
LAMB FIELD, BILSHAM ROAD

YAPTON

SOIL RESOURCE SURVEY

Prepared on behalf of:

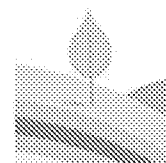
LANDLINK ESTATES LTD

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1.0 INTRODUCTION

Tim O'Hare Associates LLP was commissioned by Landlink Estates Ltd to undertake a Soil Resource Survey at the Lamb Field, Bilsham Road site, Yapton.

The authority to carry out the work was confirmed via an email message from Jacintha Carty (Landlink Estates), dated 3rd August 2021.

1.1 Purpose

TOHA understands that a residential development is to be constructed at this site, which will comprise the construction of a number of houses, with associated infrastructure, residential back gardens and soft landscaping, including a NEAP play area and SuDS features.

As part of the development strategy, the site topsoil will be stripped and stored in temporary stockpiles before it is re-used for landscape purposes, including residential back gardens.

The existing site comprises agricultural land and, as such, contains a significant quantity of topsoil and subsoil. However, there is currently no information available on the horticultural quality, variability and suitability of the soils for landscape purposes within this development. Therefore, the purpose of this *Soil Resource Survey* is to assess the quality of the site soils to advise on their suitability for re-use for the proposed landscape types, including residential back gardens.

1.2 Actions

Tim O'Hare Associates LLP has evaluated the quality and suitability of the soils for landscape construction by desk study review, on-site investigation and laboratory analysis.

This report issues the findings of the *Soil Resource Survey* for the Lamb Field, Bilsham Road, Yapton development site, including the site observations and soil descriptions, results and interpretation of all analyses, discussion on soil's quality and suitability for the proposed landscape scheme and recommendations for handling, treating and re-using the soils for landscape construction.

2.0 DESK STUDY REVIEW

2.1 Documents Reviewed

Prior to commencing the site investigation work, the following documents were reviewed:

- *Soil Map of England and Wales – Sheet 6 – Wales (1:250,000);*
- *British Geological Survey Website (Geology of Britain);*
- *Boyle and Summers, Landlink Estates, Land West of Bilsham Road, Yapton, Proposed Site Layout, Ref 21015, Sept 2021.*

2.2 Summary of Findings

Soils

The Soil Map of England and Wales (1:250,000 scale) classifies the soils as follows:

Major Group	<i>Ground-water gley soils</i>
Group	<i>Argillic gley soils</i>
Subgroup	<i>Typical argillic gley soils</i>
Series	<i>Park Gate (841e)</i>

Ground-water gley soils are soils normally developed within or over permeable materials, that have prominently mottled or uniformly grey subsoil resulting from periodic waterlogging by a fluctuating groundwater-table.

The *Park Gate* series is composed of '*deep, stoneless, silty soils visibly affected by groundwater.*'

Geology

The British Geology Survey shows that the bedrock geology of the area is part of the *Lewes Nodular Chalk Formation, Seaford Chalk Formation, Newhaven Chalk Formation, Culver Chalk Formation and Portsdown Chalk Formation (undifferentiated) - Chalk*, comprising Sedimentary Bedrock formed approximately 72 to 94 million years ago in the Devonian Period.

Superficial deposits of *River Terrace Deposits (undifferentiated) - Sand, Silt And Clay*, formed up to 3 million years ago in the Quaternary Period were recorded across the site.

Proposed Landscape Uses

The landscape design is at an early stage and was not provided for review. As such, the soft landscape scheme is assumed to include the following:

- Domestic grass lawns;
- Tree planting;
- Shrub planting;
- Communal amenity grass areas;
- SuDS features.

The soil requirements of the anticipated landscape types are considered below.

Tree Planting

Semi-mature trees are demanding planting types. Good aeration and drainage around the rootball, as well as moderate to high fertility status are critical at planting and during the establishment period. Without these properties, trees will very quickly suffer and possibly die during their first few growing seasons after planting. Given their demanding nature, all rootballed trees should be planted with well-aerated and free-draining soils to the full rooting depth (normally considered to be 1.0m).

Shrub Planting

Shrubs are planted as container grown stock. This planting type normally requires shallower depths of soil than trees and the plants themselves can be variable in their specific soil requirements. Containerised specimens in particular are often less tolerant of adverse soil conditions and would normally require soils which are fertile, well drained and aerated.

