FEHILY TIMONEY

CONSULTANTS IN ENGINEERING, ENVIRONMENTAL SCIENCE & PLANNING

# DUNSINK LANDFILL TREE PLANTING TECHNICAL ASSESSMENT

## LANDFILL CAPPING GEOTECHNICAL ASSESSMENT FOR TREE PLANTING AT DUNSINK LANDFILL

**Prepared for: Fingal County Council**

**Date: February 2022**

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# LANDFILL CAPPING GEOTECHNICAL ASSESSMENT OF FOR TREE PLANTING AT DUNSINK LANDFILL

**REVISION CONTROL TABLE, CLIENT, KEYWORDS AND ABSTRACT**
**User is responsible for Checking the Revision Status of This Document**

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| 0 | Issue for Client Review | DH | CJC | CJC | 25.02.2022 |

**Client:** Fingal County Council

**Keywords:** Landfill capping, tree planting, window sampling, soil assessment, geotechnical

**Abstract:** Fehily Timoney & Co. (FT) was commissioned by Fingal County Council to undertake an intrusive site investigation to assess the geotechnical characteristics of the capped landfill along the north-western slope of Dunsink Landfill. The intrusive investigation included 8 No. window samples (WS01 – WS08) and the collection of soil samples for geotechnical analysis. The objective of the investigation was to provide a detailed assessment of the soil characteristics on the proposed planting area to allow an assessment of the suitability for tree planting.

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# 1. INTRODUCTION

Fehily Timoney and Company (FT) was commissioned by Fingal County Council (FCC) to undertake an intrusive investigation along the north-western sloped section of Dunsink Landfill as part of an investigation to assess the suitability of the ground conditions for tree planting.

## 1.1 Background

Fingal County Council is proposing to plant up to 10,000 trees across a 4-acre plot (approx. 400 m length x 50 m width) in the former landfill at Dunsink as part of the ongoing restoration of the site and its ongoing development into a public park. The proposed planting area is located to the north-west of the site, adjacent to the boundary with the M50 motorway.

Following FCC's tree planting submission to the Environmental Protection Agency (EPA), dated 27th November 2020, it is understood this application was refused as it did not comply with the requirements of Condition 4.5 of Waste Licence No. W0127-01. Condition 4.5 which states:

*''Where tree planting is to be carried out above waste-filled areas, a synthetic barrier shall be used to augment the clay cap. Combined topsoil and subsoil depths shall be a minimum of 1m.''*

Due to the lack of synthetic barrier underlying the proposed north-western sloped area, it is understood that additional technical information is required with respect to: depth of the soil layer to waste and results from window sampling in the area where trees are to be planted. The existing tree species along the north-eastern slope comprise a mixture of Birch (fibrous shallow root depth), Alder (fibrous shallow root depth but if soil free draining roots will go deeper), Ash (shallow typically 1.0 m deep), Hazel (medium depth 2.0 m to 3.0 m) and Pine (Medium 1.5 m to 3.0 m deep) and were planted in 2012.

Based on an EPA audit carried out in May 2021, the EPA stated that a Technical Amendment / Review of Condition 4.5 may be considered as the original submission was rejected.

## 1.2 Scope and Objectives

The purpose of this report and associated site investigation was to assess the subsoil characteristics on the proposed planting site to facilitate an assessment of the suitability for tree planting.

Tree planting on a restored landfill site is subject to certain conditions being confirmed. For successful tree establishment to occur on the proposed site; stability, cap permeability, drainage and fugitive gas emissions will need to be considered.

FT, with respect to the existing tree species, set out to examine:

1. Stability requirements - investigation to determine depth of soil below the surface.
2. Barrier layer - investigation to determine the permeability of material above waste.
3. Geotechnical testing of soil samples.

## 1.3 Relevant Guidance

The reference documents and online resources used in the preparation of this chapter include the following:

- EPA Landfill Restoration and Aftercare Manual (1999)
- UK Environment Agency (EA) guidelines for Earthworks in Landfill Engineering (2014)
- After Soil Survey Manual, USDA Handbook No. 18 (1951)
- A Guide to Forest Tree Species Selection and Silviculture in Ireland COFORD 2003 ISBN 1 902696 27 1
- The Forest of Fingal – A Tree Strategy for Fingal (2010)
- Journal of Forest Science, 48, 2002 (8): 342–350
  https://www.agriculturejournals.cz/publicFiles/286313.pdf

# 2. SITE INVESTIGATION

## 2.1 Ground Investigation Works

The ground investigation was undertaken by Causeway Geotech Limited (CGL) using a Dando Terrier dynamic sampling method under the supervision of FT's Project Engineer between the 8th and 9th November 2021. The ground investigation rationale was devised in accordance with the findings of the initial desk study.

### 2.1.1 Ground Investigation Rationale and Methodology

Preliminary intrusive locations were chosen during the desk study in order to provide a broad spatial coverage of the proposed tree planting area.

The intrusive investigation comprised the following scope of works:

i. The advancement of 8 No. window samples (WS01 – WS08) to a maximum depth of 4.0m BGL.
ii. Recording of ground conditions encountered and noting the geotechnical characteristics of the deposited soil material.
iii. Collection of soil samples for geotechnical testing.

The boreholes were taken to depths ranging between 1.1 m and 4.0 m where they were terminated at their scheduled depths, or else they were terminated on encountering virtual refusal on obstructions above this depth.

The window sample locations are presented in Figure 2.1. Borehole logs are presented in Appendix 1.

Representative soil samples were taken from various depths and strata and submitted for geotechnical testing to assess the suitability of the material for tree planting. The results are provided in Appendix 2.

### 2.1.2 Site Topography and Surface Ground Conditions

As can be seen in Figure 2.1 below, the intrusive site investigation targeted the Made Ground landfill capping soil material along the north-western boundary of the site. The topography of the proposed planting area is a combination of a sloped 1:2 gradient along the west side and flat area of imported soil to the east side. Surface vegetation consisting predominantly of minor scrub and grass is established across the proposed planting area.

## Figure 2.1: Site Investigation Location Plan

## 2.2 Soil Characteristics Encountered

A summary of the soil strata encountered during the ground investigations is given in Table 2.1 below.

**Table 2.1: Summary of Geology Encountered**

| Strata | General Description | Depth to Top Range (m bgl) | Depth to Bottom Range (m bgl) |
|---|---|---|---|
| Topsoil / Made Ground | Firm - Stiff grey / brown sandy gravelly CLAY | 0 | 1.0 – 2.0 |
| Made Ground (Fill) | Varying amounts of concrete, brick, timber fragments and cinders | 2.0 – 3.0 | 2.0 – 4.0 |

Water strikes or perched surface water pooling were not reported which may indicate to a lack of low permeability cohesive soils within the proposed tree planting area.

### 2.2.1 Made Ground

The ground investigation generally encountered Made Ground comprising disturbed glacial till deposits to an average depth of between 1.8 m – 2.0 m BGL. The Made Ground was generally found to be loamy, ie having equal proportions of sand silt and clay, generally being described as *slightly sandy slightly gravelly CLAY* or *sandy gravelly CLAY*.

Due to the disturbed nature of the Made Ground, the cobble content was variable with depth. For the purpose of this report, cobble content is considered to be variable across the study area and consists of sub*angular to sub-rounded cobbles fine to coarse*.

The Made Ground material at the study area can therefore be considered a stony cohesive fill material.

### 2.2.2 Landfill Material

Landfill material was encountered in all boreholes with the exception of WS03 and WS06 comprising varying amounts of concrete, bricks, timber fragments and cinders. The presence of the landfill material was recorded at an average depth of between 2.0 m – 3.0 m BGL across the study area.

### 2.2.3 Soil Sampling

A total of 19 No. bulk soil samples were taken during the site investigation for geotechnical analysis. All samples were taken in the field by FT using standard sampling methods and dispatched to Metlab Ltd. under appropriate chain-of-custody procedures.

# 3. GEOTECHNICAL ASSESSMENT

## 3.1 Determination of Characteristic Geotechnical Parameters

### 3.1.1 Material Properties for Landfill Capping

According to the UK Environment Agency (EA) guidelines for Earthworks in Landfill Engineering (2014), the use of natural clays for landfill capping must meet the following criteria:

a) Low hydraulic conductivity.
b) Adequate shear strength.
c) Minimal shrinkage upon reduction of moisture content (this is met by application of the plasticity index limits).
d) Plasticity.
e) Workability.

In selecting acceptable capping materials, initially they should comply generally with the specifications outlined in BS1377 (1990) which are summarised in Table 3.1.

**Table 3.1: Typical Clay Capping Properties**

| Engineering Property | Minimum Requirement | Test |
|---|---|---|
| Remoulded undrained shear strength | Typically, ≥ 50 kN/m$^2$ | BS1377: 1990, Part 7: Method 8 |
| Plasticity index ($I_P$) | 10% ≤ $I_P$ ≤ 65% | BS1377: 1990, Part 2: Method 4.3 and 5.3 |
| Liquid Limit | ≤ 90% | |
| Percentage fines <0.063mm | ≥ 20 % but with a minimum clay content (particles < 2 µm) of 8% | BS1377: 1990, Part 2: Method 9.2, 9.5 |
| Percentage gravel | ≤ 30% | |

The laboratory testing as part of this assessment considered the following clay capping properties:

- Percentage fines
- Percentage gravel

The overall findings of the geotechnical laboratory assessment are summarised below in Table 3.2. The results of PSD and Hydrometer testing are also presented.

**Table 3.2: Summary of Geotechnical Laboratory Results**

| Location ID | Depth Range (m) | Textural Class (USDA) | Moisture Content (%) | pH | Organic Content |
|---|---|---|---|---|---|
| WS-1 | 0 – 1.0 | Sandy Loam | 35 | 7.1 | 23.53 |
| | 1.0 – 2.0 | Sandy Loam | 11 | 7.2 | -- |
| WS-2 | 0 – 1.0 | Loamy Sand | 25 | 7.2 | 29.73 |
| | 1.0 – 2.0 | Sandy Loam | 23 | 7.2 | -- |
| WS-3 | 0 – 1.0 | Sandy Loam | 23 | 7.1 | 25.80 |
| | 1.0 – 2.0 | Sandy Loam | 13 | 7.3 | -- |
| | 2.0 – 3.0 | Sandy Loam | 14 | 7.1 | -- |
| | 3.0 – 4.0 | Sandy Loam | 19 | 7.1 | -- |
| WS-4 | 0 – 1.0 | Sandy Loam | 17 | 7.1 | 16.80 |
| | 1.0 – 2.0 | Sandy Loam | 12 | 7.2 | -- |
| WS-5 | 0 – 1.0 | Sandy Silt Loam | 28 | 7.1 | 28.10 |
| | 1.0 – 2.0 | Sandy Loam | 14 | 7.2 | -- |
| WS-6 | 0 – 1.0 | Sandy Loam | 20 | 7.0 | 11.45 |
| WS-7 | 0 – 1.0 | Sandy Loam | 17 | 7.1 | 18.95 |
| | 1.0 – 2.0 | Loamy Sand | 15 | 7.2 | -- |
| | 2.0 – 3.0 | Sandy Loam | 13 | 7.3 | -- |
| WS-8 | 0 – 1.0 | Sandy Loam | 24 | 7.1 | 31.30 |
| | 1.0 – 2.0 | Sandy Loam | 12 | 7.2 | -- |
| | 2.0 – 3.0 | Sandy Loam | 16 | 7.3 | -- |

Table 3-2 classifies soils using the USDA soil classification system which is commonly used for agricultural soil assessments. The PSD and hydrometer laboratory results are presented overleaf.

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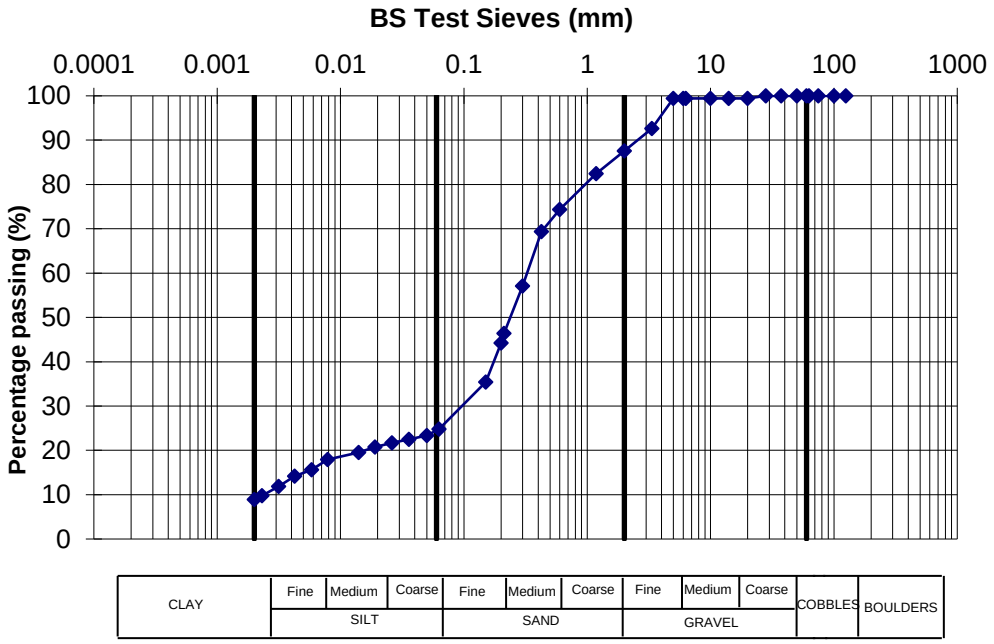
| | | | |
|---|---|---|---|
| Contract No | **J3559** | Report No | **C10281-PSD&HYD.01** |
| Client Contact | **Mr. Daniel Hayden** | Lab No | **C10281** |
| Client | **Fehily Timoney & Company** | Sample Type | **Bulk Disturbed** |
| Contract | **Dunsink Tree Planting** | Method of Prep | **N/A** |
| | | Sampling Certificate | **Yes** |
| | | Sampled By | **Client** |
| Site Ref | **N/A** | Date Sampled | **N/A** |
| Client Ref | **PSD&HYD.01** | Date Received | **25/11/2021** |
| Specification | **BS 3882** | Date Started | **16/12/2021** |
| Location | **WS.01: 0.0-1.0m** | | |
| Sample Description | **Topsoil** | | |

| Sieve Size (mm) | % Passing | Limits |
|---|---|---|
| 125 | 100 | |
| 100 | 100 | |
| 75 | 100 | |
| 63 | 100 | |
| 50 | 100 | |
| 37.5 | 100 | |
| 28 | 100 | |
| 20 | 99 | |
| 14 | 99 | |
| 10 | 99 | |
| 6.3 | 99 | |
| 5 | 99 | |
| 3.35 | 93 | |
| 2 | 88 | |
| 1.18 | 82 | |
| 0.6 | 74 | |
| 0.425 | 69 | |
| 0.3 | 57 | |
| 0.212 | 46 | |
| 0.15 | 35 | |
| 0.063 | 24.8 | |
| 0.040 | 22.9 | |
| 0.030 | 22.2 | |
| 0.020 | 21.0 | |
| 0.013 | 19.3 | |
| 0.009 | 17.9 | |
| 0.005 | 14.2 | |
| 0.002 | 8.9 | |

### PSD GRAPH




| Constituent Proportions (%) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Gravel = | 12 | Sand = | 63 | Silt = | 15.9 | Clay = | 8.9 |

| | |
|---|---|
| >2mm | 12% |
| >20mm | 1% |
| >50mm | 0% |

| | |
|---|---|
| Texture Class <2mm | SANDY LOAM |

Approved

17/01/2022
Date Reported

| Approval By: | |
|---|---|
| Technical Manager | ■ |
| Deputy Technical Manager | ☐ |
| Laboratory Supervisor | ☐ |

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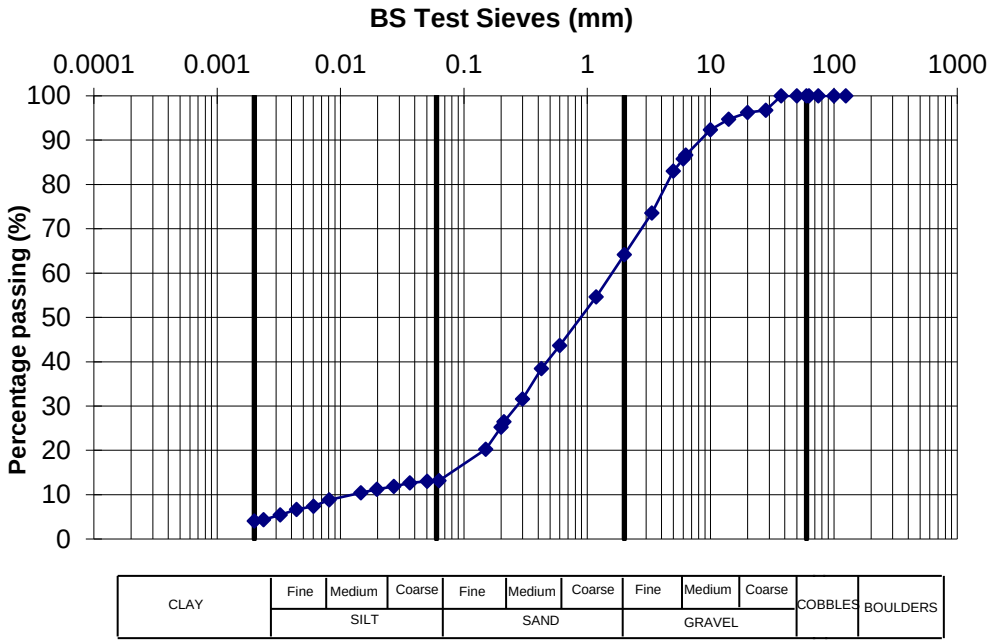
| Contract No | **J3559** | Report No | **C10282-PSD&HYD.02** |
| Client Contact | **Mr. Daniel Hayden** | Lab No | **C10282** |
| Client | **Fehily Timoney & Company** | Sample Type | **Bulk Disturbed** |
| Contract | **Dunsink Tree Planting** | Method of Prep | **N/A** |
| | | Sampling Certificate | **Yes** |
| | | Sampled By | **Client** |
| Site Ref | **N/A** | Date Sampled | **N/A** |
| Client Ref | **PSD&HYD.02** | Date Received | **25/11/2021** |
| Specification | **BS 3882** | Date Started | **17/12/2021** |
| Location | **WS.02: 0.0-1.0m** | | |
| Sample Description | **Topsoil** | | |

| Sieve Size (mm) | % Passing | Limits |
|---|---|---|
| 125 | 100 | |
| 100 | 100 | |
| 75 | 100 | |
| 63 | 100 | |
| 50 | 100 | |
| 37.5 | 100 | |
| 28 | 97 | |
| 20 | 96 | |
| 14 | 95 | |
| 10 | 92 | |
| 6.3 | 87 | |
| 5 | 83 | |
| 3.35 | 74 | |
| 2 | 64 | |
| 1.18 | 55 | |
| 0.6 | 44 | |
| 0.425 | 38 | |
| 0.3 | 32 | |
| 0.212 | 26 | |
| 0.15 | 20 | |
| 0.063 | 13.2 | |
| 0.040 | 12.9 | |
| 0.030 | 12.1 | |
| 0.020 | 11.3 | |
| 0.013 | 10.0 | |
| 0.009 | 8.8 | |
| 0.005 | 6.7 | |
| 0.002 | 4.1 | |

