**IGSL Limited**

# Ground Investigation
# SSE Great Island
# Co Wexford

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**Client – David Flynn Limited**

**Consultant – DJF CE**

**IGSL Report No. 20661**

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Geotechnical Factual Report

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**December 2017**

Factual Report

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## FOREWORD

The following Conditions and Notes on Site Investigation Procedures should be read in conjunction with this report.

### General.

Recommendations made, and opinions expressed in the report are based on the strata observed in the exploratory holes, together with the results of in-situ and laboratory tests. No responsibility can be held for conditions which have not been revealed by exploratory work, or which occur between exploratory hole locations. Whilst the report may suggest the likely configuration of strata, both between exploratory hole locations, or below the maximum depth of the investigation, this is only indicative, and liability cannot be accepted for its accuracy.

Unless specifically stated, no account has been taken of possible subsidence due to mineral extraction below or close to the site.

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### Boring Procedures.

Unless otherwise stated, the 'Shell and Auger' technique of soft ground boring has been employed. All boring operations sampling and/or logging of soils and in-situ testing complies with the recommendations of the British Standard Code of Practice BS 5930 (1981), 'Site Investigation' and BS 1377:1990, 'Methods of test for soils for civil engineering purposes'.

Whilst the technique allows the maximum data to be obtained in soft ground, some disturbance and variation of soft and layered soils is unavoidable. Attention is drawn to this condition, whenever it is suspected. Where cobbles and boulders are recorded, no conclusion should be drawn concerning the size, presence, lithological nature, or numbers per unit volume of ground.

Where peat has been encountered during siteworks, samples have been logged in accordance with the Von Post Classification (ref. Von Post, L. 1992. Sveriges Gologiska Undersoknings torvinventering och nogra av dess hittils vunna resultat (SGU peat inventory and some preliminary results) Svenska Mosskulturforeningens Tidskrift, Jonkoping, Swedden, 36, 1-37 & Hobbs N. B. Mire morphology and the properties of some British and foreign peats. QJEG, Vol. 19, 1986).

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**Routine Sampling.**

Undisturbed samples of soils, predominantly cohesive in nature are obtained unless otherwise stated by a 104mm diameter open-drive tube sampler. In granular soils, and where undisturbed sampling is inappropriate, disturbed samples are collected. Smaller disturbed samples are also recovered at intervals to allow a visual examination of the full strata section.

**In-Situ Testing.**

Standard penetration tests, utilising either the standard split spoon sampler or solid cone and automatic trip-hammer are conducted unless otherwise where required by instruction. Subsequent to a seating drive of 150mm, a summation for the number of blows for 300mm penetration is recorded on the boring records together with the blow count for each 75mm penetration. In cases where incomplete penetration is obtained, the number of blows for the recorded value of penetration are noted. In coarse granular soils, a cone end is fitted to the sampler and a similar procedure adopted.

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**Groundwater.**

The depth of entry of any influx of groundwater is recorded during the course of boring operations. However, the normal rate of boring does not usually permit the recording of an equilibrium level for any one water strike. Where possible drilling is suspended for a period of twenty minutes to monitor the subsequent rise in water
level.

Groundwater conditions observed in the borings or pits are those appertaining to the period of investigation. It should be noted however, that groundwater levels are subject to diurnal, seasonal and climatic variations and can also be affected by drainage condition, tidal variation or other causes.

**Retention of Samples.**

After satisfactory completion of all the scheduled laboratory tests on any sample, the remaining material is discarded unless a period of retention of samples is agreed, it is our normal practice to discard all soil samples one month after submission of our final report.

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**REPORT ON A SITE INVESTIGATION**
**FOR**
**PROPOSED DEVELOPMENT**
**AT**
**GREAT ISLAND, CO WEXFORD**
**ON BEHALF OF**
**DAVID FLYNN LTD ( MAIN CONTRACTOR )**
**&**
**DJF CONSULTING ENGINEERS**

**REPORT NO. 20611** **DECEMBER 2017**

## I. INTRODUCTION

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It is proposed to develop a site at the Great Island RS in Wexford as part of the ongoing site development works for SSE Electricity.

A programme of ground investigation works was specified by DJF, the projects consulting engineers, and in November 2017 IGSL were commissioned by the projects maon contractors David Flynn Limited to complete these works.