Amenity Grass

The soil requirements for amenity grass areas depend on the level of anticipated usage, whereby grass in 'low use' areas, e.g. road verges, is a robust planting type that does not require a specialist soil type. Grass in 'high use' areas, e.g. residential back gardens, requires soil that is resistant to wear and compaction. However, in both instances, the topsoil and subsoil should possess adequate structures, without excessive compaction, to allow sufficient drainage and aeration to sustain healthy grass growth.

Residential back gardens are considered to be a 'sensitive' end-use in relation to concentrations of potential contaminants (e.g. heavy metals, hydrocarbons). As such, the contaminant levels in the soils used should comply with the project's environmental requirements.

SuDS Features

We understand that a number of SuDS features are proposed to be constructed on site, e.g. attenuation basins. Details concerning the required functioning and properties of the back-fill media for these SuDS features have not been provided for this review.

3.0 SITE INVESTIGATION

3.1 Site Visit

The site visit took place on Tuesday 10th August 2021, during a period of warm and dry weather. The site is located to the south of Yapton and was accessed off Bilsham Road. Agricultural land bordered the site on each side.

The site comprised 1 No. agricultural field, bounded to the west by Ryebank Rife, as well as hedges and fencing. The site contained an old lettuce crop. Frequent patches of standing water were observed within vehicle tracks on the exposed topsoil surface.

During the visit, the site was accessed from the existing field 'tramlines' and field boundaries.



Plate 1: View of the site looking eastwards

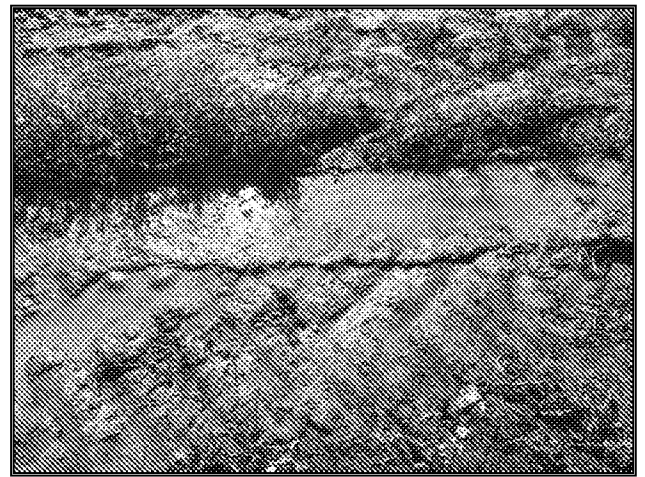


Plate 2: Example of surface water ponding

3.2 Soil Conditions

The soils were examined by constructing a total of 11 No. hand-dug trial holes (TH) at accessible locations within the survey area. Trial holes were excavated to a maximum depth of 1.0m (ground conditions permitting). The sample locations are shown on the site plan in **Appendix 1**. This vegetation restricted access across the site during the site walkover, and therefore limited the locations available for examination to within the tramlines and outer perimeter.

At each trial hole, the soils were examined with reference to the Soil Survey Field Handbook. Important physical soil characteristics were recorded, including soil texture, structure, compaction, waterlogging, anaerobism, topsoil depths, stone content and the presence of deleterious materials. At the same time, representative soil samples were taken for laboratory analysis.

3.3 Soil Descriptions

The in-situ soil profile was consistent in appearance between trial hole locations and was described as below:

Topsoil GL – 300/410mm Average: 350mm	Brown (Munsell colour 10YR 4/3), slightly moist, friable, non-calcareous to very slightly calcareous CLAY LOAM to SILTY CLAY LOAM with a moderate to well developed, fine to occasionally coarse granular and subangular blocky structure, with weak structural strength. Slightly stony, including occasional subrounded and subangular stones up to 80mm in length. No deleterious materials were observed.
Subsoil 300/410 – 1000mm	Yellowish brown (Munsell colour 10YR 5/6), slightly moist, slightly plastic, slightly calcareous SILTY CLAY LOAM with a moderately developed, subangular blocky structure. Slight to moderately stony, including subrounded and subangular stones up to 25mm in length. No deleterious materials were observed. Frequent mottling throughout with occasional manganese concretions.