### PSD GRAPH




| Constituent Proportions (%) | | | |
|---|---|---|---|
| Gravel = 36 | Sand = 51 | Silt = 9.1 | Clay = 4.1 |

| | |
|---|---|
| >2mm | 36% |
| >20mm | 4% |
| >50mm | 0% |

| | |
|---|---|
| Texture Class <2mm | LOAMY SAND |

Approved

17/01/2022
Date Reported

| Approval By: | |
|---|---|
| Technical Manager | ■ |
| Deputy Technical Manager | ☐ |
| Laboratory Supervisor | ☐ |

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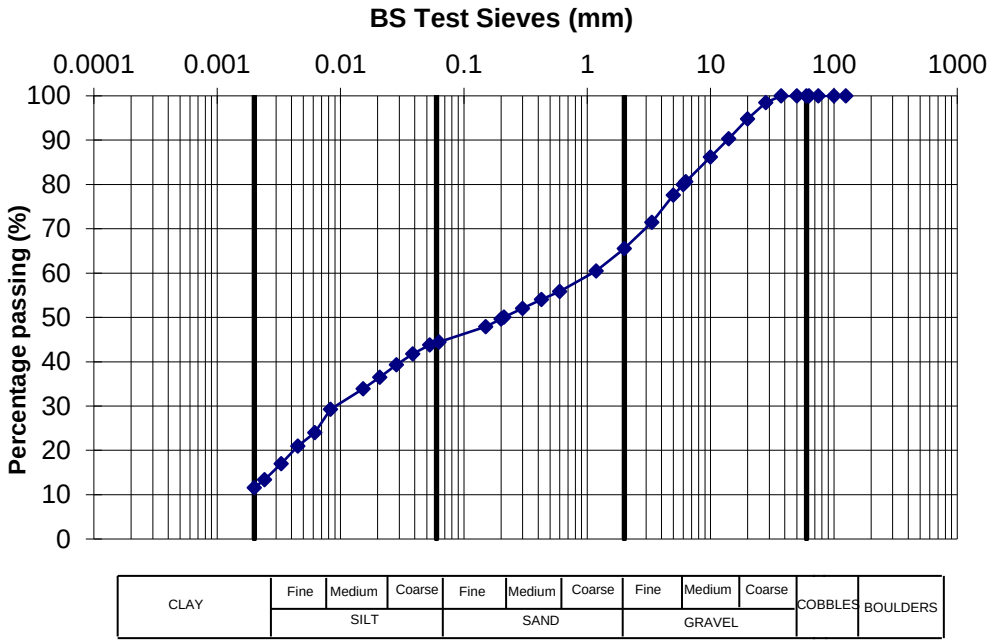
| Contract No | **J3559** | Report No | **C10283-PSD&HYD.03** |
| Client Contact | **Mr. Daniel Hayden** | Lab No | **C10283** |
| Client | **Fehily Timoney & Company** | Sample Type | **Bulk Disturbed** |
| Contract | **Dunsink Tree Planting** | Method of Prep | **N/A** |
| | | Sampling Certificate | **Yes** |
| | | Sampled By | **Client** |
| Site Ref | **N/A** | Date Sampled | **N/A** |
| Client Ref | **PSD&HYD.03** | Date Received | **25/11/2021** |
| Specification | **BS 3882** | Date Started | **16/12/2021** |
| Location | **WS.03: 0.0-1.0m** | | |
| Sample Description | **Topsoil** | | |

| Sieve Size (mm) | % Passing | Limits |
|---|---|---|
| 125 | 100 | |
| 100 | 100 | |
| 75 | 100 | |
| 63 | 100 | |
| 50 | 100 | |
| 37.5 | 100 | |
| 28 | 98 | |
| 20 | 95 | |
| 14 | 90 | |
| 10 | 86 | |
| 6.3 | 81 | |
| 5 | 78 | |
| 3.35 | 71 | |
| 2 | 66 | |
| 1.18 | 61 | |
| 0.6 | 56 | |
| 0.425 | 54 | |
| 0.3 | 52 | |
| 0.212 | 50 | |
| 0.15 | 48 | |
| 0.063 | 44.4 | |
| 0.040 | 42.1 | |
| 0.030 | 39.9 | |
| 0.020 | 36.1 | |
| 0.013 | 32.4 | |
| 0.009 | 29.3 | |
| 0.005 | 21.0 | |
| 0.002 | 11.6 | |

### PSD GRAPH




| Constituent Proportions (%) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Gravel = | 34 | Sand = | 21 | Silt = | 32.8 | Clay = | 11.6 |

| | |
|---|---|
| >2mm | 34% |
| >20mm | 5% |
| >50mm | 0% |

| | |
|---|---|
| Texture Class <2mm | SANDY LOAM |

Approved

17/01/2022
Date Reported

| Approval By: | |
|---|---|
| Technical Manager | ■ |
| Deputy Technical Manager | ☐ |
| Laboratory Supervisor | ☐ |

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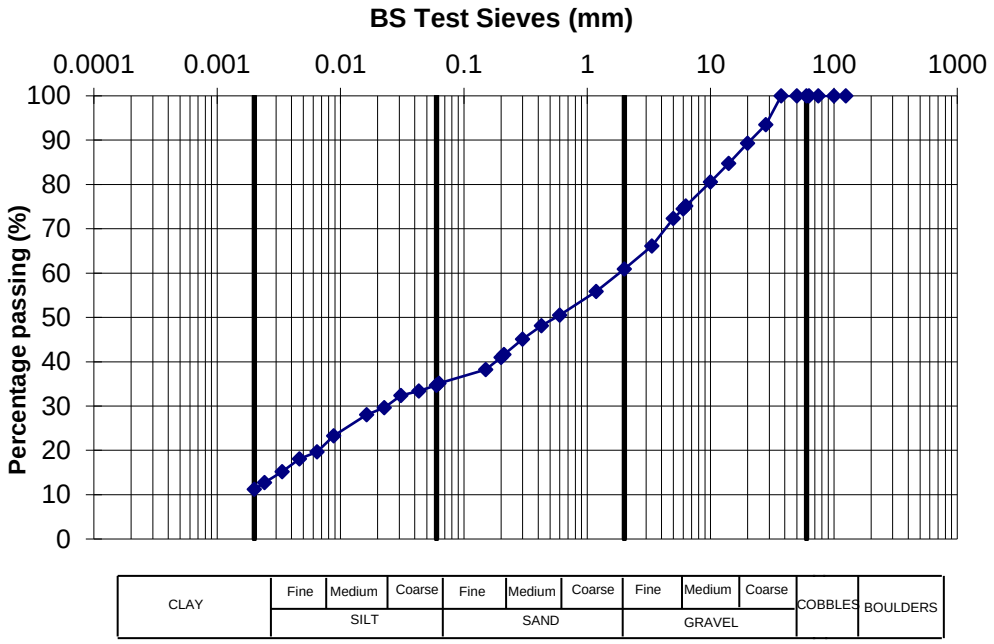
|---|---|---|---|
| Contract No | **J3559** | Report No | **C10284-PSD&HYD.04** |
| Client Contact | **Mr. Daniel Hayden** | Lab No | **C10284** |
| Client | **Fehily Timoney & Company** | Sample Type | **Bulk Disturbed** |
| Contract | **Dunsink Tree Planting** | Method of Prep | **N/A** |
| | | Sampling Certificate | **Yes** |
| | | Sampled By | **Client** |
| Site Ref | **N/A** | Date Sampled | **N/A** |
| Client Ref | **PSD&HYD.04** | Date Received | **25/11/2021** |
| Specification | **BS 3882** | Date Started | **16/12/2021** |
| Location | **WS.04: 0.0-1.0m** | | |
| Sample Description | **Topsoil** | | |

| Sieve Size (mm) | % Passing | Limits |
|---|---|---|
| 125 | 100 | |
| 100 | 100 | |
| 75 | 100 | |
| 63 | 100 | |
| 50 | 100 | |
| 37.5 | 100 | |
| 28 | 93 | |
| 20 | 89 | |
| 14 | 85 | |
| 10 | 81 | |
| 6.3 | 75 | |
| 5 | 72 | |
| 3.35 | 66 | |
| 2 | 61 | |
| 1.18 | 56 | |
| 0.6 | 51 | |
| 0.425 | 48 | |
| 0.3 | 45 | |
| 0.212 | 42 | |
| 0.15 | 38 | |
| 0.063 | 35.1 | |
| 0.040 | 33.1 | |
| 0.030 | 32.1 | |
| 0.020 | 29.0 | |
| 0.013 | 25.9 | |
| 0.009 | 23.3 | |
| 0.005 | 18.1 | |
| 0.002 | 11.2 | |

### PSD GRAPH




| Constituent Proportions (%) | | | |
|---|---|---|---|
| Gravel = 39 | Sand = 26 | Silt = 23.9 | Clay = 11.2 |

| | |
|---|---|
| >2mm | 39% |
| >20mm | 11% |
| >50mm | 0% |

| | |
|---|---|
| Texture Class <2mm | SANDY LOAM |

Approved

17/01/2022
Date Reported

| Approval By: | |
|---|---|
| Technical Manager | ■ |
| Deputy Technical Manager | ☐ |
| Laboratory Supervisor | ☐ |

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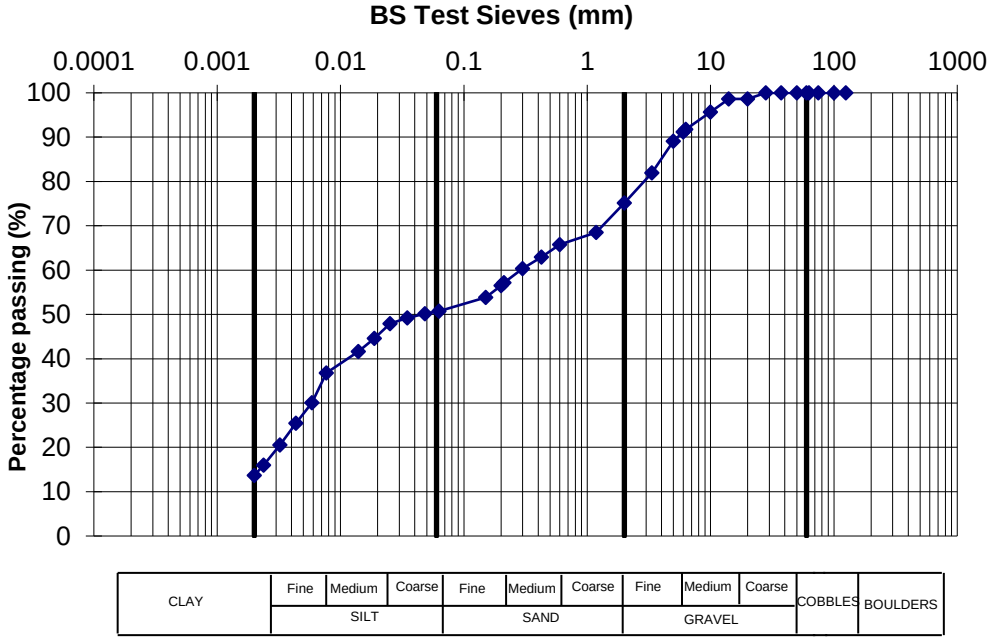
| Contract No | **J3559** | Report No | **C10285-PSD&HYD.05** |
| Client Contact | **Mr. Daniel Hayden** | Lab No | **C10285** |
| Client | **Fehily Timoney & Company** | Sample Type | **Bulk Disturbed** |
| Contract | **Dunsink Tree Planting** | Method of Prep | **N/A** |
| | | Sampling Certificate | **Yes** |
| | | Sampled By | **Client** |
| Site Ref | **N/A** | Date Sampled | **N/A** |
| Client Ref | **PSD&HYD.05** | Date Received | **25/11/2021** |
| Specification | **BS 3882** | Date Started | **16/12/2021** |
| Location | **WS.05: 0.0-1.0m** | | |
| Sample Description | **Topsoil** | | |

| Sieve Size (mm) | % Passing | Limits |
|---|---|---|
| 125 | 100 | |
| 100 | 100 | |
| 75 | 100 | |
| 63 | 100 | |
| 50 | 100 | |
| 37.5 | 100 | |
| 28 | 100 | |
| 20 | 99 | |
| 14 | 99 | |
| 10 | 96 | |
| 6.3 | 92 | |
| 5 | 89 | |
| 3.35 | 82 | |
| 2 | 75 | |
| 1.18 | 69 | |
| 0.6 | 66 | |
| 0.425 | 63 | |
| 0.3 | 60 | |
| 0.212 | 57 | |
| 0.15 | 54 | |
| 0.063 | 50.8 | |
| 0.040 | 49.6 | |
| 0.030 | 48.6 | |
| 0.020 | 45.3 | |
| 0.013 | 40.9 | |
| 0.009 | 36.8 | |
| 0.005 | 25.4 | |
| 0.002 | 13.7 | |

### PSD GRAPH




| Constituent Proportions (%) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Gravel = | 25 | Sand = | 24 | Silt = | 37.1 | Clay = | 13.7 |

| | |
|---|---|
| >2mm | 25% |
| >20mm | 1% |
| >50mm | 0% |

| | |
|---|---|
| Texture Class <2mm | SANDY SILT LOAM |

Approved

17/01/2022
Date Reported

| Approval By: | |
|---|---|
| Technical Manager | ■ |
| Deputy Technical Manager | ☐ |
| Laboratory Supervisor | ☐ |

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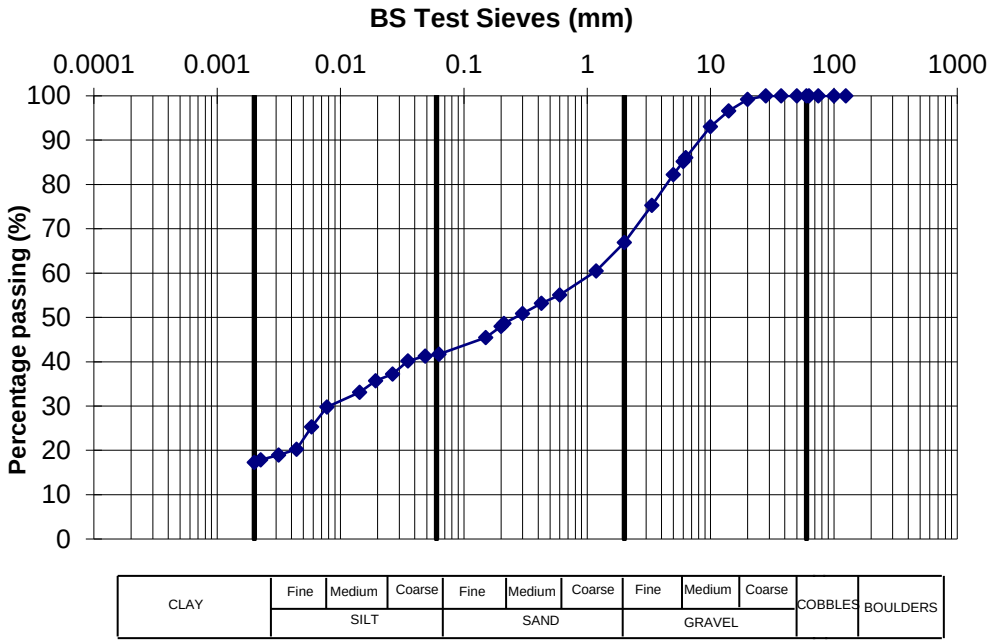
| | | | |
|---|---|---|---|
| Contract No | **J3559** | Report No | **C10286-PSD&HYD.06** |
| Client Contact | **Mr. Daniel Hayden** | Lab No | **C10286** |
| Client | **Fehily Timoney & Company** | Sample Type | **Bulk Disturbed** |
| Contract | **Dunsink Tree Planting** | Method of Prep | **N/A** |
| | | Sampling Certificate | **Yes** |
| | | Sampled By | **Client** |
| Site Ref | **N/A** | Date Sampled | **N/A** |
| Client Ref | **PSD&HYD.06** | Date Received | **25/11/2021** |
| Specification | **BS 3882** | Date Started | **17/12/2021** |
| Location | **WS.06: 0.0-1.0m** | | |
| Sample Description | **Topsoil** | | |

| Sieve Size (mm) | % Passing | Limits |
|---|---|---|
| 125 | 100 | |
| 100 | 100 | |
| 75 | 100 | |
| 63 | 100 | |
| 50 | 100 | |
| 37.5 | 100 | |
| 28 | 100 | |
| 20 | 99 | |
| 14 | 97 | |
| 10 | 93 | |
| 6.3 | 86 | |
| 5 | 82 | |
| 3.35 | 75 | |
| 2 | 67 | |
| 1.18 | 60 | |
| 0.6 | 55 | |
| 0.425 | 53 | |
| 0.3 | 51 | |
| 0.212 | 49 | |
| 0.15 | 45 | |
| 0.063 | 41.7 | |
| 0.040 | 40.6 | |
| 0.030 | 38.4 | |
| 0.020 | 36.1 | |
| 0.013 | 32.5 | |
| 0.009 | 29.8 | |
| 0.005 | 20.2 | |
| 0.002 | 17.3 | |

### PSD GRAPH




| Constituent Proportions (%) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Gravel = | 33 | Sand = | 25 | Silt = | 24.4 | Clay = | 17.3 |

| | |
|---|---|
| >2mm | 33% |
| >20mm | 1% |
| >50mm | 0% |

| | |
|---|---|
| Texture Class <2mm | SANDY LOAM |

Approved

17/01/2022
Date Reported

| Approval By: | |
|---|---|
| Technical Manager | ■ |
| Deputy Technical Manager | ☐ |
| Laboratory Supervisor | ☐ |

**End of Test**

# METLAB LTD

Unit 6 Airways Technology Park, Ballygarvan, Cork.

