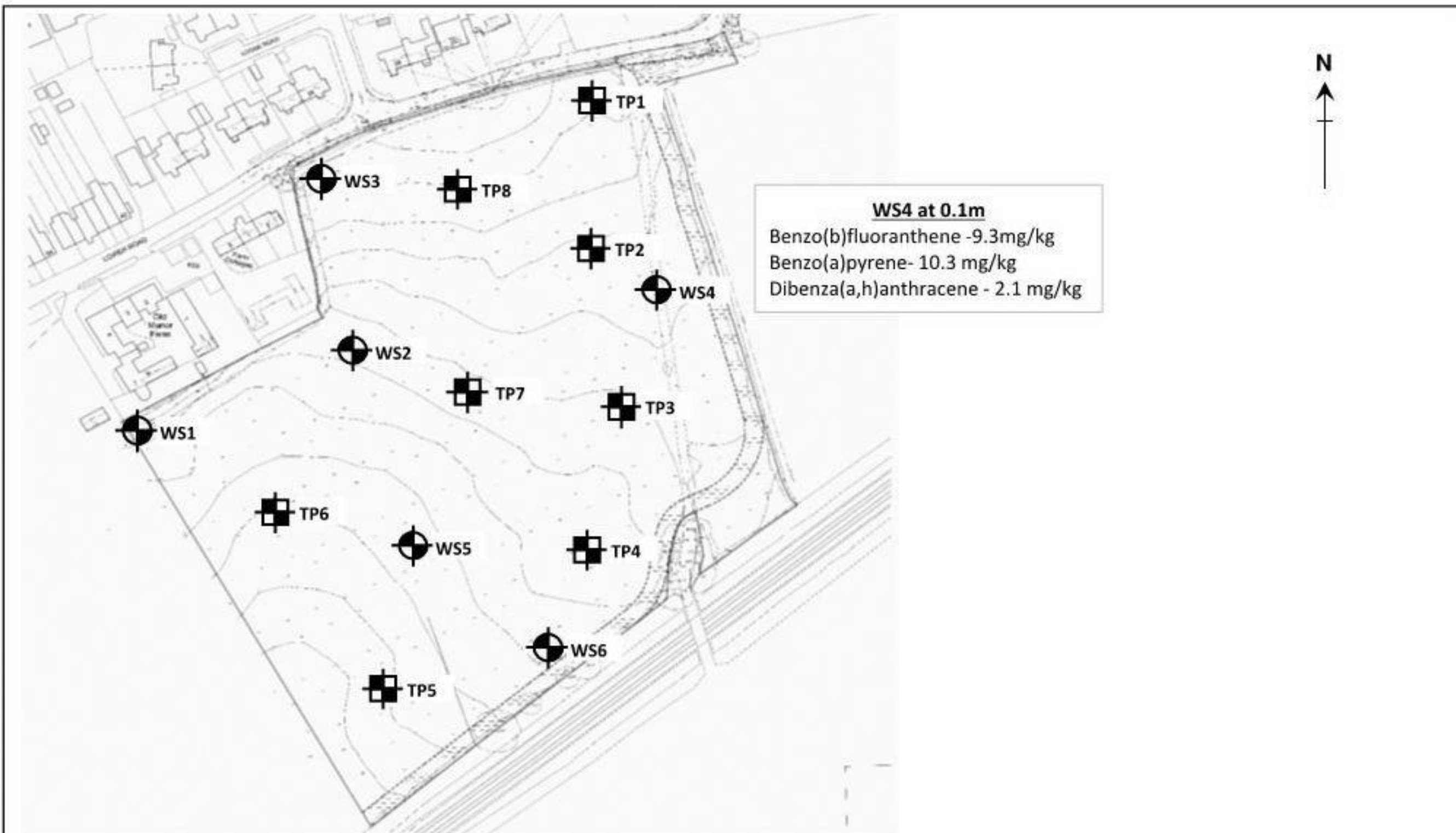
Project:	Manor Farm, Lower Road, Bedhampton			Title	Indicative Development Layout	
Client:	Bargate Homes			Geo-Environmental Services Ltd Unit 7 Danworth Farm, Cuckfield Road Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net	 Geo-Environmental	
Ref No:	GE20525	Revision:	1.0			
Drawn:	GR	Date:	11/08/2021			
Figure:	2	Scale:	Not To Scale			