Plate 3: Typical trial pit – TH3.

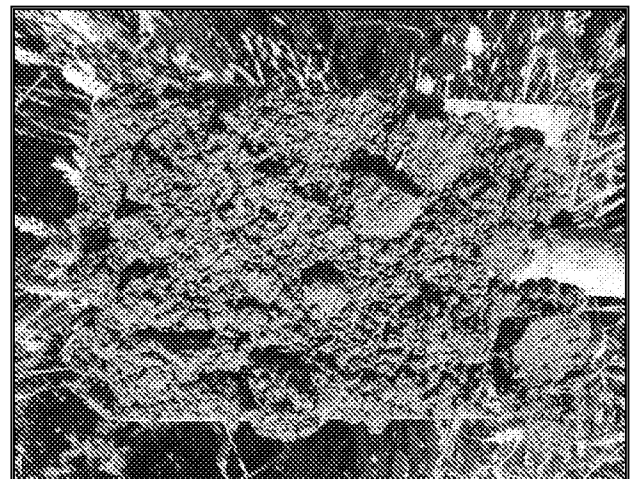


Plate 4: Typical *Topsoil* arisings.

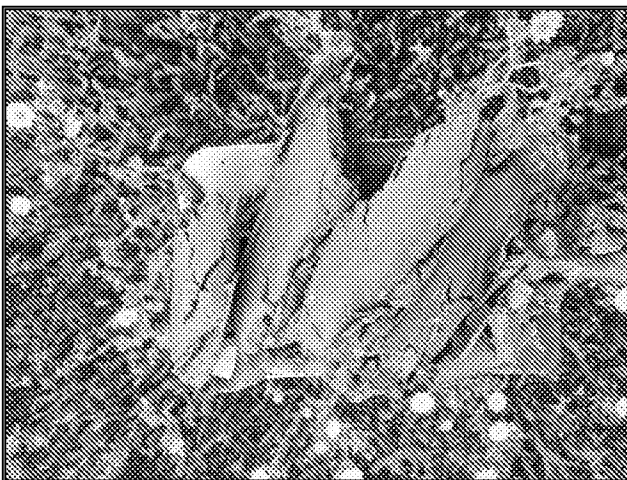


Plate 5: Typical *Subsoil* arisings.



Plate 6: Example of mottling within the *Subsoil*.

3.4 Topsoil Depths

The following topsoil depths (mm) were recorded during our survey:

Trial Hole Ref.	Topsoil Depth (mm)	Trial Hole Ref.	Topsoil Depth (mm)
TH1	320	TH7	360
TH2	310	TH8	320
TH3	330	TH9	360
TH4	330	TH10	410
TH5	320	TH11	340
TH6	300	Average Depth	340

3.5 Soil Sampling

A total of 2 No. composite samples of *Topsoil* and 2 No. composite samples of *Subsoil* were collected from site. The following table provides the locations of the sub-samples for each of the 6 No. composite samples.

Sample Reference	Sub-Sample Trial Hole Locations
<u>Topsoil</u>	
Topsoil Sample 1	TH1, TH2, TH3, TH4, TH5, TH6
Topsoil Sample 2	TH7, TH8, TH9, TH10, TH11
<u>Subsoil</u>	
Subsoil Sample 1	TH1, TH2, TH3, TH4, TH5, TH6
Subsoil Sample 2	TH7, TH8, TH9, TH10, TH11

The trial hole locations can be viewed on the site plan located within **Appendix 1**.

4.0 LABORATORY ANALYSIS

4.1 Analytical Schedule

Representative samples (2 No. *Topsoil* and 2 No. *Subsoil*) were submitted to the laboratory for analysis. The samples were analysed in accordance with the following schedule:

- particle size analysis (% sand, silt, clay);
- stone content (2-20mm, 20-50mm, >50mm);
- pH value;
- electrical conductivity values;
- exchangeable sodium percentage (*Topsoil* only);
- major plant nutrients - N, P, K, Mg (*Topsoil* only);
- organic matter content;
- C:N ratio (*Topsoil* only).

The results are presented on the Certificates of Analyses in **Appendix 2** and an interpretation of the results is given below.