T: (021) 4311614 F: (021) 4311714 email: www.metlab.ie

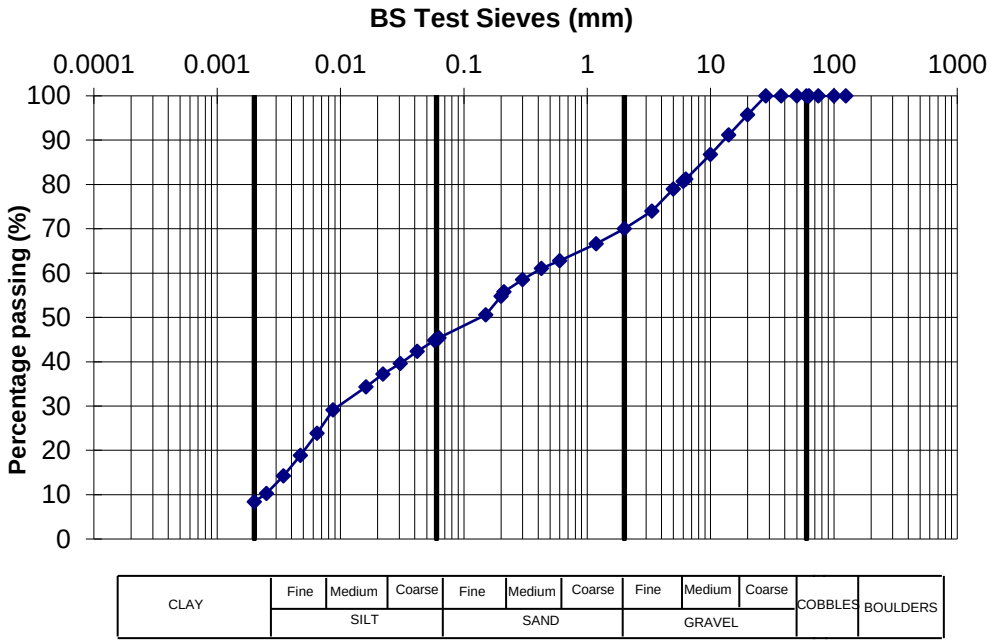
Metlab Ltd - registered in Ireland (No. 84894)


## PARTICLE SIZE DISTRIBUTION TEST REPORT
## TESTED IN ACCORDANCE WITH BS 1377:PART 2

| | | | |
|---|---|---|---|
| Contract No | **J3559** | Report No | **C10287-PSD&HYD.07** |
| Client Contact | **Mr. Daniel Hayden** | Lab No | **C10287** |
| Client | **Fehily Timoney & Company** | Sample Type | **Bulk Disturbed** |
| Contract | **Dunsink Tree Planting** | Method of Prep | **N/A** |
| | | Sampling Certificate | **Yes** |
| | | Sampled By | **Client** |
| Site Ref | **N/A** | Date Sampled | **N/A** |
| Client Ref | **PSD&HYD.07** | Date Received | **25/11/2021** |
| Specification | **BS 3882** | Date Started | **17/12/2021** |
| Location | **WS.07: 0.0-1.0m** | | |
| Sample Description | **Topsoil** | | |

| Sieve Size (mm) | % Passing | Limits |
|---|---|---|
| 125 | 100 | |
| 100 | 100 | |
| 75 | 100 | |
| 63 | 100 | |
| 50 | 100 | |
| 37.5 | 100 | |
| 28 | 100 | |
| 20 | 96 | |
| 14 | 91 | |
| 10 | 87 | |
| 6.3 | 81 | |
| 5 | 79 | |
| 3.35 | 74 | |
| 2 | 70 | |
| 1.18 | 67 | |
| 0.6 | 63 | |
| 0.425 | 61 | |
| 0.3 | 59 | |
| 0.212 | 56 | |
| 0.15 | 51 | |
| 0.063 | 45.4 | |
| 0.040 | 42.1 | |
| 0.030 | 39.5 | |
| 0.020 | 36.2 | |
| 0.013 | 32.2 | |
| 0.009 | 29.2 | |
| 0.005 | 18.9 | |
| 0.002 | 8.4 | |

### PSD GRAPH




| Constituent Proportions (%) | | | |
|---|---|---|---|
| Gravel = 30 | Sand = 25 | Silt = 37.0 | Clay = 8.4 |

| | |
|---|---|
| >2mm | 30% |
| >20mm | 4% |
| >50mm | 0% |

| | |
|---|---|
| Texture Class <2mm | SANDY LOAM |

Approved

17/01/2022
Date Reported

| Approval By: | |
|---|---|
| Technical Manager | ■ |
| Deputy Technical Manager | ☐ |
| Laboratory Supervisor | ☐ |

**End of Test**

# METLAB LTD

Unit 6 Airways Technology Park, Ballygarvan, Cork.

T: (021) 4311614 F: (021) 4311714 email: www.metlab.ie

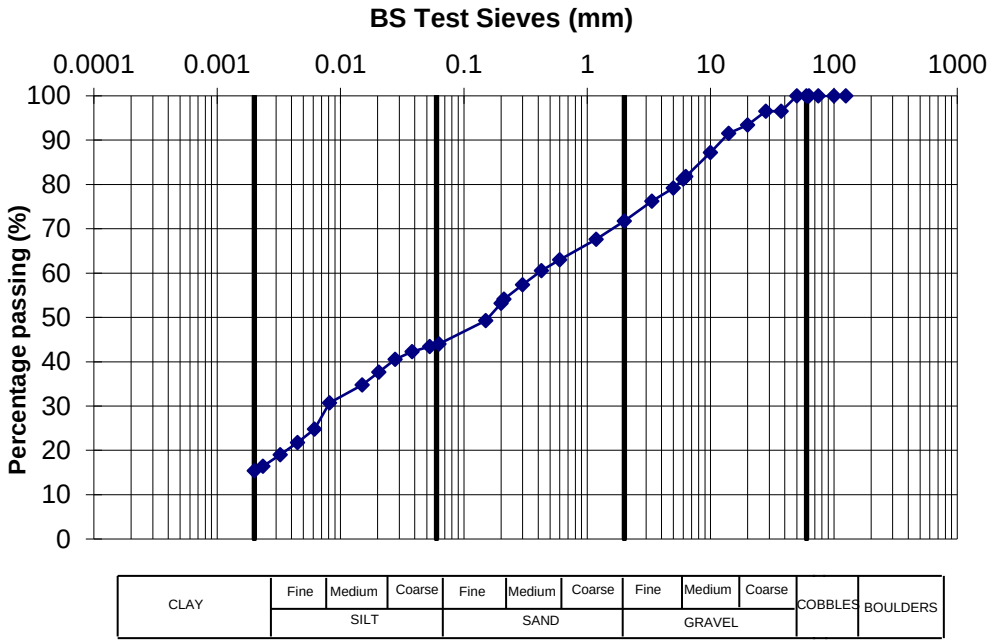
Metlab Ltd - registered in Ireland (No. 84894)


## PARTICLE SIZE DISTRIBUTION TEST REPORT
## TESTED IN ACCORDANCE WITH BS 1377:PART 2

| | | | |
|---|---|---|---|
| Contract No | **J3559** | Report No | **C10288-PSD&HYD.08** |
| Client Contact | **Mr. Daniel Hayden** | Lab No | **C10288** |
| Client | **Fehily Timoney & Company** | Sample Type | **Bulk Disturbed** |
| Contract | **Dunsink Tree Planting** | Method of Prep | **N/A** |
| | | Sampling Certificate | **Yes** |
| | | Sampled By | **Client** |
| Site Ref | **N/A** | Date Sampled | **N/A** |
| Client Ref | **PSD&HYD.08** | Date Received | **25/11/2021** |
| Specification | **BS 3882** | Date Started | **16/12/2021** |
| Location | **WS.08: 0.0-1.0m** | | |
| Sample Description | **Topsoil** | | |

| Sieve Size (mm) | % Passing | Limits |
|---|---|---|
| 125 | 100 | |
| 100 | 100 | |
| 75 | 100 | |
| 63 | 100 | |
| 50 | 100 | |
| 37.5 | 96 | |
| 28 | 96 | |
| 20 | 93 | |
| 14 | 92 | |
| 10 | 87 | |
| 6.3 | 82 | |
| 5 | 79 | |
| 3.35 | 76 | |
| 2 | 72 | |
| 1.18 | 68 | |
| 0.6 | 63 | |
| 0.425 | 61 | |
| 0.3 | 57 | |
| 0.212 | 54 | |
| 0.15 | 49 | |
| 0.063 | 44.0 | |
| 0.040 | 42.4 | |
| 0.030 | 40.9 | |
| 0.020 | 37.4 | |
| 0.013 | 33.6 | |
| 0.009 | 30.7 | |
| 0.005 | 21.8 | |
| 0.002 | 15.4 | |

### PSD GRAPH




| Constituent Proportions (%) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Gravel = | 28 | Sand = | 28 | Silt = | 28.6 | Clay = | 15.4 |

| | |
|---|---|
| >2mm | 28% |
| >20mm | 7% |
| >50mm | 0% |

| | |
|---|---|
| Texture Class <2mm | SANDY LOAM |

Approved

17/01/2022
Date Reported

| Approval By: | |
|---|---|
| Technical Manager | ■ |
| Deputy Technical Manager | ☐ |
| Laboratory Supervisor | ☐ |

**End of Test**

# METLAB LTD

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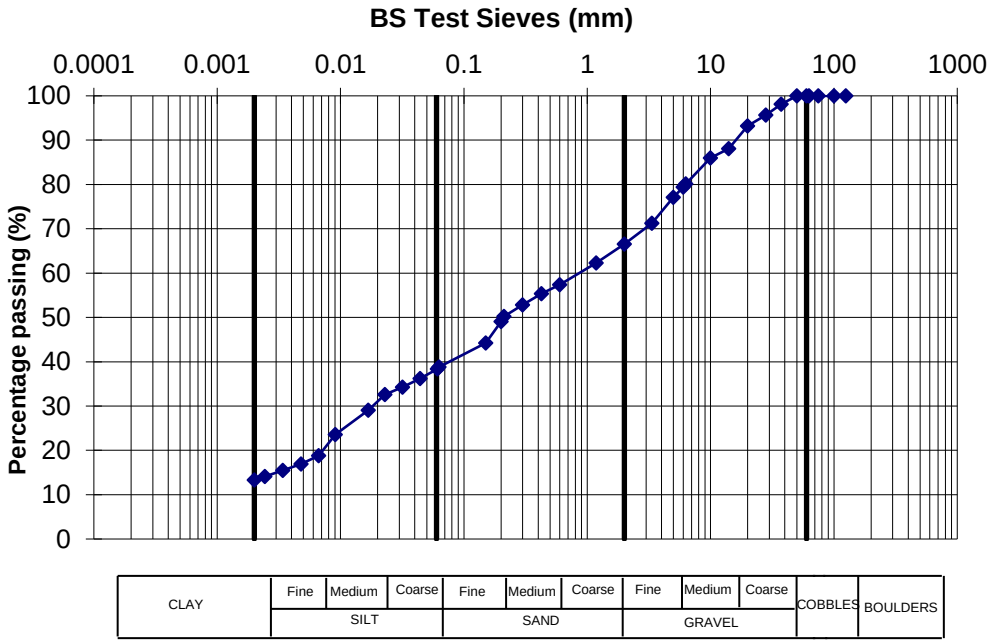
Metlab Ltd - registered in Ireland (No. 84894)


## PARTICLE SIZE DISTRIBUTION TEST REPORT
## TESTED IN ACCORDANCE WITH BS 1377:PART 2

| | | | |
|---|---|---|---|
| Contract No | **J3559** | Report No | **C10289-PSD&HYD.09** |
| Client Contact | **Mr. Daniel Hayden** | Lab No | **C10289** |
| Client | **Fehily Timoney & Company** | Sample Type | **Bulk Disturbed** |
| Contract | **Dunsink Tree Planting** | Method of Prep | **N/A** |
| | | Sampling Certificate | **Yes** |
| | | Sampled By | **Client** |
| Site Ref | **N/A** | Date Sampled | **N/A** |
| Client Ref | **PSD&HYD.09** | Date Received | **25/11/2021** |
| Specification | **BS 3882** | Date Started | **16/12/2021** |
| Location | **WS.01: 1.0-2.0m** | | |
| Sample Description | **Subsoil** | | |

| Sieve Size (mm) | % Passing | Limits |
|---|---|---|
| 125 | 100 | |
| 100 | 100 | |
| 75 | 100 | |
| 63 | 100 | |
| 50 | 100 | |
| 37.5 | 98 | |
| 28 | 96 | |
| 20 | 93 | |
| 14 | 88 | |
| 10 | 86 | |
| 6.3 | 80 | |
| 5 | 77 | |
| 3.35 | 71 | |
| 2 | 67 | |
| 1.18 | 62 | |
| 0.6 | 57 | |
| 0.425 | 55 | |
| 0.3 | 53 | |
| 0.212 | 50 | |
| 0.15 | 44 | |
| 0.063 | 38.8 | |
| 0.040 | 35.7 | |
| 0.030 | 33.9 | |
| 0.020 | 30.9 | |
| 0.013 | 26.4 | |
| 0.009 | 23.6 | |
| 0.005 | 16.9 | |
| 0.002 | 13.3 | |

### PSD GRAPH




| Constituent Proportions (%) | | | |
|---|---|---|---|
| Gravel = 33 | Sand = 28 | Silt = 25.5 | Clay = 13.3 |

| | |
|---|---|
| >2mm | 33% |
| >20mm | 7% |
| >50mm | 0% |

| | |
|---|---|
| Texture Class <2mm | SANDY LOAM |

Approved

17/01/2022
Date Reported

| Approval By: | |
|---|---|
| Technical Manager | ■ |
| Deputy Technical Manager | ☐ |
| Laboratory Supervisor | ☐ |

**End of Test**

# METLAB LTD

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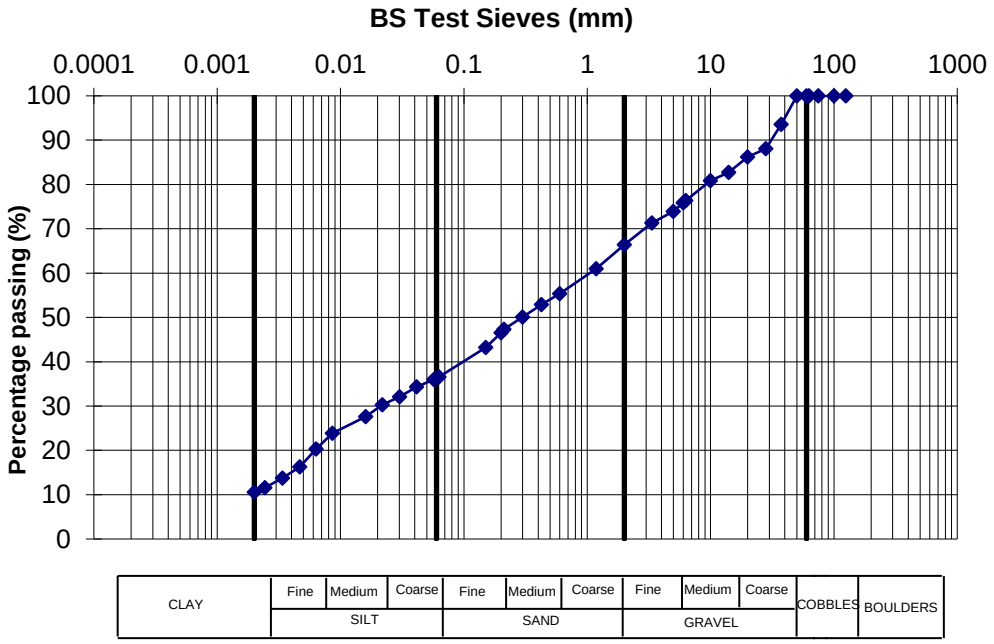
Metlab Ltd - registered in Ireland (No. 84894)