The programme of works completed comprised,

- ✓ The completion of two soakaway tests for storm water drainage. The tests were carried out at one location in accordance with BRE Digest 365 and test data is contained in Appendix I to this report.

- ✓ The completion of EPA tests to establish the suitability of the site for foul water percolation. The tests were completed by an IGSL engineer ( Wexford Co Co approved ) and the EPA site charactarisation forms are contained in Appendix II to this report.

All of the test locations were marked out on site by a representative from David Flynn Limited and the IGSL projects engineers and the site plan is enclosed in Appendix II to this report.

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# Appendix 1 – BRE Digest 365 Soakaway Test Results

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# SOAKAWAY TEST (in accordance with BRE Digest 365)

IGSL (F2)

| | | |
|---|---|---|
| Site | SSE GREAT ISLAND POWER STATION, CO. WEXFORD | |
| Test No. | SA1 | |
| Client | DFL | |
| Date | 30/11/2017 | Engineer : DK |

**Trial pit log**

| from | to | Description |
|---|---|---|
| 0.00 | | MADE GROUND (comprising layers of sandy gravelly clay and |
| | 1.70 | highly weathered bedrock) |
| 1.70 | 2.50 | Brown sandy gravelly CLAY |
| | | |

| | |
|---|---|
| Depth to water in trial pit | Not met |
| After what period of time? | 48hrs |

**TEST RECORD**

| | |
|---|---|
| Depth of test hole | 2.50 |
| Length | 1.50 |
| Width | 1.00 |

| | Depth to water | Elapsed time (minutes) | Remarks |
|---|---|---|---|
| | 1.700 | 0 | **Results of 3rd Fill** |
| | 1.705 | 5 | |
| | 1.710 | 10 | |
| | 1.718 | 20 | |
| | 1.726 | 30 | |
| | 1.735 | 40 | |
| | 1.743 | 50 | |
| | 1.751 | 60 | |
| | 1.774 | 90 | |
| | 1.796 | 120 | |
| | 1.817 | 150 | |
| | 1.838 | 180 | |

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# SOAKAWAY TEST (in accordance with BRE Digest 365)

IGSL (F2)

| | | |
|---|---|---|
| Site | SSE GREAT ISLAND POWER STATION, CO. WEXFORD | |
| Test No. | SA2 | |
| Client | DFL | |
| Date | 30/11/2017 | Engineer : DK |

**Trial pit log**

| from | to | Description |
|---|---|---|
| 0.00 | 0.20 | TOPSOIL |
| 0.20 | 0.60 | Brown sandy gravelly CLAY |
| 0.60 | 1.70 | Grey brown sandy gravelly CLAY |
| 1.70 | 3.00 | Brown highly weathered SHALE BEDROCK in clayey matrix |

| | |
|---|---|
| Depth to water in trial pit | Not met |
| After what period of time? | 48hrs |

**TEST RECORD**

| | |
|---|---|
| Depth of test hole | 3.00 |
| Length | 1.50 |
| Width | 0.90 |

| Time | Depth to water | Elapsed time (minutes) | Remarks |
|---|---|---|---|
| | 2.000 | 0 | **Results of 3rd Fill** |
| | 2.011 | 5 | |
| | 2.022 | 10 | |
| | 2.042 | 20 | |
| | 2.062 | 30 | |
| | 2.082 | 40 | |
| | 2.101 | 50 | |
| | 2.120 | 60 | |
| | 2.174 | 90 | |
| | 2.228 | 120 | |
| | 2.280 | 150 | |
| | 2.330 | 180 | |
| | | | |
| | | | |
| | | | |
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| | | | |

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Figure 1. SA1 - Trial Pit

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Figure 2. SA 1 – Arisings

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Figure 3. SA2 - Trial Pit

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Figure 4. SA2 - Arisings

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Figure 5. SA2 – Filling Testhole with water

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# Appendix 2 – EPA Site Characterisation Reports

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# APPENDIX B: SITE CHARACTERISATION FORM

File Reference:

## 1.0 GENERAL DETAILS (From planning application)

Prefix: First Name: SSE - GREAT ISLAND Surname: POWER STATION

Address: GREAT ISLAND, CO. WEXFORD

Site Location and Townland: GREAT ISLAND, CO. WEXFORD

Telephone No: Fax No:

E-Mail:

Maximum no. of Residents: No. of Double Bedrooms: No. of Single Bedrooms:

Proposed Water Supply: Mains ✓ Private Well/Borehole ☐ Group Well/Borehole ☐

## 2.0 GENERAL DETAILS (From planning application)

Soil Type, (Specify Type): Shallow well drained mineral (Mainly acidic)

Aquifer Category: Regionally Important Rf Locally Important Poor

Vulnerability: Extreme ✓ High ☐ Moderate ☐ Low ☐ High to Low ☐ Unknown ☐

Bedrock Type: Campile Formation : Rhyolitic volcanics, brown & grey slates

Name of Public/Group Scheme Water Supply within 1 km:

Groundwater Protection Scheme (Y/N): No Source Protection Area: SI ☐ SO ☐

Groundwater Protection Response: R2²

Presence of Significant Sites (Archaeological, Natural & Historical): NONE NOTED

Past experience in the area: NO

Comments:

(Integrate the information above in order to comment on: the potential suitability of the site, potential targets at risk, and/or any potential site restrictions).

THE GROUNDWATER IS A TARGET RISK.

R2² : Acceptable subject to normal good practice and the following additional condition:
A secondary treatment system as described in Sections 8 and 9 of the EPA 2009 Code of Practice, Wastewater Treatment and Disposal Systems Serving Single Houses is installed, with a minimum thickness of 0.3m unsaturated soil/subsoil with P/T values from 3 to 75 (in addition to the polishing filter which should be a minimum depth of 0.9m), beneath the invert of the polishing filter (i.e. 1.2m in total for a soil polishing filter).

Population Equivalent of 10 has been calculated by the Project Engineers, DJF Engineering Services Ltd.

**Note:** Only information available at the desk study stage should be used in this section.

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## 3.0 ON-SITE ASSESSMENT

### 3.1 Visual Assessment

Landscape Position: MIDDLE OF SLOPE

Slope: Steep (>1:5) ☐ Shallow (1:5-1:20) ☑ Relatively Flat (<1:20) ☐

Surface Features within a minimum of 250m (Distance To Features Should Be Noted In Metres)

Houses: NONE WITHIN 250M

Existing Land Use: CONTRACTOR'S COMPOUND

Vegetation Indicators: NONE NOTED WITHIN 250M

Groundwater Flow Direction: SOUTH

Ground Condition: FIRM

Site Boundaries: >3M

Roads: >10M

Outcrops (Bedrock And/Or Subsoil): NONE NOTED WITHIN 250M

Surface Water Ponding: NONE NOTED WITHIN 250M Lakes: NONE NOTED WITHIN 250M

Beaches/Shellfish: NONE NOTED WITHIN 250M Areas/Wetlands: NONE NOTED WITHIN 250M

Karst Features: NONE NOTED WITHIN 250M

Watercourse/Stream*: THE BARROW RIVER IS >400m SOUTH

Drainage Ditches*: NONE NOTED WITHIN 250M

Springs / Wells*: NONE NOTED WITHIN 250M

Comments:
(Integrate the information above in order to comment on: the potential suitability of the site, potential targets at risk, the suitability of the site to treat the wastewater and the location of the proposed system within the site).

THE GROUNDWATER IS A TARGET RISK.

***Note and record** water level

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**3.2 Trial Hole** (should be a minimum of 2.1m deep (3m for regionally important aquifers))

To avoid any accidental damage, a trial hole assessment or percolation tests should not be undertaken in areas, which are at or adjacent to significant sites (e.g. NHAs, SACs, SPAs, and/or Archaeological etc.), without prior advice from National Parks and Wildlife Service or the Heritage Service.