4.2 Results of Analysis

Particle Size Analysis

Topsoil and Subsoil

The *Topsoil* samples fell into the CLAY LOAM to SILTY CLAY LOAM texture classes and the *Subsoil* samples fell into the SILTY CLAY LOAM texture class. The *Topsoil* and *Subsoil* samples would be described as 'silty' in texture (60 – 66% silt).

Such soils have physical limitations for use in soft landscaping purposes, in particular residential back gardens, areas of amenity grass with high footfall and other demanding uses e.g. backfilling tree pits. Silty soils, such as these, typically have low structural strength and are therefore prone to structural degradation and self-compaction when handled intensively (e.g. stripping, stockpiling, respreding). In addition, unlike clay soils, silty soils do not possess the same ability to 'self-repair' by the *shrink and swell* mechanism (an important soil structure forming process), and they usually do not respond well to mechanical cultivation. As a consequence, once structurally damaged, it can be difficult to improve the physical condition of silty soils, particularly in the short-term, to a level fit for re-use in residential back gardens.

The soils are unlikely to perform well in residential back gardens, where they will be prone to compaction and at higher risk of waterlogging, surface water ponding and poor grass growth.

Stone Content

The stone contents of the *Topsoil* samples were low to moderate, including occasional stones up to 80mm in length. It would be advisable to remove all stones greater than 50mm for landscape planting purposes and greater than 20mm for residential back gardens and areas of seeded amenity grass, for example by raking or picking.

The *Subsoil* samples were slight to moderately stony and, as such, stones should not restrict the use of the *Subsoil* for use as subsoil in general landscape purposes.

pH and Electrical Conductivity

The *Topsoil* samples were neutral to slightly alkaline in reaction (pH 7.0 and 7.3) and the *Subsoil* samples were slightly alkaline to alkaline in reaction (pH 7.3 and 7.8). These pH ranges would be considered acceptable for general landscape purposes, providing species with a wide pH tolerance are selected for planting, turfing and seeding.

The electrical conductivity (salinity) values were low, indicating that soluble salts were not present at levels that would be harmful to plants.

Organic Matter and Fertility Status

The table below summarises the organic matter contents and fertility status for each sample.

	<i>Topsoil Sample 1</i>	<i>Topsoil Sample 2</i>
<i>Organic Matter</i>	<i>o</i>	<i>o</i>
<i>Total Nitrogen</i>	✓	<i>o</i>
<i>Extractable Phosphorus</i>	✓	✓
<i>Extractable Potassium</i>	✓	<i>x</i>
<i>Extractable Magnesium</i>	✓✓	✓✓

✓✓ - well supplied; ✓ - adequately supplied; *o* - slightly deficient; *x* - deficient; *xx* - very deficient

The recorded organic matter and nutrient deficiencies may be addressed by a suitable compost and/or fertiliser application.

The C:N ratio results of the *Topsoil* samples are considered acceptable for landscape purposes.

The organic matter contents of the *Subsoil* samples would be considered slightly high for subsoil (2.1%), and as such could present a greater risk of anaerobism at depth once disturbed. Such levels would only be considered suitable provided the subsoil is adequately structured to encourage drainage and aeration of the subsoil.

5.0 DISCUSSION

A residential development is to be constructed at the Lamb Field, Bilsham Road, Yapton site, which will comprise the construction of a number of residential units, with associated infrastructure, soft landscaping and residential back gardens.

The purpose of this investigation is to assess the quality of the site soils by visual examination and laboratory analysis and to advise on their suitability for re-use for landscape purposes, including residential back gardens.

5.1 Summary of Findings

From the site visit and subsequent laboratory analysis, 1 No. *Topsoil* type and 1 No. *Subsoil* type were encountered.

Topsoil

The *Topsoil* was recorded to an average depth of 340mm and was described as a neutral to slightly alkaline, non-saline, non-calcareous to very slightly calcareous CLAY LOAM to SILTY CLAY LOAM with a moderate to well developed structure (weak structural strength) and low to moderate stone content, including occasional stones up to 80mm in length.

The *Topsoil* contained sufficient reserves of extractable phosphorus and extractable magnesium, however contained low to moderate levels of total nitrogen and extractable potassium and moderately low levels of organic matter.