Project:	Manor Farm, Lower Road, Bedhampton			Title	Exploratory Hole Location Plan	
Client:	Bargate Homes			Geo-Environmental Services Ltd Unit 7 Danworth Farm, Cuckfield Road Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net  Geo-Environmental		
Ref No:	GE20525	Revision:	1.0			
Drawn:	GR	Date:	11/08/2021			
Figure:	3	Scale:	Not To Scale			



Geo-Environmental



Project:	Manor Farm, Lower Road, Bedhampton			Title	Exploratory Hole Location Plan	
Client:	Bargate Homes			Geo-Environmental Services Ltd Unit 7 Danworth Farm, Cuckfield Road Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net  Geo-Environmental		
Ref No:	GE20525	Revision:	1.0			
Drawn:	GR	Date:	11/08/2021			
Figure:	4	Scale:	Not To Scale			



APPENDIX A

Soil Import Criteria





Geo-Environmental

IMPORTED SOIL SPECIFICATION
for the land at
MANOR FARM, LOWER ROAD,
BEDHAMPTON
on behalf of
BARGATE HOMES



Report:	IMPORTED SOIL SPECIFICATION
Site:	MANOR FARM, LOWER ROAD, BEDHAMPTON
Client:	BARGATE HOMES
Date:	16/08/2021
Reference:	GE20525-ISS-AUG21
Revision:	1.0
Prepared by:	 JAMES GOODING BSc (Hons), MSc, AMIEnvSc SENIOR CONSULTANT ENGINEER
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AMENDMENT RECORD

Revision ref.	Date	Reasons for amendment	Author's initials
1.0	16/08/2021	First issue	JG



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1.0 Introduction

This document sets out the requirements for imported subsoil and Topsoil 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.

Where there is any discrepancy between this specification and BS3882:2015 or BS8601:2013, the latter documents shall take precedence unless otherwise formally confirmed by the relevant regulator.

2.0 Chemical Composition

The chemical criteria listed below are based on the published Category 4 Screening Levels (C4SLs) by DEFRA and/or the relevant Suitable for Use Levels (S4ULs) published by LQM, for a residential end use with plant uptake. 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.

Where C4SLs or S4ULs 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 shall include aliphatic and aromatic carbon banding split.

2.2 Topsoil (0-300mm depth)

Tables 1, 1a, 1b and 1c provide a list of the maximum acceptable concentrations for a range of determinants for imported topsoil.



Determinant	Maximum concentration (mg/kg)
Inorganic	SOM 6%
Arsenic (total)	37
Boron (water soluble)	290
Cadmium (total)	11
Chromium (total)	130
Copper (total)	2400
Cyanide (total)	250
Lead (total)	200
Mercury (total inorganic)	40
Nickel (total)	180
pH	5.5 – 7.8
Selenium (total)	250
Sulphate (total)	2000
Zinc (total)	3700
Asbestos	Absent
Organic	
Phenols (total)	110
Poly Aromatic Hydrocarbon (speciated)	See Table 1a
Total Petroleum Hydrocarbon (speciated)	See Table 1b