Depth of trial hole (m): 3.00

Depth from ground surface to bedrock (m) (if present): 1.70

Depth from ground surface to water table (m) (if present): 3.00

Depth of water ingress:

Rock type (if present): BROWN SLATE

Date and time of excavation: 30/11/2017 11:30

Date and time of examination: 04/12/2017 08:50

| | Depth of P/T Test* | Soil/Subsoil Texture & Classification** | Plasticity and dilatancy*** | Soil Structure | Density/ Compactness | Colour**** | Preferential flowpaths |
|---|---|---|---|---|---|---|---|
| 0.1 m | P | TOPSOIL (brown sandy gravelly clay) | Threads 4, 4, 3 Ribbon100,100,110 Not dilatant | Crumb | Firm | Brown | Random |
| 0.2 m | P | | | | | | |
| 0.3 m | P | | | | | | |
| 0.4 m | P | Sandy gravelly CLAY (no mottling present) | Threads 3, 4, 3 Ribbon120,130,120 Not dilatant | Structureless massive | Firm | Brown | Random |
| 0.5 m | T | | | | | | |
| 0.6 m | T | | | | | | |
| 0.7 m | T | | | | | | |
| 0.8 m | T | | | | | | |
| 0.9 m | | | | | | | |
| 1.0 m | | | | | | | |
| 1.1 m | | Sandy gravelly CLAY (no mottling present) | Threads 4, 5, 4 Ribbon130,130,120 Not dilatant | Structureless massive | Stiff | Grey brown | Random |
| 1.2 m | | | | | | | |
| 1.3 m | | | | | | | |
| 1.4 m | | | | | | | |
| 1.5 m | | | | | | | |
| 1.6 m | | | | | | | |
| 1.7 m | | | | | | | |
| 1.8 m | | | | | | | |
| 1.9 m | | | | | | | |
| 2.0 m | | | | | | | |
| 2.1 m | | | | | | | |
| 2.2 m | | Highly weathered SLATE BEDROCK | Tests not possible | Angular | Dense | Brown | Inter particle |
| 2.3 m | | | | | | | |
| 2.4 m | | | | | | | |
| 2.5 m | | | | | | | |
| 2.6 m | | | | | | | |
| 2.7 m | | | | | | | |
| 2.8 m | | | | | | | |
| 2.9 m | | Test holed terminated at 3.0m | | | | | |
| 3.0 m | | | | | | | |

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Likely T value:

**Note:** *Depth of percolation test holes should be indicated on log above. (Enter P or T at depts as appropriate).
** See Appendix E for BS 5930 classification.
*** 3 samples to be tested for each horizon and results should be entered above for each horizon.
**** All signs of mottling should be recorded.

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**3.2 Trial Hole (contd.)** Evaluation:

| |
|---|
| No groundwater was encountered at the excavated of 3.0m. |

**3.3(a) Percolation ("T") Test for Deep Subsoils and/or Water Table**

**Step 1:** Test Hole Preparation

| **Percolation Test Hole** | 1 | 2 | 3 |
|---|---|---|---|
| Depth from ground surface to top of hole (mm) (A) | 500 | 500 | 500 |
| Depth from ground surface to base of hole (mm) (B) | 900 | 900 | 900 |
| Depth of hole (mm) [B - A] | 400 | 400 | 400 |
| Dimensions of hole [length x breadth (mm)] | 300 x 300 | 300 x 300 | 300 x 300 |

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**Step 2:** Pre-Soaking Test Holes

| | | | | | | |
|---|---|---|---|---|---|---|
| Date and Time pre-soaking started | 04/12/2017 | 09:10 | 04/12/2017 | 09:10 | 04/12/2017 | 09:10 |

Each hole should be pre-soaked twice before the test is carried out. Each hole should be empty before refilling.

**Step 3:** Measuring $T_{100}$

| **Percolation Test Hole No.** | 1 | 2 | 3 |
|---|---|---|---|
| Date of test | 05/12/2017 | 05/12/2017 | 05/12/2017 |
| Time filled to 400 mm | 09:15 | 09:15 | 09:15 |
| Time water level at 300 mm | 12:03 | 10:43 | 11:07 |
| Time to drop 100 mm ($T_{100}$) | 168.00 | 88.00 | 112.00 |
| Average $T_{100}$ | | | 122.67 |

If $T_{100}$ > 300 minutes then T-value >90 – site unsuitable for discharge to ground
If $T_{100} \leq 210$ minutes then go to Step 4;
If $T_{100}$ > 210 minutes then go to Step 5;