## PARTICLE SIZE DISTRIBUTION TEST REPORT
## TESTED IN ACCORDANCE WITH BS 1377:PART 2

| | | | |
|---|---|---|---|
| Contract No | **J3559** | Report No | **C10290-PSD&HYD.10** |
| Client Contact | **Mr. Daniel Hayden** | Lab No | **C10290** |
| Client | **Fehily Timoney & Company** | Sample Type | **Bulk Disturbed** |
| Contract | **Dunsink Tree Planting** | Method of Prep | **N/A** |
| | | Sampling Certificate | **Yes** |
| | | Sampled By | **Client** |
| Site Ref | **N/A** | Date Sampled | **N/A** |
| Client Ref | **PSD&HYD.10** | Date Received | **25/11/2021** |
| Specification | **BS 3882** | Date Started | **16/12/2021** |
| Location | **WS.02: 1.0-2.0m** | | |
| Sample Description | **Subsoil** | | |

| Sieve Size (mm) | % Passing | Limits |
|---|---|---|
| 125 | 100 | |
| 100 | 100 | |
| 75 | 100 | |
| 63 | 100 | |
| 50 | 100 | |
| 37.5 | 94 | |
| 28 | 88 | |
| 20 | 86 | |
| 14 | 83 | |
| 10 | 81 | |
| 6.3 | 76 | |
| 5 | 74 | |
| 3.35 | 71 | |
| 2 | 66 | |
| 1.18 | 61 | |
| 0.6 | 55 | |
| 0.425 | 53 | |
| 0.3 | 50 | |
| 0.212 | 47 | |
| 0.15 | 43 | |
| 0.063 | 36.5 | |
| 0.040 | 34.2 | |
| 0.030 | 32.0 | |
| 0.020 | 29.5 | |
| 0.013 | 26.1 | |
| 0.009 | 23.9 | |
| 0.005 | 16.3 | |
| 0.002 | 10.6 | |

### PSD GRAPH




| Constituent Proportions (%) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Gravel = | 34 | Sand = | 30 | Silt = | 25.9 | Clay = | 10.6 |

| | |
|---|---|
| >2mm | 34% |
| >20mm | 14% |
| >50mm | 0% |

| | |
|---|---|
| Texture Class <2mm | SANDY LOAM |

Approved

17/01/2022
Date Reported

| Approval By: | |
|---|---|
| Technical Manager | ■ |
| Deputy Technical Manager | ☐ |
| Laboratory Supervisor | ☐ |

**End of Test**

# METLAB LTD

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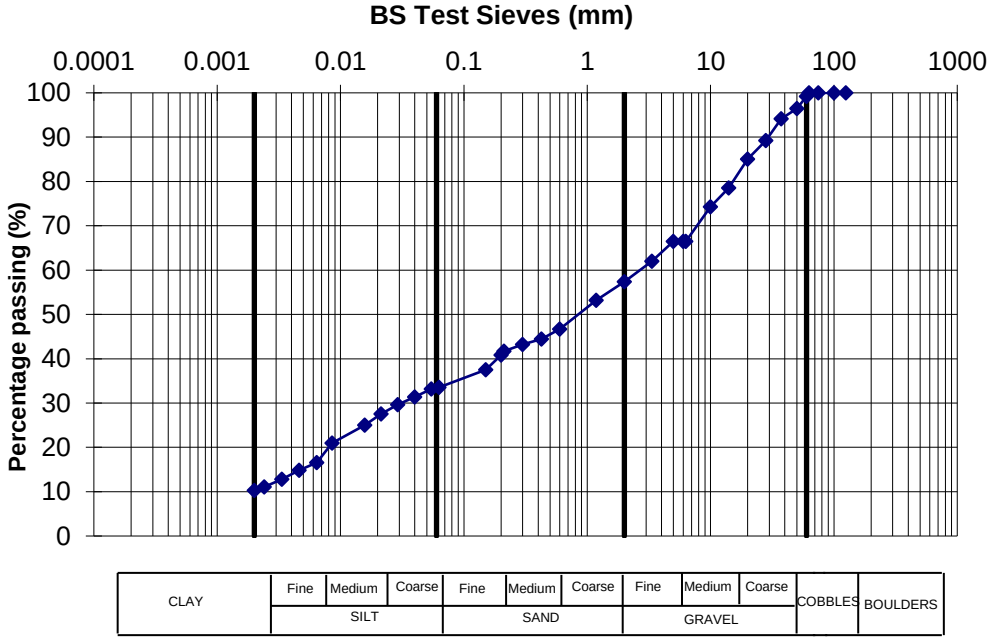
Metlab Ltd - registered in Ireland (No. 84894)


## PARTICLE SIZE DISTRIBUTION TEST REPORT
## TESTED IN ACCORDANCE WITH BS 1377:PART 2

| | | | |
|---|---|---|---|
| Contract No | **J3559** | Report No | **C10291-PSD&HYD.11** |
| Client Contact | **Mr. Daniel Hayden** | Lab No | **C10291** |
| Client | **Fehily Timoney & Company** | Sample Type | **Bulk Disturbed** |
| Contract | **Dunsink Tree Planting** | Method of Prep | **N/A** |
| | | Sampling Certificate | **Yes** |
| | | Sampled By | **Client** |
| Site Ref | **N/A** | Date Sampled | **N/A** |
| Client Ref | **PSD&HYD.11** | Date Received | **25/11/2021** |
| Specification | **BS 3882** | Date Started | **16/12/2021** |
| Location | **WS.03: 1.0-2.0m** | | |
| Sample Description | **Subsoil** | | |

| Sieve Size (mm) | % Passing | Limits |
|---|---|---|
| 125 | 100 | |
| 100 | 100 | |
| 75 | 100 | |
| 63 | 100 | |
| 50 | 96 | |
| 37.5 | 94 | |
| 28 | 89 | |
| 20 | 85 | |
| 14 | 79 | |
| 10 | 74 | |
| 6.3 | 66 | |
| 5 | 66 | |
| 3.35 | 62 | |
| 2 | 57 | |
| 1.18 | 53 | |
| 0.6 | 47 | |
| 0.425 | 44 | |
| 0.3 | 43 | |
| 0.212 | 42 | |
| 0.15 | 38 | |
| 0.063 | 33.5 | |
| 0.040 | 31.4 | |
| 0.030 | 29.8 | |
| 0.020 | 26.9 | |
| 0.013 | 23.5 | |
| 0.009 | 20.9 | |
| 0.005 | 14.8 | |
| 0.002 | 10.3 | |

### PSD GRAPH




| Constituent Proportions (%) | | | |
|---|---|---|---|
| Gravel = 42 | Sand = 24 | Silt = 23.2 | Clay = 10.3 |

| | |
|---|---|
| >2mm | 43% |
| >20mm | 15% |
| >50mm | 4% |

| | |
|---|---|
| Texture Class <2mm | SANDY LOAM |

Approved

17/01/2022
Date Reported

| Approval By: | |
|---|---|
| Technical Manager | ■ |
| Deputy Technical Manager | ☐ |
| Laboratory Supervisor | ☐ |

**End of Test**

# METLAB LTD

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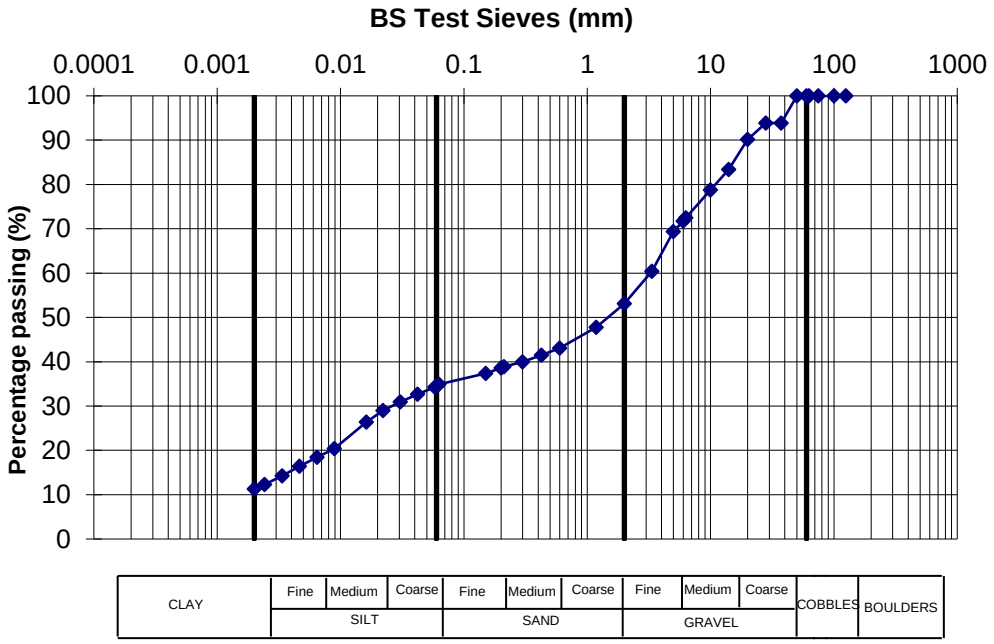
Metlab Ltd - registered in Ireland (No. 84894)


## PARTICLE SIZE DISTRIBUTION TEST REPORT
## TESTED IN ACCORDANCE WITH BS 1377:PART 2

| | | | |
|---|---|---|---|
| Contract No | **J3559** | Report No | **C10292-PSD&HYD.12** |
| Client Contact | **Mr. Daniel Hayden** | Lab No | **C10292** |
| Client | **Fehily Timoney & Company** | Sample Type | **Bulk Disturbed** |
| Contract | **Dunsink Tree Planting** | Method of Prep | **N/A** |
| | | Sampling Certificate | **Yes** |
| | | Sampled By | **Client** |
| Site Ref | **N/A** | Date Sampled | **N/A** |
| Client Ref | **PSD&HYD.12** | Date Received | **25/11/2021** |
| Specification | **BS 3882** | Date Started | **17/12/2021** |
| Location | **WS.03: 2.0-3.0m** | | |
| Sample Description | **Subsoil** | | |

| Sieve Size (mm) | % Passing | Limits |
|---|---|---|
| 125 | 100 | |
| 100 | 100 | |
| 75 | 100 | |
| 63 | 100 | |
| 50 | 100 | |
| 37.5 | 94 | |
| 28 | 94 | |
| 20 | 90 | |
| 14 | 83 | |
| 10 | 79 | |
| 6.3 | 72 | |
| 5 | 69 | |
| 3.35 | 60 | |
| 2 | 53 | |
| 1.18 | 48 | |
| 0.6 | 43 | |
| 0.425 | 41 | |
| 0.3 | 40 | |
| 0.212 | 39 | |
| 0.15 | 37 | |
| 0.063 | 34.9 | |
| 0.040 | 32.5 | |
| 0.030 | 30.9 | |
| 0.020 | 28.1 | |
| 0.013 | 23.8 | |
| 0.009 | 20.4 | |
| 0.005 | 16.4 | |
| 0.002 | 11.3 | |

### PSD GRAPH




| Constituent Proportions (%) | | | |
|---|---|---|---|
| Gravel = 47 | Sand = 18 | Silt = 23.6 | Clay = 11.3 |

| | |
|---|---|
| >2mm | 47% |
| >20mm | 10% |
| >50mm | 0% |

| | |
|---|---|
| Texture Class <2mm | SANDY LOAM |

Approved

17/01/2022
Date Reported

| Approval By: | |
|---|---|
| Technical Manager | ■ |
| Deputy Technical Manager | ☐ |
| Laboratory Supervisor | ☐ |

**End of Test**

# METLAB LTD

Unit 6 Airways Technology Park, Ballygarvan, Cork.

T: (021) 4311614 F: (021) 4311714 email: www.metlab.ie

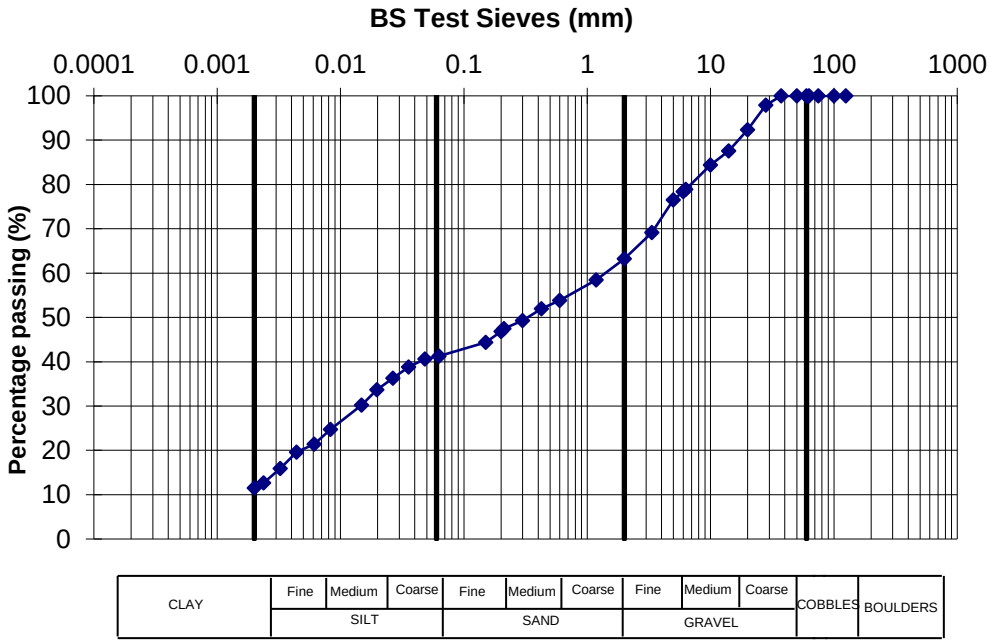
Metlab Ltd - registered in Ireland (No. 84894)


## PARTICLE SIZE DISTRIBUTION TEST REPORT
## TESTED IN ACCORDANCE WITH BS 1377:PART 2

| | | | |
|---|---|---|---|
| Contract No | **J3559** | Report No | **C10293-PSD&HYD.13** |
| Client Contact | **Mr. Daniel Hayden** | Lab No | **C10293** |
| Client | **Fehily Timoney & Company** | Sample Type | **Bulk Disturbed** |
| Contract | **Dunsink Tree Planting** | Method of Prep | **N/A** |
| | | Sampling Certificate | **Yes** |
| | | Sampled By | **Client** |
| Site Ref | **N/A** | Date Sampled | **N/A** |
| Client Ref | **PSD&HYD.13** | Date Received | **25/11/2021** |
| Specification | **BS 3882** | Date Started | **16/12/2021** |
| Location | **WS.03: 3.0-4.0m** | | |
| Sample Description | **Subsoil** | | |

| Sieve Size (mm) | % Passing | Limits |
|---|---|---|
| 125 | 100 | |
| 100 | 100 | |
| 75 | 100 | |
| 63 | 100 | |
| 50 | 100 | |
| 37.5 | 100 | |
| 28 | 98 | |
| 20 | 92 | |
| 14 | 88 | |
| 10 | 84 | |
| 6.3 | 79 | |
| 5 | 77 | |
| 3.35 | 69 | |
| 2 | 63 | |
| 1.18 | 58 | |
| 0.6 | 54 | |
| 0.425 | 52 | |
| 0.3 | 49 | |
| 0.212 | 47 | |
| 0.15 | 44 | |
| 0.063 | 41.3 | |
| 0.040 | 39.4 | |
| 0.030 | 37.2 | |
| 0.020 | 33.9 | |
| 0.013 | 28.7 | |
| 0.009 | 24.7 | |
| 0.005 | 19.6 | |
| 0.002 | 11.5 | |

### PSD GRAPH




| Constituent Proportions (%) | | | |
|---|---|---|---|
| Gravel = 37 | Sand = 22 | Silt = 29.8 | Clay = 11.5 |

| | |
|---|---|
| >2mm | 37% |
| >20mm | 8% |
| >50mm | 0% |

| | |
|---|---|
| Texture Class <2mm | SANDY LOAM |

Approved

17/01/2022
Date Reported

| Approval By: | |
|---|---|
| Technical Manager | ■ |
| Deputy Technical Manager | ☐ |
| Laboratory Supervisor | ☐ |

**End of Test**

# METLAB LTD

Unit 6 Airways Technology Park, Ballygarvan, Cork.