Table 1 Chemical Specification for Topsoil

Determinant	Maximum Concentration (mg/kg)		
	1% SOM	2.5% SOM	6% SOM
Acenaphthene	210	510	1100
Acenaphthylene	170	420	920
Anthracene	2400	5400	11000
Benz(a)anthracene	7.2	11	13
Benzo(a)pyrene	2.2	2.7	3.0
Benzo(b)fluoranthene	2.6	3.3	3.7
Benzo(ghi)perylene	320	340	350
Benzo(k)fluoranthene	77	93	100
Chrysene	15	22	27
Dibenz(ah)anthracene	0.24	0.28	0.30
Fluoranthene	280	560	890
Fluorene	170	400	860
Indeno(1,2,3CD)pyrene	27	36	41
Naphthalene	2.3	5.6	13.0
Phenanthrene	95	220	440
Pyrene	620	1200	2000

Table 1a Topsoil Specification for Speciated PAH

Determinant	Maximum Concentration (mg/kg)		
	1% SOM	2.5% SOM	6% SOM
Aliphatic			
EC 5-6	42	78	160
EC >6-8	100	230	530
EC >8-10	27	65	150
EC >10-12	130	330	760



Determinant	Maximum Concentration (mg/kg)		
	1% SOM	2.5% SOM	6% SOM
EC >12-16	1100	2400	4300
EC >16-35	65000	92000	110000
EC >35-44	65000	92000	110000
Aromatic			
EC 5-7 (benzene)	70	140	300
EC >7-8 (toluene)	130	290	660
EC >8-10	34	83	190
EC >10-12	74	180	380
EC >12-16	140	330	660
EC >16-21	260	540	930
EC >21-35	1100	1500	1700
EC >35-44	1100	1500	1700
Aliphatic and Aromatic			
EC >44-70	1600	1800	1900

Table 1b Topsoil Specification for Speciated TPH

Determinant	Phytotoxicity GAC (mg/kg)		
	pH <6.0	pH 6.0-7.0	pH >7.0
Zinc	200	200	300
Copper	100	135	200
Nickel	60	75	110

Table 1c Topsoil Specification for phytotoxicity

2.3 Subsoil (>150m depth)

Tables 2, 2a, 2b and 2c provide a list of the maximum acceptable concentrations for a range of determinants for imported subsoil.

Determinant	Maximum concentration (mg/kg)
Inorganic	SOM 6%
Arsenic (total)	37
Boron (water soluble)	290
Cadmium (total)	11
Chromium (total)	130
Copper (total)	2400
Cyanide (total)	250
Lead (total)	200
Mercury (total inorganic)	40
Nickel (total)	180
pH	5.5 – 7.8
Selenium (total)	250
Sulphate (total)	2000
Zinc (total)	3700
Asbestos	Absent
Organic	
Phenols (total)	110
Poly Aromatic Hydrocarbon (speciated)	See Table 2a



Determinant	Maximum concentration (mg/kg)
Inorganic	SOM 6%
Total Petroleum Hydrocarbon (speciated)	See Table 2b

Table 2 Chemical Specification for Subsoil

Determinant	Maximum Concentration (mg/kg)		
	1% SOM	2.5% SOM	6% SOM
Acenaphthene	210	510	1100
Acenaphthylene	170	420	920
Anthracene	2400	5400	11000
Benz(a)anthracene	7.2	11	13
Benzo(a)pyrene	2.2	2.7	3.0
Benzo(b)fluoranthene	2.6	3.3	3.7
Benzo(ghi)perylene	320	340	350
Benzo(k)fluoranthene	77	93	100
Chrysene	15	22	27
Dibenz(ah)anthracene	0.24	0.28	0.30
Fluoranthene	280	560	890
Fluorene	170	400	860
Indeno(1,2,3CD)pyrene	27	36	41
Naphthalene	2.3	5.6	13.0
Phenanthrene	95	220	440
Pyrene	620	1200	2000