Subsoil

The *Subsoil* was found to be relatively consistent in composition and was described as a slightly alkaline to alkaline, non-saline, very slightly calcareous SILTY CLAY LOAM with a moderate structure and low to moderate stone content. The *Subsoil* contained slightly elevated levels of organic matter.

5.2 Soil Suitability for Re-Use

Topsoil and Subsoil

The silty character of the site *Topsoil* and the *Subsoil* (moisture retentive, with weak soil structures and tendency to self-compact) makes them **particularly problematic** and of a **low quality for landscape uses**. Soils such as these have little capability for self-repair, unlike those with high clay contents which tend to form deep cracks when dry. The moisture retentive character of the *Topsoil* and its vulnerability to physical degradation following disturbance by soil stripping, limits the potential to re-use this soil to non-demanding, hardy species and planting types.

The requirement to strip the topsoil results in a loss of soil structure and so further reduces its quality as a 'landscape soil'. This damage has been taken into account with respect to its re-use for landscape purpose, and it will be essential that it is minimised and repaired following resspreading. For all future uses, it is important that following the earthworks phases that all soils are left in an uncompacted condition with adequate soil structure.

The *Topsoil* contained occasional stones greater than 50mm in length. Any large stones in the *Topsoil* (>50mm in soft landscape areas and >20mm in residential back gardens and areas of seeded amenity grass) should be removed by raking or picking prior to re-use.

Given the physical limitations presented by the *Topsoil* for re-use for garden construction, several options are presented below for further consideration (Section 5.3).

In addition, the *Topsoil* had occasional slight deficiencies in organic matter, total nitrogen and extractable potassium. These deficiencies should be addressed for landscape purposes, by either a suitable application of compost or fertiliser.

A high level of organic matter was recorded within the *Subsoil*. Such levels would only be considered suitable provided the *Subsoil* is adequately structured to encourage drainage and aeration of the subsoil.

5.3 Options for Garden Construction

The *Subsoil* is anticipated to offer severe drainage restrictions following the normal construction phases. **Therefore, for all options below, we recommend that the subsoil is thoroughly decompacted and prepared prior to spreading the topsoil.**

Drainage installation may be required for all options at vulnerable locations, e.g. base of slopes and tree pits, as well as other measures to avoid flooding, including sloping patios and gardens away from houses and installation of interceptor drains between topsoil and pathways/patios.

Option 1 – Placement of 300mm Imported Topsoil

Imported topsoil should be a 'sandy loam' or 'loamy sand' texture and be compliant with BS3882:2015.

Option 1 would be considered to be most preferable in relation to the quality of the completed gardens (and therefore customer satisfaction) and present the lowest 'risk' of delays due to bad weather during construction. The completed gardens would be **compliant with the British Standard for topsoil (BS3882:2015).**

This option potentially generates unusable site topsoil as surplus spoil which would need to be accommodated on-site or incur disposal costs off-site. Additional costs for imported topsoil would be incurred.

Option 2 – Placement of 150mm Imported Topsoil over 150mm Site Topsoil

An imported 'sandy loam' or 'loamy sand' BS3882:2015 compliant topsoil and placing 150mm of this material over 150mm of the site-won topsoil.

This option allows for some of the site topsoil to be re-used which reduces the potential volume of surplus spoil. The completed gardens would be **compliant with the British Standard for topsoil (BS3882:2015)**.

This option is reliant on the site topsoil having an adequate 'soil structure' following stripping storage and resspreading. If the earthworks programme dictates the topsoil to be stripped and stored during the wetter periods of the year, this option may not be viable due to the damage (compaction) caused to the structure of the topsoil by intensive soil handling. Once the topsoil is damaged, this option could still be feasible if the topsoil can be successfully 'reconditioned' prior to placement.

Additional costs are incurred to import topsoil. Where site-won topsoil cannot be accommodated on-site, any surplus topsoil would need to be disposed of off-site with the associated costs.

Option 3 – Re-Use of 300mm Site Topsoil

If the site topsoil is to be used for the full topsoil depth (300mm).

For this option we recommend that the **upper 50mm** of the upper topsoil layer is ameliorated with a suitable source of sand. The aim is to improve the physical condition of the topsoil surface to help turf establishment.