T: (021) 4311614 F: (021) 4311714 email: www.metlab.ie

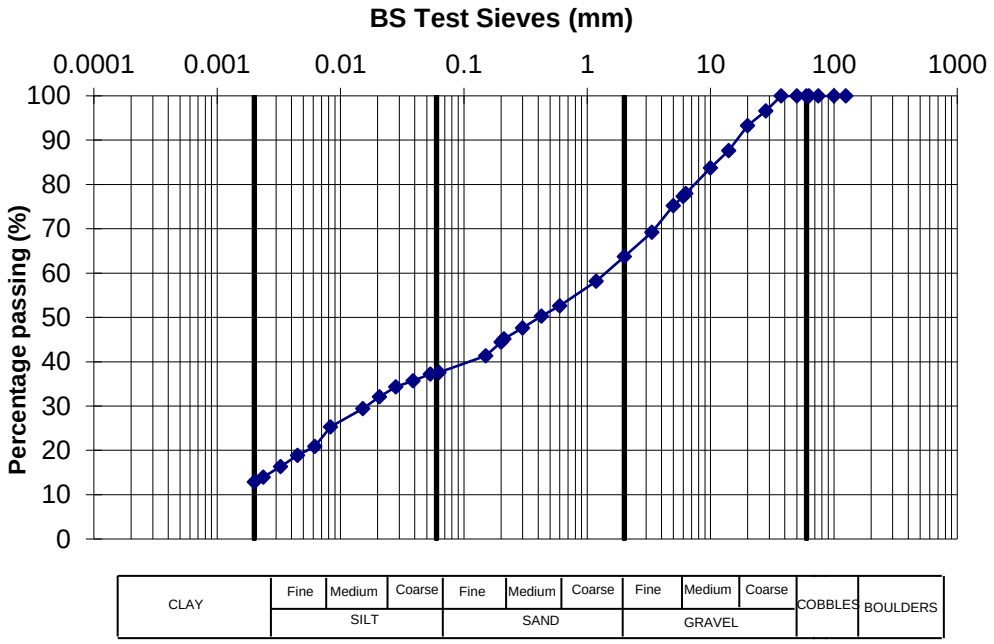
Metlab Ltd - registered in Ireland (No. 84894)


## PARTICLE SIZE DISTRIBUTION TEST REPORT
## TESTED IN ACCORDANCE WITH BS 1377:PART 2

| | | | |
|---|---|---|---|
| Contract No | **J3559** | Report No | **C10294-PSD&HYD.14** |
| Client Contact | **Mr. Daniel Hayden** | Lab No | **C10294** |
| Client | **Fehily Timoney & Company** | Sample Type | **Bulk Disturbed** |
| Contract | **Dunsink Tree Planting** | Method of Prep | **N/A** |
| | | Sampling Certificate | **Yes** |
| | | Sampled By | **Client** |
| Site Ref | **N/A** | Date Sampled | **N/A** |
| Client Ref | **PSD&HYD.14** | Date Received | **25/11/2021** |
| Specification | **BS 3882** | Date Started | **16/12/2021** |
| Location | **WS.04: 1.0-2.0m** | | |
| Sample Description | **Subsoil** | | |

| Sieve Size (mm) | % Passing | Limits |
|---|---|---|
| 125 | 100 | |
| 100 | 100 | |
| 75 | 100 | |
| 63 | 100 | |
| 50 | 100 | |
| 37.5 | 100 | |
| 28 | 97 | |
| 20 | 93 | |
| 14 | 88 | |
| 10 | 84 | |
| 6.3 | 78 | |
| 5 | 75 | |
| 3.35 | 69 | |
| 2 | 64 | |
| 1.18 | 58 | |
| 0.6 | 53 | |
| 0.425 | 50 | |
| 0.3 | 48 | |
| 0.212 | 45 | |
| 0.15 | 41 | |
| 0.063 | 37.6 | |
| 0.040 | 35.8 | |
| 0.030 | 34.6 | |
| 0.020 | 31.8 | |
| 0.013 | 28.1 | |
| 0.009 | 25.3 | |
| 0.005 | 18.9 | |
| 0.002 | 12.9 | |

### PSD GRAPH




| Constituent Proportions (%) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Gravel = | 36 | Sand = | 26 | Silt = | 24.7 | Clay = | 12.9 |

| | |
|---|---|
| >2mm | 36% |
| >20mm | 7% |
| >50mm | 0% |

| | |
|---|---|
| Texture Class <2mm | SANDY LOAM |

Approved

17/01/2022
Date Reported

| Approval By: | |
|---|---|
| Technical Manager | ■ |
| Deputy Technical Manager | ☐ |
| Laboratory Supervisor | ☐ |

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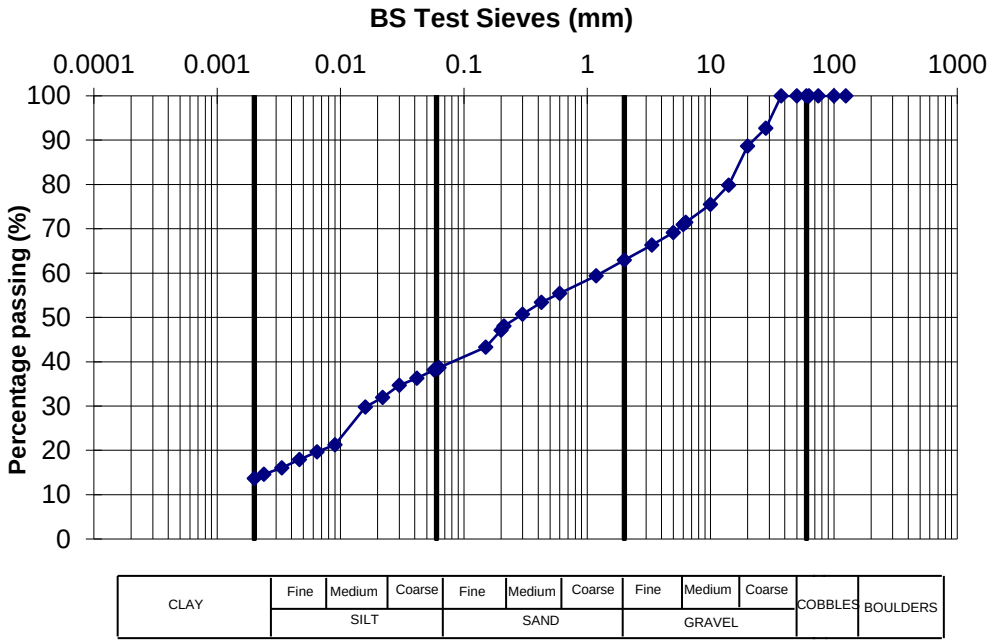
## PARTICLE SIZE DISTRIBUTION TEST REPORT
## TESTED IN ACCORDANCE WITH BS 1377:PART 2

| | | | |
|---|---|---|---|
| Contract No | **J3559** | Report No | **C10295-PSD&HYD.15** |
| Client Contact | **Mr. Daniel Hayden** | Lab No | **C10295** |
| Client | **Fehily Timoney & Company** | Sample Type | **Bulk Disturbed** |
| Contract | **Dunsink Tree Planting** | Method of Prep | **N/A** |
| | | Sampling Certificate | **Yes** |
| | | Sampled By | **Client** |
| Site Ref | **N/A** | Date Sampled | **N/A** |
| Client Ref | **PSD&HYD.15** | Date Received | **25/11/2021** |
| Specification | **BS 3882** | Date Started | **16/12/2021** |
| Location | **WS.05: 1.0-2.0m** | | |
| Sample Description | **Subsoil** | | |

| Sieve Size (mm) | % Passing | Limits |
|---|---|---|
| 125 | 100 | |
| 100 | 100 | |
| 75 | 100 | |
| 63 | 100 | |
| 50 | 100 | |
| 37.5 | 100 | |
| 28 | 93 | |
| 20 | 89 | |
| 14 | 80 | |
| 10 | 76 | |
| 6.3 | 71 | |
| 5 | 69 | |
| 3.35 | 66 | |
| 2 | 63 | |
| 1.18 | 59 | |
| 0.6 | 55 | |
| 0.425 | 53 | |
| 0.3 | 51 | |
| 0.212 | 48 | |
| 0.15 | 43 | |
| 0.063 | 38.7 | |
| 0.040 | 36.1 | |
| 0.030 | 34.7 | |
| 0.020 | 31.2 | |
| 0.013 | 26.2 | |
| 0.009 | 21.2 | |
| 0.005 | 17.9 | |
| 0.002 | 13.7 | |

### PSD GRAPH




| Constituent Proportions (%) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Gravel = | 37 | Sand = | 24 | Silt = | 25.0 | Clay = | 13.7 |

| | |
|---|---|
| >2mm | 37% |
| >20mm | 11% |
| >50mm | 0% |

| | |
|---|---|
| Texture Class <2mm | SANDY LOAM |

Approved

17/01/2022
Date Reported

| Approval By: | |
|---|---|
| Technical Manager | ■ |
| Deputy Technical Manager | ☐ |
| Laboratory Supervisor | ☐ |

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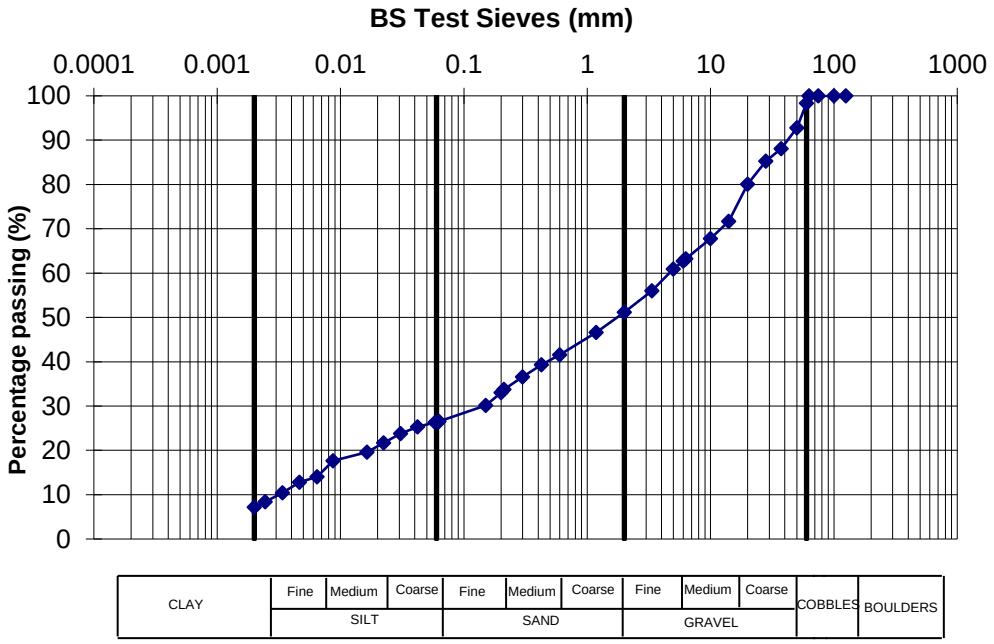
## PARTICLE SIZE DISTRIBUTION TEST REPORT
## TESTED IN ACCORDANCE WITH BS 1377:PART 2

| | | | |
|---|---|---|---|
| Contract No | **J3559** | Report No | **C10296-PSD&HYD.16** |
| Client Contact | **Mr. Daniel Hayden** | Lab No | **C10296** |
| Client | **Fehily Timoney & Company** | Sample Type | **Bulk Disturbed** |
| Contract | **Dunsink Tree Planting** | Method of Prep | **N/A** |
| | | Sampling Certificate | **Yes** |
| | | Sampled By | **Client** |
| Site Ref | **N/A** | Date Sampled | **N/A** |
| Client Ref | **PSD&HYD.16** | Date Received | **25/11/2021** |
| Specification | **BS 3882** | Date Started | **07/01/2022** |
| Location | **WS.07: 1.0-2.0m** | | |
| Sample Description | **Subsoil** | | |

| Sieve Size (mm) | % Passing | Limits |
|---|---|---|
| 125 | 100 | |
| 100 | 100 | |
| 75 | 100 | |
| 63 | 100 | |
| 50 | 93 | |
| 37.5 | 88 | |
| 28 | 85 | |
| 20 | 80 | |
| 14 | 72 | |
| 10 | 68 | |
| 6.3 | 63 | |
| 5 | 61 | |
| 3.35 | 56 | |
| 2 | 51 | |
| 1.18 | 47 | |
| 0.6 | 42 | |
| 0.425 | 39 | |
| 0.3 | 37 | |
| 0.212 | 34 | |
| 0.15 | 30 | |
| 0.063 | 26.5 | |
| 0.040 | 25.2 | |
| 0.030 | 23.7 | |
| 0.020 | 20.9 | |
| 0.013 | 18.8 | |
| 0.009 | 17.7 | |
| 0.005 | 12.8 | |
| 0.002 | 7.2 | |

### PSD GRAPH




| Constituent Proportions (%) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Gravel = | 47 | Sand = | 25 | Silt = | 19.3 | Clay = | 7.2 |

| | |
|---|---|
| >2mm | 49% |
| >20mm | 20% |
| >50mm | 7% |

| | |
|---|---|
| Texture Class <2mm | LOAMY SAND |

Approved

17/01/2022
Date Reported

| Approval By: | |
|---|---|
| Technical Manager | ■ |
| Deputy Technical Manager | ☐ |
| Laboratory Supervisor | ☐ |

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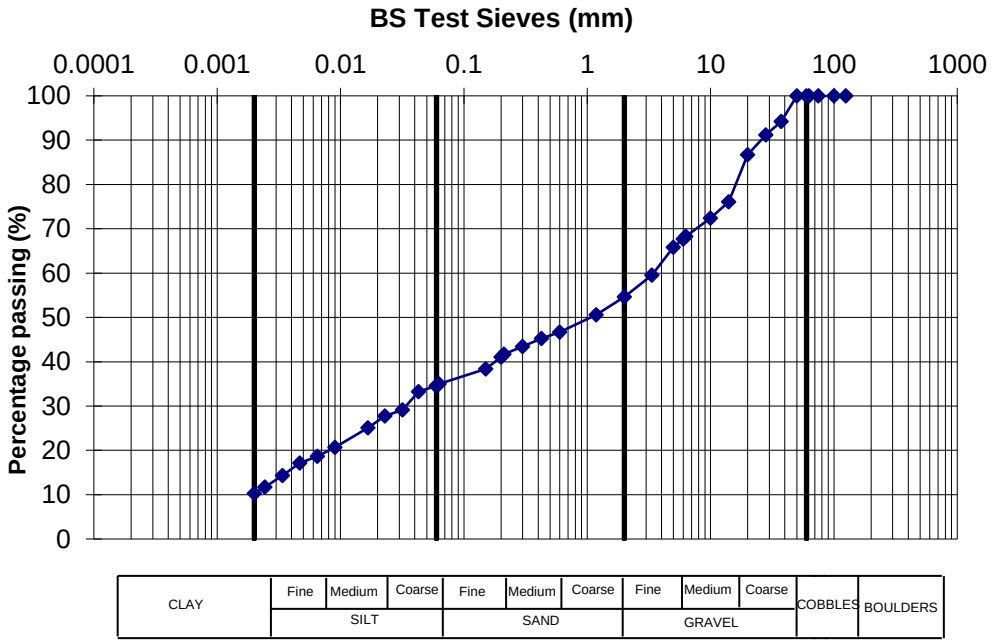
## PARTICLE SIZE DISTRIBUTION TEST REPORT
## TESTED IN ACCORDANCE WITH BS 1377:PART 2

| | | | |
|---|---|---|---|
| Contract No | **J3559** | Report No | **C10297-PSD&HYD.17** |
| Client Contact | **Mr. Daniel Hayden** | Lab No | **C10297** |
| Client | **Fehily Timoney & Company** | Sample Type | **Bulk Disturbed** |
| Contract | **Dunsink Tree Planting** | Method of Prep | **N/A** |
| | | Sampling Certificate | **Yes** |
| | | Sampled By | **Client** |
| Site Ref | **N/A** | Date Sampled | **N/A** |
| Client Ref | **PSD&HYD.17** | Date Received | **25/11/2021** |
| Specification | **BS 3882** | Date Started | **17/12/2021** |
| Location | **WS.07: 2.0-3.0m** | | |
| Sample Description | **Subsoil** | | |

| Sieve Size (mm) | % Passing | Limits |
|---|---|---|
| 125 | 100 | |
| 100 | 100 | |
| 75 | 100 | |
| 63 | 100 | |
| 50 | 100 | |
| 37.5 | 94 | |
| 28 | 91 | |
| 20 | 87 | |
| 14 | 76 | |
| 10 | 72 | |
| 6.3 | 68 | |
| 5 | 66 | |
| 3.35 | 60 | |
| 2 | 55 | |
| 1.18 | 51 | |
| 0.6 | 47 | |
| 0.425 | 45 | |
| 0.3 | 43 | |
| 0.212 | 42 | |
| 0.15 | 38 | |
| 0.063 | 35.0 | |
| 0.040 | 33.1 | |
| 0.030 | 28.5 | |
| 0.020 | 26.5 | |
| 0.013 | 23.0 | |
| 0.009 | 20.7 | |
| 0.005 | 17.1 | |
| 0.002 | 10.3 | |

### PSD GRAPH




| Constituent Proportions (%) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Gravel = | 45 | Sand = | 20 | Silt = | 24.7 | Clay = | 10.3 |

| | |
|---|---|
| >2mm | 45% |
| >20mm | 13% |
| >50mm | 0% |

| | |
|---|---|
| Texture Class <2mm | SANDY LOAM |

Approved

17/01/2022
Date Reported

| Approval By: | |
|---|---|
| Technical Manager | ■ |
| Deputy Technical Manager | ☐ |
| Laboratory Supervisor | ☐ |