Table 2a Subsoil Specification for Speciated PAH

Determinant	Maximum Concentration (mg/kg)		
	1% SOM	2.5% SOM	6% SOM
Aliphatic			
EC 5-6	42	78	160
EC >6-8	100	230	530
EC >8-10	27	65	150
EC >10-12	130	330	760
EC >12-16	1100	2400	4300
EC >16-35	65000	92000	110000
EC >35-44	65000	92000	110000
Aromatic			
EC 5-7 (benzene)	70	140	300
EC >7-8 (toluene)	130	290	660
EC >8-10	34	83	190
EC >10-12	74	180	380
EC >12-16	140	330	660
EC >16-21	260	540	930
EC >21-35	1100	1500	1700
EC >35-44	1100	1500	1700
Aliphatic and Aromatic			
EC >44-70	1600	1800	1900

Table 2b Subsoil Specification for Speciated TPH



Determinant	Phytotoxicity GAC (mg/kg)		
	pH <6.0	pH 6.0-7.0	pH >7.0
Zinc	200	200	300
Copper	100	135	200
Nickel	60	75	110

Table 2c Subsoil Specification for phytotoxicity

3.0 Nutritional Composition

The nutritional criteria listed below are based on BS3882:2015 for topsoil and BS8601:2013 for subsoil. 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. The nutrient concentrations set out in Table 3 for Topsoil are based on those set out in BS3882:2015 which states “*Multipurpose topsoil is the grade suited to most situations where topsoil is required; however, there can be situations where specific purpose topsoil is required*”. In the event that an alternative specific Topsoil grade is required, i.e. acidic; calcareous; low fertility; low fertility acidic; or low fertility calcareous, the compliance criteria set out in BS3882:2015 shall be applicable in place of those set out in Table 3 below.

Topsoil/Subsoil	Parameter	Concentration
Topsoil (multipurpose grade only)	Phosphorous	16 – 140 mg/l
	Potassium	121 – 1500 mg/l
	Magnesium	51 – 600 mg/l
	Nitrogen	0.15 % m/m
	Carbon:nitrogen ratio	<20:1
Subsoil	Phosphorous	16 mg/l
	Potassium	121 mg/l
	Magnesium	51 mg/l
	Nitrogen	0.15 %
	Carbon:nitrogen ratio	<20:1

Table 3 Nutritional Specification for Topsoil and Subsoil

4.0 Physical Composition

The physical criteria listed below are based on BS3882:2015 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 the physical suitability requirements for imported topsoil and subsoil. Table 4 sets out acceptability criteria from BS3882:2015 for multipurpose Topsoil. In the event that an alternative specific Topsoil grade is required, i.e. acidic; calcareous; low fertility; low fertility acidic; or low fertility calcareous, the compliance criteria set out in BS3882:2015 shall be applicable in place of those set out in Table 4 below.



Topsoil/Subsoil	Parameter	Specification requirements
Topsoil (multipurpose Topsoil only)	Textural Classification	Sandy clay loam, sandy loam, loamy sand, sandy silt loam (as defined in BS3882:2015, Figure 1)
	Loss on Ignition	3 - 20% (for 5-20% clay soil) 5 - 20% (for 20-35% clay soil)
	Maximum Stone content:	>2mm = 30% >20mm = 10% >50mm = 0%
Subsoil	Textural Classification	Refer to BS8601:2013 Figure 1
	Loss on Ignition	2%
	Maximum Stone content:	>2mm = 40% >20mm = 20% >75mm = 0%

NB: Topsoil and Subsoil must be free from glass, brick fragments, plastic, metal, asbestos and other deleterious materials.

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:

- A site plan detailing the location and address of the source site, including grid reference.
- Location description of source material, including historic and current site uses.
- Sample analysis results of material at source, including details of laboratory, date of sampling, date samples received by laboratory etc.

5.2 Manufactured soils

Where natural soils are unavailable manufactured soils may be utilised, and 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 50m³.

6.0 Testing Rates and Compliance

Sampling shall be undertaken in accordance with BS3882:2015 and BS8601:2013.