The sand used should be dominated by *medium sand* (0.25 – 0.50mm) and should be a washed quarried sand. Marine dredged sand or a recycled sand should not be used.

This option allows for the maximum re-use of the available site topsoil, with additional costs for the importation of sand only.

As for Option 2, the success of this option is completely dependent on the physical condition of the topsoil being maintained through the earthworks stages. Therefore, this option carries the highest risk of delays through inclement weather and/or severe damage being caused to the structure of the topsoil where the topsoil is handled when moist/plastic.

This treatment will not improve the overall drainage capacity of the topsoil, and therefore the final quality of the gardens should be anticipated to be not as good as Option 1 or Option 2, with the highest risks of waterlogging, turf failure and customer complaints. Following sand amelioration, the topsoil will remain **non-compliant with the British Standard for Topsoil (BS3882:2015)**.

5.4 Tree Planting

The following consideration is given to the re-use of the site soils for semi-mature trees.

Semi-mature trees are the most demanding planting environment to construct. Trees of this size and age have grown accustomed to optimum growing conditions in the nursery, and these need to be replicated when the rootballed or containerised tree is planted in the pit. In particular, aeration and drainage around the rootball as well as moderate to high fertility status are critical. Without these properties, trees will very quickly suffer and possibly die during their first few growing seasons after planting.

All rootballed trees should be planted with well-aerated and free-draining soils to the full rooting depth (normally considered to be 1.0m).

Given the anticipated poor drainage of the site subsoil, it would be important that the tree pits do not act as sumps for surface draining water. As a minimum, an appropriate free-draining sand or sandy subsoil should be used as subsoil. Consideration should be given to constructing tree pits with appropriate drainage media and positive drainage where necessary. Other measures such as shallow topsoil mounding should be considered where necessary.

5.5 SuDS Features

The soil requirements for soft landscape SuDS are dependent on the anticipated moisture regime of these features, presence of pipework and the type of planting within them. If for instance, the SuDS features are intended to receive and attenuate rainwater, and then enable it to infiltrate efficiently into the underlying ground or to pipework, light sandy soils are normally preferred to facilitate water drainage. Alternatively, it may be desirable to encourage formation of ephemeral or permanent water bodies, or marshy conditions in such areas, for which more moisture retentive soil might be preferable.

The planting type will also influence the soil requirements, for example if there are to be trees, grassland, shrubs or more marginal 'marsh' like vegetation. Grassland in basins for instance will have similar requirements to low use amenity grass or wildflower grassland, whilst tree planting will be subject to the considerations given above for this planting type.

If the SuDS are to provide an efficient soakage function (e.g. to existing ground or to convey to underlying pipework) it would seem that the moisture retentive properties of the site won soils are probably not suitable for re-use for this landscape type. In this situation, a suitable imported sand-based topsoil would be preferable to ensure the proper functioning of these SuDS features. However, if topsoil of low permeability is desirable / acceptable for some of these features, then the site won soils could be considered.

Lower soil fertility status may be desirable to prevent leaching of excess nutrients into recipient watercourses, depending on the outfall strategy from the SuDS system. The moderate phosphate levels of the site won topsoil should help to reduce the risk of nutrient run-off which can promote eutrophication and algal growth in recipient watercourses should the SuDS features outfall directly to these. However, further review by a water specialist may be required to confirm suitability.

5.6 Re-use of the Site Soils – Summary

A summary of the re-use potential of the site soils for particular landscape types is given in the table below. This summary is on the proviso that the considerations discussed above are adhered to. It is important to note that for all planting, turfing and seeding, the soils must be uncompacted and have an adequate structural condition.

Planting Environment	Topsoil	Subsoil
Tree Planting (≥16cm girth)	X	X
Tree Planting (<16cm girth)	✓	O
Ornamental Shrub Planting	X	X
Native Shrub Planting	✓	O
Amenity Grass (high foot traffic – including residential back gardens)	See Section 5.3	See Section 5.3
Amenity Grass (low foot traffic)	✓	✓
SuDS Feature	SD	SD

- ✓ Soil suited to this landscape type **provided** it is in good physical condition, large stones are removed and plant species are tolerant of moisture retentive soils with a wide pH tolerance.
- O Soil may be suitable for this landscape type provided the soil is in its optimum condition and drainage improvements are made where necessary, Species selected must be hardy and suited to moisture retentive soils with a wide pH tolerance.
- X Not suited to this landscape type.
- SD Suitability depends on desired function of different SuDS feature.