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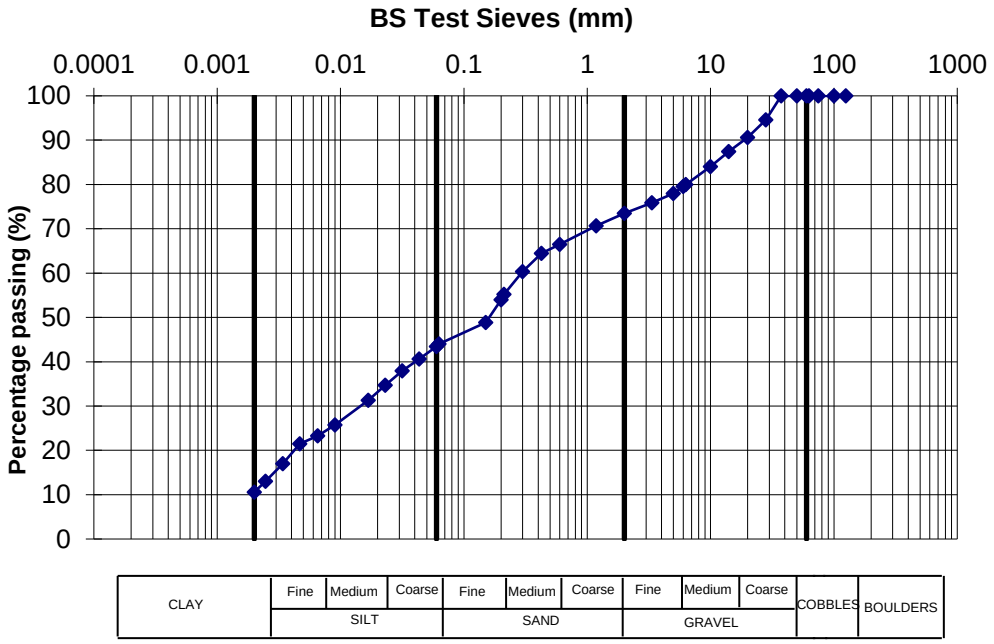
## PARTICLE SIZE DISTRIBUTION TEST REPORT
## TESTED IN ACCORDANCE WITH BS 1377:PART 2

| | | | |
|---|---|---|---|
| Contract No | **J3559** | Report No | **C10298-PSD&HYD.18** |
| Client Contact | **Mr. Daniel Hayden** | Lab No | **C10298** |
| Client | **Fehily Timoney & Company** | Sample Type | **Bulk Disturbed** |
| Contract | **Dunsink Tree Planting** | Method of Prep | **N/A** |
| | | Sampling Certificate | **Yes** |
| | | Sampled By | **Client** |
| Site Ref | **N/A** | Date Sampled | **N/A** |
| Client Ref | **PSD&HYD.18** | Date Received | **25/11/2021** |
| Specification | **BS 3882** | Date Started | **16/12/2021** |
| Location | **WS.08: 1.0-2.0m** | | |
| Sample Description | **Subsoil** | | |

| Sieve Size (mm) | % Passing | Limits |
|---|---|---|
| 125 | 100 | |
| 100 | 100 | |
| 75 | 100 | |
| 63 | 100 | |
| 50 | 100 | |
| 37.5 | 100 | |
| 28 | 95 | |
| 20 | 91 | |
| 14 | 87 | |
| 10 | 84 | |
| 6.3 | 80 | |
| 5 | 78 | |
| 3.35 | 76 | |
| 2 | 74 | |
| 1.18 | 71 | |
| 0.6 | 66 | |
| 0.425 | 64 | |
| 0.3 | 60 | |
| 0.212 | 55 | |
| 0.15 | 49 | |
| 0.063 | 44.0 | |
| 0.040 | 40.0 | |
| 0.030 | 37.6 | |
| 0.020 | 33.1 | |
| 0.013 | 28.6 | |
| 0.009 | 25.8 | |
| 0.005 | 21.5 | |
| 0.002 | 10.6 | |

### PSD GRAPH




| Constituent Proportions (%) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Gravel = | 26 | Sand = | 30 | Silt = | 33.4 | Clay = | 10.6 |

| | |
|---|---|
| >2mm | 26% |
| >20mm | 9% |
| >50mm | 0% |

| | |
|---|---|
| Texture Class <2mm | SANDY LOAM |

Approved

18/01/2022
Date Reported

| Approval By: | |
|---|---|
| Technical Manager | ■ |
| Deputy Technical Manager | ☐ |
| Laboratory Supervisor | ☐ |

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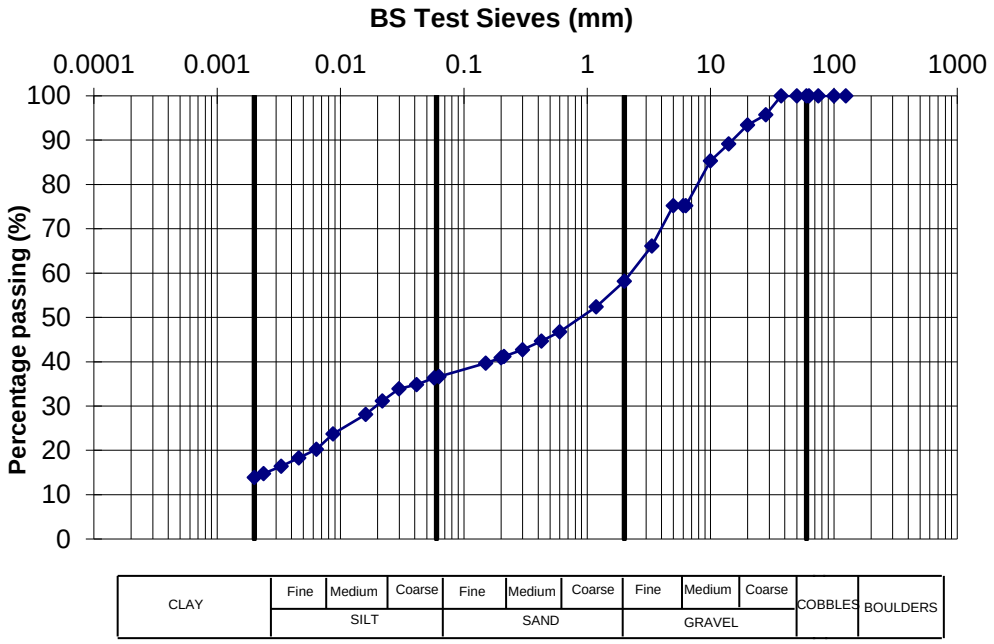
## PARTICLE SIZE DISTRIBUTION TEST REPORT
## TESTED IN ACCORDANCE WITH BS 1377:PART 2

| | | | |
|---|---|---|---|
| Contract No | **J3559** | Report No | **C10299-PSD&HYD.19** |
| Client Contact | **Mr. Daniel Hayden** | Lab No | **C10299** |
| Client | **Fehily Timoney & Company** | Sample Type | **Bulk Disturbed** |
| Contract | **Dunsink Tree Planting** | Method of Prep | **N/A** |
| | | Sampling Certificate | **Yes** |
| | | Sampled By | **Client** |
| Site Ref | **N/A** | Date Sampled | **N/A** |
| Client Ref | **PSD&HYD.19** | Date Received | **25/11/2021** |
| Specification | **BS 3882** | Date Started | **16/12/2021** |
| Location | **WS.08: 2.0-3.0m** | | |
| Sample Description | **Subsoil** | | |

| Sieve Size (mm) | % Passing | Limits |
|---|---|---|
| 125 | 100 | |
| 100 | 100 | |
| 75 | 100 | |
| 63 | 100 | |
| 50 | 100 | |
| 37.5 | 100 | |
| 28 | 96 | |
| 20 | 93 | |
| 14 | 89 | |
| 10 | 85 | |
| 6.3 | 75 | |
| 5 | 75 | |
| 3.35 | 66 | |
| 2 | 58 | |
| 1.18 | 52 | |
| 0.6 | 47 | |
| 0.425 | 45 | |
| 0.3 | 43 | |
| 0.212 | 41 | |
| 0.15 | 40 | |
| 0.063 | 36.7 | |
| 0.040 | 34.7 | |
| 0.030 | 33.9 | |
| 0.020 | 30.2 | |
| 0.013 | 26.3 | |
| 0.009 | 23.7 | |
| 0.005 | 18.3 | |
| 0.002 | 13.9 | |

### PSD GRAPH




| Constituent Proportions (%) | | | |
|---|---|---|---|
| Gravel = 42 | Sand = 22 | Silt = 22.8 | Clay = 13.9 |

| | |
|---|---|
| >2mm | 42% |
| >20mm | 7% |
| >50mm | 0% |

| | |
|---|---|
| Texture Class <2mm | SANDY LOAM |

Approved

18/01/2022
Date Reported

| Approval By: | |
|---|---|
| Technical Manager | ■ |
| Deputy Technical Manager | ☐ |
| Laboratory Supervisor | ☐ |

**End of Test**

### 3.1.2 Depth of Soil

As can be seen in Table 3.2, the depth of soil material encountered varied across the study area with an overall available subsoil profile of 2.0 m – 4.0 m recorded. Locations where deeper boreholes were advanced reflected the position on the slope (WS-3 and WS-8) and lack of obstructions (WS-7) impeding drilling auger.

The site investigation confirmed there is a suitable depth of soil to facilitate tree planting. The SI also confirmed that the existing capping meets the requirements of the sites Licence (W0127-01), Condition 4.3 which states:

*a) Topsoil (150 -300mm);*

*b) Subsoils, such that total thickness of topsoil and subsoils is at least 1.0m;*

The borehole logs reference encountering refusal caused by '*concrete, brick, timber fragments and cinders'*. The amount of material found is however unlikely to significantly impact subsoil permeability.

### 3.1.3 Particle Size Distribution

Particle Size Distribution (PSD) classification testing was carried out on 19 no. samples of the Made Ground subsoil from each of the window samples advanced at the site. The PSD curves are presented within the Geotechnical Laboratory Report in Appendix 2.

Soil texture refers to the feel of the soil as defined by the particle size distribution of the solid inorganic constituents of the soil. It is determined by the relative proportion of clay, silt and sand in the mineral fraction which is less than 2mm in diameter. The PSD analysis adopted the USDA method to define textual class and classified the material sampled from the study area as a *Sandy Loam, Loamy Sand or Sandy Silty Loam*.

The analysis of percentage gravel shows the subsoil material does not comply with the specification (BS1377: 1990, Part 2: Method 9.2, 9.5) for clay capping properties. Percentage gravel content exceeded the 30% minimum requirement in 16 / 19 samples analysed. The PSD grading curves for all samples, with the exception of sample WS02 (0 – 1.0m), show percentage fines are generally compliant with the specification (BS1377: 1990, Part 2: Method 9.2, 9.5) for clay capping properties (i.e. ≥ 20 % but with a minimum clay content (particles < 2 µm) of 8%).

The results of the PSD analysis and plotted grading curves generally show the made ground soil material to be suitable for tree establishment.

### 3.1.4 Moisture Content

Based on the results summarised in Table 3.2 above, the moisture content of the upper 1.0 m soil profile was found to be variable across the site and range between 12% – 35%. The moisture content of the lower 1.0 m – 2.0 m profile was consistent across all subsoil samples analysed and measured between a range of 11% to 23%.

The lower moisture content in the lower subsoil profile may be caused by:

- Deep percolation inputs yet to reach the lower profiles following recent rainfall events.
- Less permeable soils in the upper profile inhibiting percolation.

### 3.1.5 Soil Organic Matter Content

The laboratory assessment of soil organic matter (SOM) content measured organic matter by evaluating the aboveground and belowground fractions. Above ground organic matter comprises plant residues and animal residues, below ground organic matter consists of living soil fauna and microflora, partially decomposed plant and animal residues, and humic substances.

Based on the results summarised in Table 3.2 above, the SOM content was analysed from soil samples taken from the upper 1.0 m of the landfill cap. Total SOM content was found to be variable across the study area and measured between a range of 11.45% to 31.30%.

The percentage organic matter content across the study area is considered typical of a mineral soil which contains between 5 – 30% organic matter. SOM levels within this range are deemed suitable for tree cultivation purposes.

# 4. TREE PLANTING SUITABILITY ASSESSMENT

## 4.1 Establishment Criteria

Roots are required to facilitate capture of nutrients and water and to provide structural stability. Soil depth requirements for respective tree species varies in relation to species and root systems.

In Ireland trees with tap roots may have rooting depths that exceed 6.0 m. Trees with fibrous root systems typically have a shallower root system typically requiring soil depths of 1.0 m to 2.0 m.

Where sites are exposed, tree stability may be compromised if soil depth is less than 2.0 m of if waterlogged conditions inhibit root development.

Respiration also occurs in roots, and it is important that the roots are not exposed to excessive carbon dioxide or methane which are by-products of waste breakdown under anaerobic conditions.

For this reason, it is preferable that depth of soil is at least 3.0 m where there is no synthetic barrier in place. This allows 1.0 m to 2.0 m depth for growth and 1.0 m soil depth as a cap where roots will not be present to provide cover to the waste body.

For successful tree establishment to occur on the proposed study area, stability, cap permeability, drainage and adequate soil depth need to be considered. The key soil properties considered in this report for successful tree planting include:

- Soil depth.
- Particle size distribution.
- Soil texture.
- Tree species selection.

An assessment of the above properties is discussed below based on the results of the geotechnical assessment in Section 3.

### 4.1.1 Soil Depth

Soil depth at site was originally established to provide an “engineered “ cap to minimise rainwater infiltration at the site. The depth of soil exceeds the minimum cap requirement of 1.0 m which is typically used for cohesive soils.

Soil depth varies between 2.0 m and 4.0 m. There is minimum requirement for 3.0 m see Section 4.1.4 below. Therefore, planting is deemed to be suitable for indigenous fibrous/shallow tap root tree species where depth of soil is 3.0 m or greater.

### 4.1.2 Particle Size Distribution and Soil Texture

The ability of a soil to support tree growth and its response to management depends to a large extent on the particle size distribution and soil structure. Particle size and soil structure influences pore space, aeration, drainage conditions, root development and ease of working. Field descriptions of particle size and soil structure can be used to inform permeability.

Compaction of soils is probably the most critical factor affecting tree growth and it should therefore be minimised and alleviated wherever possible. Ideally, soils should be loose tipped but where this cannot occur, some compaction is inevitable. This compaction will need to be alleviated prior to planting with trees.

Soil structure as evidenced by information provided in Table 3.2 relating to texture, water content and organic matter, supported by and PSD analysis indicate the soils are structured and suitable for small native indigenous trees.

Soil texture is defined as the particle size distribution of the solid inorganic constituents of the soil. It refers to the relative proportion of clay, silt and sand in the mineral fraction less than 2 mm in diameter. Soil texture influences factors such as moisture retention, drainage, tilling properties of the soil, its resistance to damage by stock and machinery and earliness of crop growth. Figure 4.1 shows the different textural USDA classes for soils.

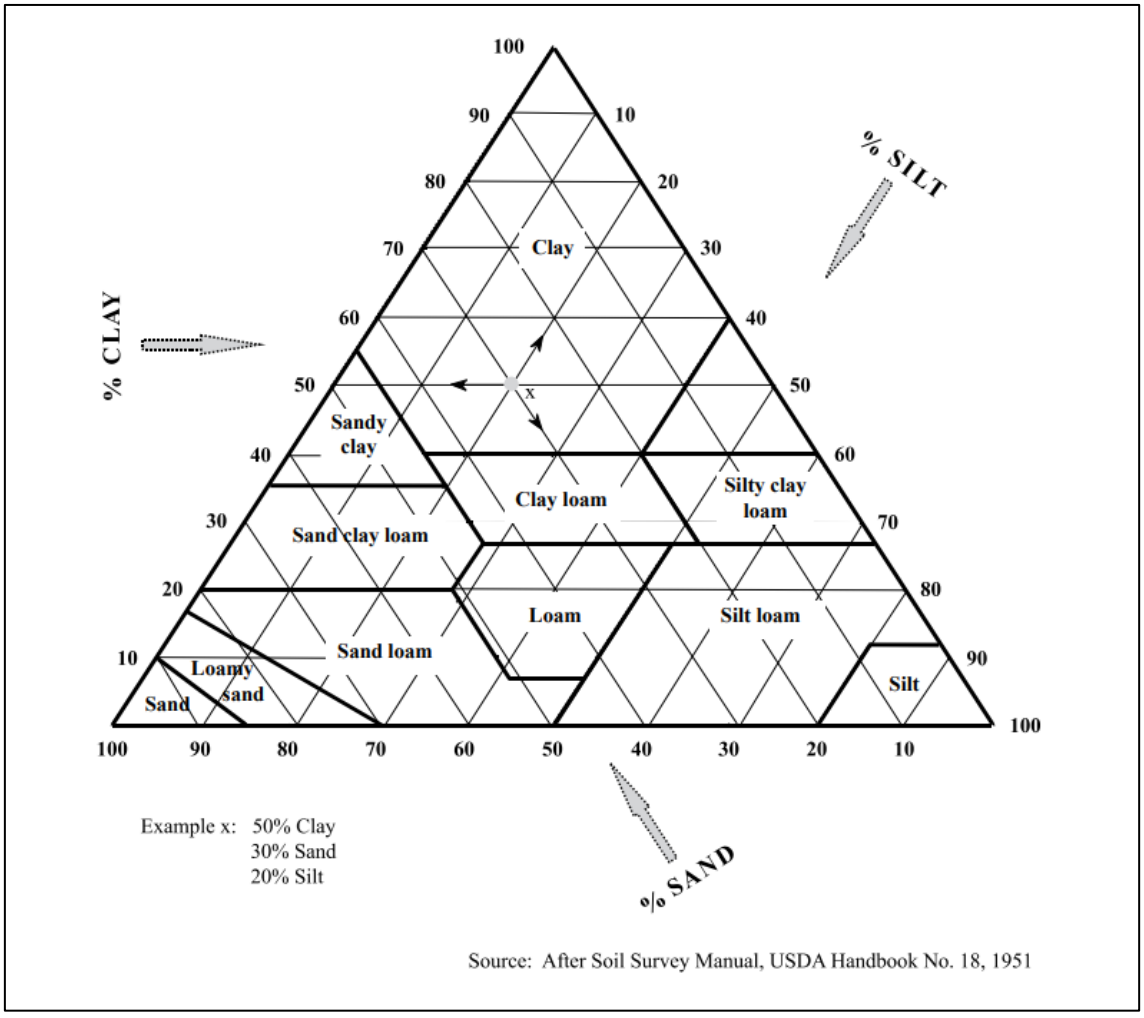



**Figure 4.1: USDA Soil Textural Class Pyramid**

The main characteristics of the three main soil types are as follows:

- Sandy soils tend to dry out quickly so that crops growing on them suffer drought. These soils are often inherently acid and infertile, but this can be corrected by the use of lime and fertiliser. They are generally more prone to water and wind erosion. They are light and easy to cultivate and therefore easily moved by mechanised soil handling.
- Clayey soils are often plastic and heavy and suffer from poor drainage. They are more fertile than sandy soils and are more difficult to cultivate and move by mechanised soil handling; and
- Loamy and silty soils have good moisture holding capacity but usually drain easily. They are usually fertile and moderately easy to cultivate. However, they can be easily damaged by mechanised soil handling, especially silty ones.