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**Step 4:** Standard Method (where $T_{100} \leq 210$ minutes)

| Percolation Test Hole | 1 | | | 2 | | | 3 | | |
|---|---|---|---|---|---|---|---|---|---|
| Fill no. | Start Time (at 300 mm) | Finish Time (at 200 mm) | Δt (min) | Start Time (at 300 mm) | Finish Time (at 200 mm) | Δt (min) | Start Time (at 300 mm) | Finish Time (at 200 mm) | Δt (min) |
| 1 | 12:03 | 15:11 | 188.00 | 10:43 | 12:19 | 96.00 | 11:07 | 13:11 | 124.00 |
| 2 | 15:15 | 18:51 | 216.00 | 12:22 | 13:58 | 96.00 | 13:15 | 15:31 | 136.00 |
| 3 | 18:55 | 23:23 | 268.00 | 14:01 | 15:45 | 104.00 | 15:35 | 18:03 | 148.00 |
| Average Δt Value | | | 224.00 | | | 98.67 | | | 136.00 |
| | Average Δt/4 = [Hole No.1] | | 56.00 ($t_1$) | Average Δt/4 = [Hole No.2] | | 24.67 ($t_2$) | Average Δt/4 = [Hole No.3] | | 34.00 ($t_3$) |

Result of Test: T = 38.22 (min/25 mm)

Comments:

T Test result was 38.

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**Step 5:** Modified Method (where $T_{100} > 210$ minutes)

| Percolation Test Hole No. | 1 | | | | 2 | | | | 3 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fall of water in hole (mm) | Time Factor = $T_f$ | Time of fall (mins) = $T_m$ | $K_{fs}$ = $T_f$ / $T_m$ | T – Value = 4.45 / $K_{fs}$ | Time Factor = $T_f$ | Time of fall (mins) = $T_m$ | $K_{fs}$ = $T_f$ / $T_m$ | T – Value = 4.45 / $K_{fs}$ | Time Factor = $T_f$ | Time of fall (mins) = $T_m$ | $K_{fs}$ = $T_f$ / $T_m$ | T – Value = 4.45 / $K_{fs}$ |
| 300 - 250 | 8.1 | | | | 8.1 | | | | 8.1 | | | |
| 250 - 200 | 9.7 | | | | 9.7 | | | | 9.7 | | | |
| 200 - 150 | 11.9 | | | | 11.9 | | | | 11.9 | | | |
| 150 - 100 | 14.1 | | | | 14.1 | | | | 14.1 | | | |
| Average T- Value | T- Value Hole 1= ($t_1$) | | | 0.00 | T- Value Hole 1= ($t_2$) | | | 0.00 | T- Value Hole 1= ($t_3$) | | | 0.00 |

Result of Test: T = 0.00 (min/25 mm)

Comments:

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### 3.3(b) Percolation ("P") Test for Shallow Soil / Subsoils and/or Water Table

**Step 1:** Test Hole Preparation

| Percolation Test Hole | 1 | 2 | 3 |
|---|---|---|---|
| Depth from ground surface to top of hole (mm) | 0 | 0 | 0 |
| Depth from ground surface to base of hole (mm) | 400 | 400.00 | 400 |
| Depth of hole (mm) | 400 | 400 | 400 |
| Dimensions of hole [length x breadth (mm)] | 300 x 300 | 300 x 300 | 300 x 300 |

**Step 2:** Pre-Soaking Test Holes

| | | | | | | |
|---|---|---|---|---|---|---|
| Date and Time pre-soaking started | 04/12/2017 | 09:10 | 04/12/2017 | 09:10 | 04/12/2017 | 09:10 |

Each hole should be pre-soaked twice before the test is carried out. Each hole should be empty before refilling.

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**Step 3:** Measuring $P_{100}$

| Percolation Test Hole No. | 1 | 2 | 3 |
|---|---|---|---|
| Date of test | 05/12/2017 | 05/12/2017 | 05/12/2017 |
| Time filled to 400 mm | 09:15 | 09:15 | 09:15 |
| Time water level at 300 mm | 10:51 | 10:59 | 10:39 |
| Time to drop 100 mm ($P_{100}$) | 96.00 | 104.00 | 84.00 |
| Average $P_{100}$ | | | 94.67 |

If $P_{100}$ > 300 minutes then P-value >90 – site unsuitable for discharge to ground
If $P_{100} \leq 210$ minutes then go to Step 4;
If $P_{100}$ > 210 minutes then go to Step 5;