5.7 Compliance with British Standards

The *Topsoil* was **not fully compliant** with the requirements of the British Standard for Topsoil (*BS3882:2015 – Specification for Topsoil – Table 1, Multipurpose Topsoil*) on account of the total silt content (*Topsoil Sample 2*), the presence of stones >50mm and slight deficiencies in organic matter, total nitrogen (*Topsoil Sample 2*) and extractable potassium (*Topsoil Sample 2*).

The *Subsoil* was **largely compliant** with the requirements of the British Standard for Subsoil (*BS8601:2013 – Specification for Subsoil – Table 1, Multipurpose Subsoil*), with the exception of a slightly elevated organic matter content.

5.8 Soil Structure & Physical Degradation

It is essential to provide a structured, uncompacted soil profile for the successful establishment and subsequent growth of plants and grass. Adequate soil structure is a key element for healthy plant growth to ensure aeration and drainage within the rootzone. Where the site's development programme requires the soils to be disturbed by activities such as excavation, storage and respreading, soil structure can easily be destroyed by compaction. Any damage to soil structure will reduce the drainage rate of these soils.

Almost all soils are physically degraded during intensive handling and the potential quality and the ultimate suitability of the site soils for re-use will depend on how well their soil structures are preserved during the earthworks phase. This topsoil is particularly prone to structural damage if handled and moved when wet. In this situation, the larger (air containing) soil pores are destroyed and replaced by smaller (water retentive) pores. This will restrict gaseous exchange with the atmosphere and cause the topsoil to become anaerobic (oxygen depleted). In addition, the lack of larger pores prevents effective drainage and results in an increased risk of waterlogging.

5.9 Topsoil Handling & Programming

If the site topsoil is to be re-used successfully, structural degradation must be kept to a minimum. In order to achieve this, it is considered best practice to only handle the topsoil when it is reasonably dry and friable in consistency.

The most appropriate time to carry out the topsoil strip will therefore be during the summer months (May/June to September/October), and then only when the topsoil is dry. If the topsoil is dry when it goes into the temporary stockpile, it can be kept dry until it is respread.

If the development's programme requires the topsoil to be handled when moist/wet and plastic, it is inevitable that significant damage is likely to occur to its structure. This damage will be potentially irreparable (particularly in the short to medium term), and planning the programme of earthworks should therefore be carefully considered by the project team at the earliest stage.

Should the topsoil become damaged through wet handling, it may still be possible to repair the damage provided there is sufficient time and dry weather. It will therefore be essential that the *Topsoil Respreading Phase* take place during a summer season, to allow enough time for the soil to dry out effectively and be thoroughly cultivated before soil cultivation and planting/seeding/turfing takes place in autumn (grass seeding) and winter (planting).

If the project's programme results in wet topsoil being respread for planting/seeding/turfing in the wetter/colder, winter or following spring months, there will be no opportunity to recondition and prepare the topsoil to address the structural degradation caused by the stripping/stockpiling process. Planting into such adverse conditions is likely to result in plant/lawn failures and greater instances of flooded back gardens and other low lying areas of the development.

5.10 Soil Resource Plan

Careful management of topsoil and subsoil is an important aspect for the sustainable use of soils. With reference to the DEFRA's *Construction Code of Practice for the Sustainable Use of Soils on Construction Sites* (2009), a **Soil Resource Plan** will be prepared.

The Soil Resource Plan will include the following:

1. Treatment of existing vegetation.
2. Methods for stripping and stockpiling soils.
3. Appropriate topsoil depths.
4. Methods for resspreading soils.
5. Soil treatment techniques to ensure a well structured, uncompacted rooting zone is provided for future landscape construction.
6. Soil amelioration measures including options to improve the quality of the soils by adding fertiliser, compost or sand etc.

We would like to thank Landlink Estates Ltd for entrusting our practice with this commission. We trust this report meets with your approval and provides the necessary information. Please do not hesitate to contact the undersigned if you require further assistance.