The subsoil material sampled from the study area is classified as a *Sandy Loam, Loamy Sand or Sandy Silty Loam.* The soil texture of the site is therefore deemed to be suitable for many small native indigenous Irish tree species.

### 4.1.3 Licence Compliance

Condition 4.5 of the sites licence states:

*''Where tree planting is to be carried out above waste-filled areas, a synthetic barrier shall be used to augment the clay cap. Combined topsoil and subsoil depths shall be a minimum of 1m.''*

There is no geosynthetic LLDPE liner in place. For health and safety reasons, it is not considered appropriate to excavate 2-3 m of soil to facilitate the installation of an LLDPE barrier and subsurface drainage geo-composite.

A technical assessment of the soils in the study area shows that soils are not low permeability clays. However, by planting the trees in the area, evapotranspiration will remove water reserves in the subsoil / existing cap and therefore reduce the risk of deep percolation rainfall inputs into the waste body. Planting of trees with shallow root systems will therefore reduce further deep percolation inputs as may occur.

### 4.1.4 Selection of Tree Species

Many factors govern the selection of tree species for planting schemes and the soil types present, in the absence of an underlying waste body, would be deemed suitable for a wide range of indigenous trees[1].

In relation to the landfill at Dunsink there are two additional considerations:

- Maintenance of a minimum cap thickness of 1.0 m where no tree roots are present to reduce percolation inputs into the waste and to reduce the risk of landfill gas coming into contact with roots.
- Having root systems and planting regimes that when fully mature are sufficiently developed to reduce the risk of trees toppling over when subject to high wind loadings.

[1] A Guide to Forest Tree Species Selection and Silviculture in Ireland COFORD 2003 ISBN 1 902696 27 1

It is recommended that planting using small native trees, will further reduce the risk of deep percolation inputs to the cap albeit that there is no barrier layer in place.

Planting will however be subject to prior agency approval because it is not recommended that a barrier and drainage layer be constructed below the proposed planting areas to facilitate compliance with waste licence Condition 4.5 because of safety concerns. Also if a deep excavation was implemented it may encourage localised deep percolation inputs and development of roots to seek water.

Suitable species are considered to be:

- Whitebeam *Sorbus aria* (roots up to 2.0 m).
- Birch *Betula pendula* (shallow roots systems need to be planted with protection provided by deeper tree root systems roots also have aggressive shallow root systems not to be placed adjacent to services).
- Wild *Prunus avium* and Bird Cherry *Prunus padus* (shallow roots systems need to be planted with protection provided by deeper tree root systems).
- Crab apple *Malas silvestris* (shallow roots less than 1.0 m).

The following larger trees may be considered but they may need to be planted within copses, to reduce the risk of failure in exposed locations, and where soil depth exceeds 3.0 m.

- Sessile Oak *Quercus petraea.*
- Oak Pedunculate *Quercus robur* (tap roots 2.0 m deep).
- Alder *Alnus glutinosa* (tap roots 2.0 m deep).

Larger trees such as Scots Pine should be avoided as this species typically has tap roots > 3.0 m.

Planting density should be selected to support energy dissipation as opposed to plantation style planting which may create a wind break. Layout should also be cognisant of prevailing winds and soil depth.

Planting should where possible be mixed so that the trees on mass develop a mix of shallow fibrous roots and deep (i.e. up to 2.0 m max) root systems.

It is recommended that prior to planting soil testing be carried out to determine the need or other for fertiliser applications. Plants should be planted as whip size to maximise chance of survival an establishment. Applications may be subject to both soil conditions and species requirements.

Sites must be reprofiled after planting to ensure that surfaces are free draining and there are no localised surface depressions present.

Trees must be planted with a maintenance contract to manage weeds and replace losses. Plantation may also need to protect (fencing and or sleeves as required to prevent, damage by rabbits, deer or other.

FEHILY TIMONEY

CONSULTANTS IN ENGINEERING,
ENVIRONMENTAL SCIENCE
& PLANNING

# APPENDIX 1

## Causeway Geotech Site Investigation Report

# Dunsink Tree Planting – Ground Investigation

| | |
|---|---|
| Client: | DCC |
| Client's Representative: | Fehily Timoney |
| Report No.: | 21-1429 |
| Date: | February 2022 |
| Status: | Final for Issue |

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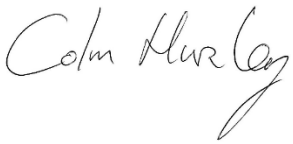
Registered in Northern Ireland. Company Number: NI610766
Approved: ISO 9001 • ISO 14001 • OHSAS 18001

## CONTENTS



## APPENDICES

## Document Control Sheet

| | | | | | |
|---|---|---|---|---|---|
| **Report No.:** | | 21-1429 | | | |
| **Project Title:** | | Dunsink Tree Planting | | | |
| **Client:** | | DCC | | | |
| **Client's Representative:** | | Fehily Timoney | | | |
| **Revision:** | A01 | **Status:** | Final for Issue | **Issue Date:** | 21st February 2022 |
| **Prepared by:** | | **Reviewed by:** | | **Approved by:** | |
|  Sean Ross<br>BSc MSc MIEI | |  Colm Hurley<br>BSc PGeo FGS | |  Darren O'Mahony<br>BSc MSc MIEI EurGeol PGeo | |

The works were conducted in accordance with:

British Standards Institute (2015) BS 5930:2015+A1:2020, Code of practice for site investigations.

BS EN 1997-2: 2007: Eurocode 7 - Geotechnical design - Part 2 Ground investigation and testing.

Geotechnical Society of Ireland (2016), Specification & Related Documents for Ground Investigation in Ireland

## METHODS OF DESCRIBING SOILS AND ROCKS

Soil and rock descriptions are based on the guidance in BS5930:2015+A1:2020, The Code of Practice for Site Investigation.

| **Abbreviations used on exploratory hole logs** | |
|---|---|
| U | Nominal 100mm diameter undisturbed open tube sample (thick walled sampler). |
| UT | Nominal 100mm diameter undisturbed open tube sample (thin walled sampler). |
| P | Nominal 100mm diameter undisturbed piston sample. |
| B | Bulk disturbed sample. |
| LB | Large bulk disturbed sample. |
| D | Small disturbed sample. |
| C | Core sub-sample (displayed in the Field Records column on the logs). |
| L | Liner sample from dynamic sampled borehole. |
| W | Water sample. |
| ES / EW | Soil sample for environmental testing / Water sample for environmental testing. |
| SPT (s) | Standard penetration test using a split spoon sampler (small disturbed sample obtained). |
| SPT (c) | Standard penetration test using 60 degree solid cone. |
| (x,x/x,x,x,x) | Blows per increment during the standard penetration test. The initial two values relate to the seating drive (150mm) and the remaining four to the 75mm increments of the test length. |
| (Y for Z/ Y for Z) | Incomplete standard penetration test where the full test length was not achieved. The blows 'X' represent the total blows for the given seating or test length 'Z' (mm). |
| N=X | SPT blow count 'N' given by the summation of the blows 'X' required to drive the full test length (300mm). |
| HVP / HVR | In situ hand vane test result (HVP) and vane test residual result (HVR). Results presented in kPa. |
| V<br>VR | Shear vane test (borehole). Shear strength stated in kPa.<br>V: undisturbed vane shear strength VR: remoulded vane shear strength |
| Soil consistency description | In cohesive soils, where samples are disturbed and there are no suitable laboratory tests, N values may be used to indicate consistency on borehole logs – a median relationship of Nx5=Cu is used (as set out in Stroud & Butler 1975). |
| dd-mm-yyyy | Date at the end and start of shifts, shown at the relevant borehole depth. Corresponding casing and water depths shown in the adjacent columns. |
| ▽ | Water strike: initial depth of strike. |
| ▼ | Water strike: depth water rose to. |
| Abbreviations relating to rock core – reference Clause 36.4.4 of BS 5930: 2015 | |
| TCR (%) | Total Core Recovery: Ratio of rock/soil core recovered (both solid and non-intact) to the total length of core run. |
| SCR (%) | Solid Core Recovery: Ratio of solid core to the total length of core run. Solid core has a full diameter, uninterrupted by natural discontinuities, but not necessarily a full circumference and is measured along the core axis between natural fractures. |
| RQD (%) | Rock Quality Designation: Ratio of total length of solid core pieces greater than 100mm to the total length of core run. |
| FI | Fracture Index: Number of natural discontinuities per metre over an indicated length of core of similar intensity of fracturing. |
| NI | Non Intact: Used where the rock material was recovered fragmented, for example as fine to coarse gravel size particles. |
| AZCL | Assessed zone of core loss: The estimated depth range where core was not recovered. |
| DIF | Drilling induced fracture: A fracture of non-geological origin brought about by the rock coring. |
| (xxx/xxx/xxx) | Spacing between discontinuities (minimum/average/maximum) measured in millimetres. |

# Dunsink Tree Planting

## 1 AUTHORITY

On the instructions of Fehily Timoney, ("the Client's Representative"), acting on the behalf of DCC ("the Client"), a ground investigation was undertaken at the above location to provide geotechnical information for input to the design of a proposed tree planting scheme.

This report details the work carried out on site; it contains a description of the site, the works undertaken, the exploratory hole logs and the laboratory test results.

All information given in this report is based upon the ground conditions encountered during the site investigation works. However, there may be conditions at the site that have not been taken into account, such as unpredictable soil strata, contaminant concentrations, and water conditions between or below exploratory holes. It should be noted that groundwater levels usually vary due to seasonal and/or other effects and may at times differ to those recorded during the investigation. No responsibility can be taken for conditions not encountered through the scope of work commissioned, for example between exploratory hole points, or beneath the termination depths achieved.

This report was prepared by Causeway Geotech Ltd for the use of the Client and the Client's Representative in response to a particular set of instructions. Any other parties using the information contained in this report do so at their own risk and any duty of care to those parties is excluded.

## 2 SCOPE

The extent of the investigation, as instructed by the Client's Representative, included boreholes and the preparation of a factual report on the findings.

## 3 DESCRIPTION OF SITE

As shown on the site location plan in Appendix A, the works were conducted on the site of Dunsink Landfill located west of Finglas in Dublin. The site is bounded by the National Orthopaedic Hospital to the north, by Dunsink Lane to the south, by the M50 to the west and by residential properties to the east. The site is comprised entirely of grassland and is undulating in topography.

# 4 SITE OPERATIONS

## 4.1 Summary of site works

Site operations, which were conducted between 8th and 9th November 2021, comprised:

- eight boreholes by dynamic (windowless) sampling methods

The exploratory holes were located as instructed by the Client's Representative, as shown on the exploratory hole location plan in Appendix A.

## 4.2 Boreholes

Eight boreholes (WS01-WS08) were put down to completion by light percussion boring techniques using a Dando Terrier dynamic sampling rig. The boreholes were put down initially in 150mm diameter, reducing in diameter with depth as required, down to 50mm by use of the smallest sampler.

The boreholes were taken to depths ranging between 1.10m and 4.0m where they were terminated at their scheduled depths, or else they were terminated on encountering virtual refusal on obstructions above this depth.

Any water strikes encountered during boring were recorded along with any changes in their levels as the borehole proceeded. Details of the water strikes are presented on the individual borehole logs.

Appendix B presents the borehole logs.

## 4.3 Surveying

Co-ordinates on the borehole logs and as shown in Appendix A drawings are as provided by the Client's Representative prior to works commencing.

The plan coordinates (Irish Transverse Mercator) at each location are recorded on the individual exploratory hole logs. The exploratory hole plan presented in Appendix A shows these as-built positions.

# 5 GROUND CONDITIONS

## 5.1 General geology of the area

Published geological mapping indicate the superficial deposits underlying the site comprise made ground. These deposits are underlain by limestones and shales of the Tober Colleen Formation.

## 5.2 Ground types encountered during investigation of the site

A summary of the ground types encountered in the exploratory holes is listed below, in approximate stratigraphic order:

- **Topsoil/Made ground (clay cap):** encountered across the site with a thickness of 1.00-2.00m.
- **Made Ground (fill):** landfill material was encountered in all boreholes with the exception of WS03 and WS06 comprising varying amounts of concrete, brock, timber fragments and cinders.

## 5.3 Groundwater

Details of the individual groundwater strikes, along with any relative changes in levels as works proceeded, are presented on the exploratory hole logs for each location.

Groundwater was encountered during light percussion boring through soil as a seepage at a depth of 3.00m in WS07.

Groundwater was not noted during drilling at any of the other borehole locations.

Seasonal variation in groundwater levels should also be factored into design considerations.

# 6 REFERENCES

Geotechnical Society of Ireland (2016), Specification & Related Documents for Ground Investigation in Ireland.

IS EN 1997-2: 2007: Eurocode 7 - Geotechnical design - Part 2 Ground investigation and testing. National Standards Authority of Ireland.

BS 5930: 2015+A1:2020: Code of practice for ground investigations. British Standards Institution.

BS EN ISO 14688-1:2018: Geotechnical investigation and testing. Identification and classification of soil. Part 1 Identification and description.

BS EN ISO 14688-2:2018: Geotechnical investigation and testing. Identification and classification of soil. Part 2 Principles for a classification.

BS 1377: 1990: Methods of test for soils for civil engineering purposes. British Standards Institution.

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# APPENDIX A

# SITE AND EXPLORATORY HOLE LOCATION PLAN

CAUSEWAY GEOTECH

| | | | |
|---|---|---|---|
| **Project No.:** | 21-1429 | **Client:** | DCC |
| **Project Name:** | Dunsink Tree Planting | **Client's Representative:** | Fehily Timoney |

Legend Key


**Title:**

Site Location Plan

| **Last Revised:** | **Scale:** |
|---|---|
| 21/02/2022 | 1:25000 |

CAUSEWAY GEOTECH

| | | | |
|---|---|---|---|
| **Project No.:** | 21-1429 | **Client:** | DCC |
| **Project Name:** | Dunsink Tree Planting | **Client's Representative:** | Fehily Timoney |

Legend Key

Locations By Type - DS


**Title:**

Site Location Plan

| **Last Revised:** | **Scale:** |
|---|---|
| 21/02/2022 | 1:5000 |

CAUSEWAY GEOTECH

# APPENDIX B

# BOREHOLE LOGS

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| Project No. | Project Name: | Borehole ID |
|---|---|---|
| 21-1429 | Dunsink Tree Planting | WS01 |
| | Client: DCC | |
| | Client's Rep: Fehily Timoney | |

| Method | Plant Used | Top (m) | Base (m) | Coordinates |
|---|---|---|---|---|
| Dynamic Sampling | Dando Terrier | 0.00 | 3.00 | 710155.12 E<br>739165.37 N |

| Final Depth: | Start Date: | Driller: | Sheet 1 of 1 |
|---|---|---|---|
| 3.00 m | 08/11/2021 | JA | Scale: 1:50 |
| **Elevation:** mOD | **End Date:** 08/11/2021 | **Logger:** SR | FINAL |

| Depth (m) | Sample / Tests | Field Records | Casing Depth (m) | Water Depth (m) | Level mOD | Depth (m) | Legend | Description | Water | Backfill |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 0.60 | | MADE GROND: Soft brown CLAY. | | |
| | | | | | | 1.80 | | MADE GROUND: Firm brownish grey slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular fine to medium. Cobbles are subangular. | | |
| | | | | | | 2.00 | | MADE GROND: Red brick fill. | | |
| | | | | | | 2.10 | | MADE GROUND: LANDFILL material with bits of timber. | | |
| | | | | | | 3.00 | | MADE GROUND: Soft brownish grey slightly sandy slightly gravelly CLAY with fragments of plastic. Sand is fine to coarse. Gravel is subangular fine to medium, | | |
| | | | | | | | | End of Borehole at 3.00m | | |

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0

**Water Strikes**

| Struck at (m) | Casing to (m) | Time (min) | Rose to (m) |
|---|---|---|---|
| | | | |

**Casing Details**

| To (m) | Diameter |
|---|---|
| | |

**Remarks**

No groundwater encountered.

**Termination Reason**

Terminated at scheduled depth.

**Last Updated**

21/02/2022

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CAUSEWAY GEOTECH

| Project No. | Project Name: | Borehole ID |
|---|---|---|
| 21-1429 | Dunsink Tree Planting | WS02 |
| | Client: DCC | |
| | Client's Rep: Fehily Timoney | |

| Method | Plant Used | Top (m) | Base (m) | Coordinates |
|---|---|---|---|---|
| Dynamic Sampling | Dando Terrier | 0.00 | 2.60 | 710243.05 E<br>739230.25 N |

| Final Depth: | Start Date: | Driller: | Sheet 1 of 1 |
|---|---|---|---|
| 2.60 m | 08/11/2021 | JA | Scale: 1:50 |
| **Elevation:** mOD | **End Date:** 08/11/2021 | **Logger:** SR | FINAL |

| Depth (m) | Sample / Tests | Field Records | Casing Depth (m) | Water Depth (m) | Level mOD | Depth (m) | Legend | Description | Water | Backfill |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 0.45 | | MADE GROUND: Soft brown slightly sandy CLAY. Sand is fine to coarse. | | |
| | | | | | | 1.70 | | MADE GROUND: Firm brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse. | | |
| | | | | | | 2.60 | | MADE GROUND: LANDFILL with fragments of glass, plastic, red brick and timber. | | |
| | | | | | | | | End of Borehole at 2.60m | | |

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0

| Water Strikes | | | | Casing Details | |
|---|---|---|---|---|---|
| Struck at (m) | Casing to (m) | Time (min) | Rose to (m) | To (m) | Diameter |
| | | | | | |

**Remarks**

No groundwater encountered.