6.1 Topsoil

Where natural sourcing is proposed, the provenance of the material shall be determined by analysis of the soils at a minimum rate of 3No. samples per source site (up to 250m³) and 1 sample per 250m³ thereafter. Imported soils should be sampled once it has been laid on the site to support the analysis provided by the source supplier.

Where Topsoil is derived from a manufactured source, testing would be undertaken at a rate of 1 sample per 50m³, with a minimum of 3No. tests for any given potential source material (or production batch).



6.2 Subsoil

Where the source of the material is known validation sampling should be undertaken at a minimum rate of 3 samples per source (up to 250m³) and 1 sample per 250m³ thereafter. Imported soils should be sampled once it has been laid on the site to support the analysis provided by the source supplier.

Where subsoil is derived from a manufactured source, testing would be undertaken at a rate of 1 sample per 50m³, with a minimum of 3No. tests for any given potential source material (or production batch)

Where the source of the material is not known the validation sampling should be undertaken in-line with the testing rates as set out for cover systems to ensure the materials are suitable for their intended use. Further guidance on minimum testing under this scenario is presented in Section 6.3 below.

6.3 Cover Systems

Where a cover system/ capping layer is proposed as part of the required remedial measures, sampling frequency will follow the guidance set out by the NHBC in their guidance for clean cover systems (2010) and supplemented within NHBC Technical Extra Guidance Issue 8, November 2012, outlined below:

- Sites with more than 30 plots testing should be conducted at a rate of one plot in four, with a minimum of 10 tests across the site;
- Sites with between 20 – 30 plots testing should be conducted at a rate of one plot in three, with a minimum of 7 tests across the site;
- Sites with between 5 -20 plots testing should be conducted at a rate of one plot in two with a minimum of 5 tests across the site;
- Sites with fewer than 5 plots testing should be conducted in every plot with a minimum of 3 tests across the site.

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 and to provide clarification whether the soil is suitable for importation and/or proposed use.

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. Results showing consistency of batching may be requested to demonstrate consistency of the physical, chemical and nutritional composition of the material.

Imported soil suppliers and groundwork 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, nutritional and physical compliance criteria (as set out in Tables 1 to 4). 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.



APPENDIX B

CATWASTE Results

Site Name	Manor Farm Bedhampton
Location	Manor Farm Bedhampton
Site ID	
Job Number	GE20252
Date	8/13/2021
User Name	katie.brayne@gesl.net
Company Name	Geo-Environmental Services Limited

[illegible]

Site Name	Manor Farm Bedhampton
Location	Manor Farm Bedhampton
Site ID	
Job Number	GE20252
Date	8/13/2021
User Name	katie.brayne@gesl.net
Company Name	Geo-Environmental Services Limited

[illegible]

Site Name	Manor Farm Bedhampton
Location	Manor Farm Bedhampton
Site ID	
Job Number	GE20252
Date	8/13/2021
User Name	katie.brayne@gesl.net
Company Name	Geo-Environmental Services Limited