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Senior Soil Scientist

For & on behalf of Tim O'Hare Associates LLP

Report Qualifications

This interpretation of the soil conditions is based on observations made during the site investigation and the results of laboratory tests. This report presents TOHA's site observations and test results and interpretation of those observations and results. On any site there may be variations in soil conditions between these exploratory positions. TOHA can therefore not accept any responsibility for soil conditions that have not been exposed by this investigation.

This investigation considers the re-use of the site soils for landscape purposes for the Lamb Field, Bilsham Road, Yapton site. It should not therefore be relied on for alternative end-uses or for other schemes. This report has been prepared solely for the benefit of TOHA's client Landlink Estates Ltd. No warranty is provided to any third party and no responsibility or liability will be accepted for any loss or damage in the event that this report is relied upon by a third party or is used in circumstances for which it was not originally intended.

Appendix 1

Site Plan - Trial Hole Locations



■ Trial Hole Location (approx.)

----- Site boundary



Client:	Landlink Estates Ltd		
Project:	Lamb Field, Bilsham Road, Yapton		
Job ref no.:	TOHA/21/6591/ML		
Drawing no.:	6591/1		
Drawing title:	Soil Resource Survey		
Date:	Dec '21	Scale:	NTS
Drawn by:	ML	Checked by:	RH
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Appendix 2

Laboratory Analysis Results



TIM O'HARE ASSOCIATES
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Client:	Landlink Estates Ltd
Project:	Lamb Field, Bilsham Road, Yapton
Job:	Soil Resource Survey - Topsoil
Date:	December 2021
Job Ref No:	TOHA/21/6591/ML

Sample Reference		
Sample Location		
		Accreditation
Clay (<0.002mm)	%	UKAS
Silt (0.002-0.063mm)	%	UKAS
Sand (0.063-2.0mm)	%	UKAS
Texture Class (UK Classification)	--	UKAS
Stones (2-20mm)	% DW	GLP
Stones (20-50mm)	% DW	GLP
Stones (>50mm)	% DW	GLP
pH Value (1:2.5 water extract)	units	UKAS
Electrical Conductivity (1:2.5 water extract)	uS/cm	UKAS
Electrical Conductivity (1:2 CaSO ₄ extract)	uS/cm	UKAS
Exchangeable Sodium Percentage	%	UKAS
Organic Matter (LOI)	%	UKAS
Total Nitrogen (Dumas)	%	UKAS
C : N Ratio	ratio	UKAS
Extractable Phosphorus	mg/l	UKAS
Extractable Potassium	mg/l	UKAS
Extractable Magnesium	mg/l	UKAS

CL = CLAY LOAM
ZCL = SILTY CLAY LOAM

Topsoil Sample 1
TH1 - TH6

19
60
21
CL
5
6
1

7.3
86
2051
1.4

3.2
0.15
13
22
164
124

Topsoil Sample 2
TH7 - TH11

22
65
13
ZCL
1
4
2

7.0
130
2095
1.5

2.9
0.13
13
17
102
124

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Results of analysis should be read in conjunction with the report they were issued with



TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Client:	Landlink Estates Ltd
Project:	Lamb Field, Bilsham Road, Yapton
Job:	Soil Resource Survey - Subsoil
Date:	December 2021
Job Ref No:	TOHA/21/6591/ML

Sample Reference		
Sample Location		
		Accreditation
Clay (<0.002mm)	%	UKAS
Silt (0.002-0.063mm)	%	UKAS
Sand (0.063-2.0mm)	%	UKAS
Texture Class (UK Classification)	--	UKAS
Stones (2-20mm)	% DW	GLP
Stones (20-50mm)	% DW	GLP
Stones (>50mm)	% DW	GLP
pH Value (1:2.5 water extract)	units	UKAS
Electrical Conductivity (1:2.5 water extract)	uS/cm	UKAS
Organic Matter (LOI)	%	UKAS

ZCL = SILTY CLAY LOAM

Subsoil Sample 1
TH1 - TH6

26
66
8
ZCL
9
13
0

7.8
200

2.1

Subsoil Sample 2
TH7 - TH11

27
64
9
ZCL
2
2
8

7.3
137

2.1

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