**Termination Reason**

Terminated at scheduled depth.

**Last Updated**

21/02/2022

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CAUSEWAY GEOTECH

| Project No. | Project Name: | Borehole ID |
|---|---|---|
| 21-1429 | Dunsink Tree Planting | WS03 |
| | Client: DCC | |
| | Client's Rep: Fehily Timoney | |

| Method | Plant Used | Top (m) | Base (m) | Coordinates |
|---|---|---|---|---|
| Dynamic Sampling | Dando Terrier | 0.00 | 4.00 | 710351.36 E<br>739246.22 N |

| Final Depth: | Start Date: | Driller: | Sheet 1 of 1 |
|---|---|---|---|
| 4.00 m | 08/11/2021 | JA | Scale: 1:50 |
| **Elevation:** mOD | **End Date:** 08/11/2021 | **Logger:** SR | FINAL |

| Depth (m) | Sample / Tests | Field Records | Casing Depth (m) | Water Depth (m) | Level mOD | Depth (m) | Legend | Description | Water | Backfill |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | MADE GROUND: Soft brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to medium. | | |
| | | | | | | 1.50 | | No Recovery - pushing a cobble. | | |
| | | | | | | 2.00 | | MADE GROUND: Firm grey sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to medium. | | |
| | | | | | | 4.00 | | End of Borehole at 4.00m | | |

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0

**Water Strikes**

| Struck at (m) | Casing to (m) | Time (min) | Rose to (m) |
|---|---|---|---|
| | | | |

**Casing Details**

| To (m) | Diameter |
|---|---|
| | |

**Remarks**

No groundwater encountered.

**Termination Reason**

Terminated at scheduled depth.

**Last Updated**

21/02/2022

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CAUSEWAY GEOTECH

| Project No. | Project Name: Dunsink Tree Planting | Borehole ID |
|---|---|---|
| 21-1429 | Client: DCC | WS04 |
| | Client's Rep: Fehily Timoney | |

| Method | Plant Used | Top (m) | Base (m) | Coordinates | Final Depth: 3.00 m | Start Date: 08/11/2021 | Driller: JA | Sheet 1 of 1 |
|---|---|---|---|---|---|---|---|---|
| Dynamic Sampling | Dando Terrier | 0.00 | 3.00 | 710392.36 E<br>739320.67 N | Elevation: mOD | End Date: 08/11/2021 | Logger: SR | Scale: 1:50<br>FINAL |

| Depth (m) | Sample / Tests | Field Records | Casing Depth (m) | Water Depth (m) | Level mOD | Depth (m) | Legend | Description | Water | Backfill |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 0.70 | | MADE GROUND: Soft brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to medium. | | |
| | | | | | | 0.90 | | MADE GROUND: Brown sandy subangular fine to coarse GRAVEL. Sand is fine to coarse. | | |
| | | | | | | | | MADE GROUND: Firm brownish grey sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to medium. | | |
| | | | | | | 2.00 | | MADE GROUND: Soft greyish black gravelly CLAY with fragments of red brick, timber and cinders. (Landfill material) | | |
| | | | | | | 3.00 | | End of Borehole at 3.00m | | |

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0

| Water Strikes | | | | Casing Details | |
|---|---|---|---|---|---|
| Struck at (m) | Casing to (m) | Time (min) | Rose to (m) | To (m) | Diameter |
| | | | | | |

**Remarks**

No groundwater encountered.

**Termination Reason**

Terminated at scheduled depth.

**Last Updated**

21/02/2022

AGS

CAUSEWAY GEOTECH

| Project No. | Project Name: | Borehole ID |
|---|---|---|
| 21-1429 | Dunsink Tree Planting | WS05 |
| | Client: DCC | |
| | Client's Rep: Fehily Timoney | |

| Method | Plant Used | Top (m) | Base (m) | Coordinates |
|---|---|---|---|---|
| Dynamic Sampling | Dando Terrier | 0.00 | 2.40 | 710487.74 E<br>739396.31 N |

| Final Depth: | Start Date: | Driller: | Sheet 1 of 1 |
|---|---|---|---|
| 2.40 m | 08/11/2021 | JA | Scale: 1:50 |
| **Elevation:** mOD | **End Date:** 08/11/2021 | **Logger:** SR | FINAL |

| Depth (m) | Sample / Tests | Field Records | Casing Depth (m) | Water Depth (m) | Level mOD | Depth (m) | Legend | Description | Water | Backfill |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 0.80 | | MADE GROUND: Soft brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to medium. | | |
| | | | | | | 1.90 | | MADE GROUND: Firm grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subrounded fine to medium. | | |
| | | | | | | 2.40 | | MADE GROUND: Soft greyish black gravelly CLAY with fragments of red brick and cinders. (Landfill material) | | |
| | | | | | | | | End of Borehole at 2.40m | | |

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0

**Water Strikes**

| Struck at (m) | Casing to (m) | Time (min) | Rose to (m) |
|---|---|---|---|
| | | | |

**Casing Details**

| To (m) | Diameter |
|---|---|
| | |

**Remarks**

No groundwater encountered.

**Termination Reason**

Terminated at scheduled depth.

**Last Updated**

21/02/2022

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CAUSEWAY GEOTECH

| Project No. | Project Name: | Borehole ID |
|---|---|---|
| 21-1429 | Dunsink Tree Planting | WS06 |
| | Client: DCC | |
| | Client's Rep: Fehily Timoney | |

| Method | Plant Used | Top (m) | Base (m) | Coordinates |
|---|---|---|---|---|
| Dynamic Sampling | Dando Terrier | 0.00 | 1.10 | 710572.63 E<br>739458.28 N |

| Final Depth: | Start Date: | Driller: | Sheet 1 of 1 |
|---|---|---|---|
| 1.10 m | 09/11/2021 | JA | Scale: 1:50 |
| **Elevation:** mOD | **End Date:** 09/11/2021 | **Logger:** SR | FINAL |

| Depth (m) | Sample / Tests | Field Records | Casing Depth (m) | Water Depth (m) | Level mOD | Depth (m) | Legend | Description | Water | Backfill |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 1.00<br>1.10 | | MADE GROUND: Soft brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to medium.<br>MADE GROUND: Firm brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subrounded fine to medium.<br>End of Borehole at 1.10m | | |

| Water Strikes | | | | Casing Details | |
|---|---|---|---|---|---|
| Struck at (m) | Casing to (m) | Time (min) | Rose to (m) | To (m) | Diameter |

**Remarks**

No groundwater encountered.

**Termination Reason**

Terminated on boulders - attempted 3 times.

**Last Updated**

21/02/2022

AGS

CAUSEWAY GEOTECH

| Project No. | Project Name: | Borehole ID |
|---|---|---|
| 21-1429 | Dunsink Tree Planting | WS07 |
| | Client: DCC | |
| | Client's Rep: Fehily Timoney | |

| Method | Plant Used | Top (m) | Base (m) | Coordinates |
|---|---|---|---|---|
| Dynamic Sampling | Dando Terrier | 0.00 | 3.00 | 710592.06 E<br>739404.94 N |

| Final Depth: | Start Date: | Driller: | Sheet 1 of 1 |
|---|---|---|---|
| 3.00 m | 09/11/2021 | JA | Scale: 1:50 |
| **Elevation:** mOD | **End Date:** 09/11/2021 | **Logger:** SR | FINAL |

| Depth (m) | Sample / Tests | Field Records | Casing Depth (m) | Water Depth (m) | Level mOD | Depth (m) | Legend | Description | Water | Backfill |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 0.20 | | MADE GROUND: Soft brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to medium. | | |
| | | | | | | 1.30 | | MADE GROUND: Firm brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subrounded fine to medium. | | |
| | | Slight seepage at 3.00m. | | | | 3.00 | | MADE GROUND: Firm to stiff grey slightly sandy slightly gravelly CLAY with fragments of plastic, red brick and concrete. (Landfill material) | | |
| | | | | | | | | End of Borehole at 3.00m | | |

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0

**Water Strikes**

| Struck at (m) | Casing to (m) | Time (min) | Rose to (m) |
|---|---|---|---|
| 3.00 | | | |

**Casing Details**

| To (m) | Diameter |
|---|---|
| | |

**Remarks**

**Termination Reason**

Terminated at scheduled depth.

**Last Updated**

21/02/2022

AGS

CAUSEWAY GEOTECH

| Project No. | Project Name: | Borehole ID |
|---|---|---|
| 21-1429 | Dunsink Tree Planting | WS08 |
| | Client: DCC | |
| | Client's Rep: Fehily Timoney | |

| Method | Plant Used | Top (m) | Base (m) | Coordinates |
|---|---|---|---|---|
| Dynamic Sampling | Dando Terrier | 0.00 | 2.90 | 710479.57 E<br>739340.89 N |

| Final Depth: | Start Date: | Driller: | Sheet 1 of 1 |
|---|---|---|---|
| 2.90 m | 09/11/2021 | JA | Scale: 1:50 |
| **Elevation:** mOD | **End Date:** 09/11/2021 | **Logger:** SR | FINAL |

| Depth (m) | Sample / Tests | Field Records | Casing Depth (m) | Water Depth (m) | Level mOD | Depth (m) | Legend | Description | Water | Backfill |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | MADE GROUND: Firm brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to medium. | | |
| | | | | | | 1.00 | | MADE GROUND: Stiff grey sandy gravelly CLAY with fragments of concrete, red brick and timber. Sand is fine to coarse. Gravel is subrounded fine to medium. (Landfill material) | | |
| | | | | | | 2.70 | | MADE GROUND: LANDFILL material comprising fragments of red brick, concrete and cinders. | | |
| | | | | | | 2.90 | | End of Borehole at 2.90m | | |

| Water Strikes | | | | Casing Details | |
|---|---|---|---|---|---|
| Struck at (m) | Casing to (m) | Time (min) | Rose to (m) | To (m) | Diameter |

**Remarks**

No groundwater encountered.

**Termination Reason**

Terminated at scheduled depth.

**Last Updated**

21/02/2022

AGS

FEHILY TIMONEY

CONSULTANTS IN ENGINEERING,
ENVIRONMENTAL SCIENCE
& PLANNING

# APPENDIX 2

## Geotechnical Laboratory Analysis Results

# METLAB LTD

Unit 6 Airways Technology Park, Ballygarvan, Cork.

T: (021) 4311614 F: (021) 4311714 email: www.metlab.ie

Metlab Ltd - registered in Ireland (No. 84894)


## pH VALUE DETERMINATION TEST REPORT
## TESTED IN ACCORDANCE WITH BS 1377:PART 3:1990:Method 9

| | | | |
|---|---|---|---|
| Contract No | **J3559** | Report No | **J3559-pH.01-08** |
| Client Contact | **Mr. Daniel Hayden** | Lab No | **See Below** |
| Client | **Fehily Timoney & Company** | Sample Type | **Bulk Disturbed** |
| Contract | **Dunsink Tree Planting** | Method of Prep | **N/A** |
| | | Sampling Certificate | **Yes** |
| | | Sampled By | **Client** |
| Site Ref | **N/A** | Date Sampled | **N/A** |
| Client Ref | **pH.01-08** | Date Received | **25/11/2021** |
| Specification | **N/A** | Date Started | **17/01/2022** |
| Location | **See Below** | | |
| Sample Description | **Topsoil** | | |

| Lab No | Location | Mean pH Value |
|---|---|---|
| C10281 | WS.01: 0.0-1.0m | 7.1 |
| C10282 | WS.02: 0.0-1.0m | 7.2 |
| C10283 | WS.03: 0.0-1.0m | 7.1 |
| C10284 | WS.04: 0.0-1.0m | 7.1 |
| C10285 | WS.05: 0.0-1.0m | 7.1 |
| C10286 | WS.06: 0.0-1.0m | 7.0 |
| C10287 | WS.07: 0.0-1.0m | 7.1 |
| C10288 | WS.08: 0.0-1.0m | 7.1 |

**Remarks:**

Approved

18/01/2022
Date Reported

| Approval By: | |
|---|---|
| Technical Manager | ■ |
| Laboratory Manager | ☐ |
| Contracts Manager | ☐ |

**End of Test**

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## pH VALUE DETERMINATION TEST REPORT
## TESTED IN ACCORDANCE WITH BS 1377:PART 3:1990:Method 9

| | | | |
|---|---|---|---|
| Contract No | **J3559** | Report No | **J3559-pH.09-19** |
| Client Contact | **Mr. Daniel Hayden** | Lab No | **See Below** |
| Client | **Fehily Timoney & Company** | Sample Type | **Bulk Disturbed** |
| Contract | **Dunsink Tree Planting** | Method of Prep | **N/A** |
| | | Sampling Certificate | **Yes** |
| | | Sampled By | **Client** |
| Site Ref | **N/A** | Date Sampled | **N/A** |
| Client Ref | **pH.09-19** | Date Received | **25/11/2021** |
| Specification | **N/A** | Date Started | **14/01/2022** |
| Location | **See Below** | | |
| Sample Description | **Subsoil** | | |

| Lab No | Location | Mean pH Value |
|---|---|---|
| C10289 | WS.01: 1.0-2.0m | 7.2 |
| C10290 | WS.02: 1.0-2.0m | 7.2 |
| C10291 | WS.03: 1.0-2.0m | 7.3 |
| C10292 | WS.03: 2.0-3.0m | 7.1 |
| C10293 | WS.03: 3.0-4.0m | 7.1 |
| C10294 | WS.04: 1.0-2.0m | 7.2 |
| C10295 | WS.05: 1.0-2.0m | 7.2 |
| C10296 | WS.07: 1.0-2.0m | 7.2 |
| C10297 | WS.07: 2.0-3.0m | 7.3 |
| C10298 | WS.08: 1.0-2.0m | 7.2 |
| C10299 | WS.08: 2.0-3.0m | 7.3 |

**Remarks:**

Approved

18/01/2022
Date Reported

| Approval By: | |
|---|---|
| Technical Manager | ■ |
| Laboratory Manager | ☐ |
| Contracts Manager | ☐ |

**End of Test**

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## ORGANIC CONTENT TEST REPORT

| | | | |
|---|---|---|---|
| Contract No | **J3559** | Report No | **J3559-ORG.01-08** |
| Client Contact | **Mr. Daniel Hayden** | Lab No | **See Below** |
| Client | **Fehily Timoney & Company** | Sample Type | **Bulk Disturbed** |
| Contract | **Dunsink Tree Planting** | Method of Prep | **N/A** |
| | | Sampling Certificate | **Yes** |
| | | Sampled By | **Client** |
| Site Ref | **N/A** | Date Sampled | **N/A** |
| Client Ref | **ORG.01-08** | Date Received | **25/11/2021** |
| Specification | **N/A** | Date Started | **04/01/2022** |
| Location | **See Below** | | |
| Sample Description | **Topsoil** | | |

| Lab No | Location | Total Organic Content (%) |
|---|---|---|
| C10281 | WS.01: 0.0-1.0m | 23.53 |
| C10282 | WS.02: 0.0-1.0m | 29.73 |
| C10283 | WS.03: 0.0-1.0m | 25.80 |
| C10284 | WS.04: 0.0-1.0m | 16.80 |
| C10285 | WS.05: 0.0-1.0m | 28.10 |
| C10286 | WS.06: 0.0-1.0m | 11.45 |
| C10287 | WS.07: 0.0-1.0m | 18.95 |
| C10288 | WS.08: 0.0-1.0m | 31.30 |

**Remarks:** Test subcontracted to an approved laboratory

Approved

18/01/2022
Date Reported

| Approval By: | |
|---|---|
| Technical Manager | ■ |
| Laboratory Manager | ☐ |
| Contracts Manager | ☐ |

**End of Test**

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## MOISTURE CONTENT DETERMINATION TEST REPORT
## TESTED IN ACCORDANCE WITH BS 1377:PART 2:1990:3.2

| | | | |
|---|---|---|---|
| Contract No | **J3559** | Report No | **J3559-MC.01-11** |
| Client Contact | **Mr. Daniel Hayden** | Lab No | **See Below** |
| Client | **Fehily Timoney & Company** | Sample Type | **Bulk Disturbed** |
| Contract | **Dunsink Tree Planting** | Method of Prep | **N/A** |
| | | Sampling Certificate | **Yes** |
| | | Sampled By | **Client** |
| Site Ref | **N/A** | Date Sampled | **N/A** |
| Client Ref | **MC.01-11** | Date Received | **25/11/2021** |
| Specification | **N/A** | Date Started | **16/12/2021** |
| Location | **See Below** | | |
| Sample Description | **Subsoil** | | |

| Lab No | Location | Moisture Content (%) |
|---|---|---|
| C10289 | WS.01: 1.0-2.0m | 11.0 |
| C10290 | WS.02: 1.0-2.0m | 23.0 |
| C10291 | WS.03: 1.0-2.0m | 13.0 |
| C10292 | WS.03: 2.0-3.0m | 14.0 |
| C10293 | WS.03: 3.0-4.0m | 19.0 |
| C10294 | WS.04: 1.0-2.0m | 12.0 |
| C10295 | WS.05: 1.0-2.0m | 14.0 |
| C10296 | WS.07: 1.0-2.0m | 15.0 |
| C10297 | WS.07: 2.0-3.0m | 13.0 |
| C10298 | WS.08: 1.0-2.0m | 12.0 |
| C10299 | WS.08: 2.0-3.0m | 16.0 |

**Remarks:**

Approved

18/01/2022
Date Reported

| Approval By: | |
|---|---|
| Technical Manager | ■ |
| Deputy Technical Manager | ☐ |
| Laboratory Supervisor | ☐ |

**End of Test**

FEHILY TIMONEY

**CONSULTANTS IN ENGINEERING, ENVIRONMENTAL SCIENCE & PLANNING**

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