Hole ID	Sample Depth	Contaminant	Contaminant Concentration (%)	Hazardous Waste Y/N	Hazard Property	Individual Hazard Statements Exceeded	Cumulative Hazard Statements Exceeded
WS4	0.10	pH	0.00000	N			
WS4	0.10	Naphthalene	0.00000	N			
WS4	0.10	Acenaphthylene	0.00000	N			
WS4	0.10	Acenaphthene	0.00000	N			
WS4	0.10	Fluorene	0.00000	N			
WS4	0.10	Phenanthrene	0.00000	N			
WS4	0.10	Anthracene	0.00000	N			
WS4	0.10	Fluoranthene	0.00000	N			
WS4	0.10	Pyrene	0.00000	N			
WS4	0.10	Benzo(a)anthracene	0.00000	N			
WS4	0.10	Chrysene	0.00000	N			
WS4	0.10	Benzo(b)fluoranthene	0.00000	N			
WS4	0.10	Benzo(k)fluoranthene	0.00000	N			
WS4	0.10	Benzo(a)pyrene	0.00000	N			
WS4	0.10	Indeno(1,2,3-cd)pyrene	0.00000	N			
WS4	0.10	Di-benz(a,h)anthracene	0.00000	N			
WS4	0.10	hydrocarbon/oil with marker	0.00000	N			
WS4	0.10	Arsenic	0.00000	N			
WS4	0.10	Chromium (Total)	0.00000	N			
WS4	0.10	Copper	0.00000	N			
WS4	0.10	Lead	0.00000	N			
WS4	0.10	Nickel	0.00000	N			
WS4	0.10	Selenium	0.00000	N			
WS4	0.10	Zinc	0.00000	N			
WS4	0.10	Vanadium	0.00000	N			
WS4	0.40	Benzo(a)pyrene	0.00000	N			
WS4	1.00	pH	0.00000	N			
WS4	1.00	Benzo(a)pyrene	0.00000	N			
WS4	1.00	Arsenic	0.00000	N			
WS4	1.00	Chromium (Total)	0.00000	N			
WS4	1.00	Copper	0.00000	N			
WS4	1.00	Lead	0.00000	N			
WS4	1.00	Nickel	0.00000	N			
WS4	1.00	Zinc	0.00000	N			
WS4	1.00	Vanadium	0.00000	N			

[illegible]

Notes - Additional Information on Hazard Properties

Hazardous Property	Description	Hazard Statement	Note
HP1	Explosive	H200, H201, H202, H203, H204, H240 and H241	A waste is assessed for HP1 via test methods, rather than a concentration limit. If you have substances or a mixture containing explosive properties the waste should be tested in accordance with the European Chemical Agency's guidance on the application of the CLP Criteria.
HP2	Oxidising	H270, H271, H272	A waste is assessed for HP2 via test methods, rather than a concentration limit. If you have substances or a mixture containing oxidising properties the waste should be tested in accordance with the European Chemical Agency's guidance on the application of the CLP Criteria.
HP3	Flammable	H220 to H226, H228, H242, H250, H251m H252, H260, H261	A waste is assessed for HP3 via test methods, rather than a concentration limit. If you have substances or a mixture containing flammable properties the waste should be tested in accordance with the European Chemical Agency's guidance on the application of the CLP Criteria. If a waste contains either H220, H221, H260 or H261 a calculation can be performed to identify the minimum amount of that substance that will trigger HP3.
HP5	Specific Target Organ Toxicity (STOT)	H304	Should a waste contain two or more compounds displaying H304 (Asp. Tox 1) and equal or exceed its specific concentration limit of 10%, then a waste will be hazardous by HP5 if its kinematic viscosity exceeds 20.5 mm ² /s. Guidance should be sought from the CLP Criteria.
HP9	Infectious	N/A	A waste is assessed for HP9 via further testing, rather than a concentration limit. In cases where there is the potential for toxins to be present, further testing will be required. For healthcare waste reference should be made to the Department of health guidance: Safe management of healthcare waste.
HP12	Release of acute toxic gas	EUH029, EUH031, EUH032, H260 or H261	A waste is assessed for HP12 via test methods, rather than a concentration limit. If you have substances or a mixture that may release acute toxic gas the waste should be tested in accordance with the European Chemical Agency's guidance on the application of the CLP Criteria.
HP15	Explosive or explosive properties	H205, EUH001, EUH019 or EUH044	A waste is assessed for HP15 via test methods, rather than a concentration limit. If you have substances or a mixture that may exhibit explosive or explosive properties the waste should be tested in accordance with the European Chemical Agency's guidance on the application of the CLP Criteria.
HP16	Persistent organic pollutants	N/A	A waste is considered hazardous if the concentration of one or more compound (persistent organic pollutant) as listed in Appendix C of Environment Agency guidance WM3 is above its assigned concentration limit. For reference for dioxins and furans, this assessment incorporates the use of specific toxicity equivalent factors.