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**Step 4:** Standard Method (where $P_{100} \leq 210$ minutes)

| Percolation Test Hole | 1 | | | 2 | | | 3 | | |
|---|---|---|---|---|---|---|---|---|---|
| Fill no. | Start Time (at 300 mm) | Finish Time (at 200 mm) | Δp (min) | Start Time (at 300 mm) | Finish Time (at 200 mm) | Δp (min) | Start Time (at 300 mm) | Finish Time (at 200 mm) | Δp (min) |
| 1 | 10:51 | 12:39 | 108.00 | 10:59 | 12:59 | 120.00 | 10:39 | 12:15 | 96.00 |
| 2 | 12:43 | 15:51 | 188.00 | 13:04 | 15:28 | 144.00 | 12:18 | 14:10 | 112.00 |
| 3 | 15:56 | 18:32 | 156.00 | 15:33 | 18:29 | 176.00 | 14:14 | 16:34 | 140.00 |
| Average Δp Value | | | 150.67 | | | 146.67 | | | 116.00 |
| | Average Δp/4 = [Hole No.1] | | 37.67 ($p_1$) | Average Δp/4 = [Hole No.2] | | 36.67 ($p_2$) | Average Δp/4 = [Hole No.3] | | 29.00 ($p_3$) |

Result of Test: P = 34.44 (min/25 mm)

Comments:

P = 34

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**Step 5:** Modified Method (where $P_{100} > 210$ minutes)

| Percolation Test Hole No. | 1 | | | | 2 | | | | 3 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fall of water in hole (mm) | Time Factor = $T_f$ | Time of fall (mins) = $T_m$ | $K_{fs}$ = $T_f$ / $T_m$ | P – Value = 4.45 / $K_{fs}$ | Time Factor = $T_f$ | Time of fall (mins) = $T_m$ | $K_{fs}$ = $T_f$ / $T_m$ | P – Value = 4.45 / $K_{fs}$ | Time Factor = $T_f$ | Time of fall (mins) = $T_m$ | $K_{fs}$ = $T_f$ / $T_m$ | P – Value = 4.45 / $K_{fs}$ |
| 300 - 250 | 8.1 | | | | 8.1 | | | | 8.1 | | | |
| 250 - 200 | 9.7 | | | | 9.7 | | | | 9.7 | | | |
| 200 - 150 | 11.9 | | | | 11.9 | | | | 11.9 | | | |
| 150 - 100 | 14.1 | | | | 14.1 | | | | 14.1 | | | |
| Average P- Value | P- Value Hole 1= ($p_1$) | | | 0.00 | P- Value Hole 1= ($p_2$) | | | 0.00 | P- Value Hole 1= ($p_3$) | | | 0.00 |

Result of Test: P = 0.00 (min/25 mm)

Comments:

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## 4.0 CONCLUSION of SITE CHARACTERISATION

Integrate the information from the desk study and on-site assessment (i.e. visual assessment, trial hole and percolation tests) above and conclude the type of system(s) that is (are) appropriate. This information is also used to choose the optimum final disposal route of the treated wastewater.

**Not Suitable for Development** ☐

| **Suitable for** [1] | | **Discharge Route** |
|---|---|---|
| 1. Septic tank system (septic tank and percolation area) | No | Discharge to Ground Water |
| 2. Secondary Treatment System | | |
| a. septic tank and filter system constructed on-site and polishing filter; or | Yes | |
| b. packaged wastewater treatment system and polishing filter | Yes | |

## 5.0 RECOMMENDATION

Propose to install: Packaged wastewater treatment system and polishing filter

and discharge to: Ground Water

Trench Invert level (m): 0.50

Site Specific Conditions (e.g. special works, site improvement works testing etc.

A secondary treatment system as described in Sections 8 and 9 of the EPA 2009 Code of Practice, Wastewater Treatment and Disposal Systems Serving Single Houses is installed, with a minimum thickness of 0.3m unsaturated soil/subsoil with P/T values from 3 to 75 (in addition to the polishing filter which should be a minimum depth of 0.9m), beneath the invert of the polishing filter (i.e. 1.2m in total for a soil polishing filter).

A raised soil polishing filter is recommended and should be installed in accordance with Table 8.1, EPA CoP 2009 and Treatment Systems for Small Communities, Business, Leisure Centres and Hotels, under the supervision of a suitably qualified engineer. The soil polishing filter should have a minimum thickness of 1200mm of free-draining unsaturated soil between the point of infiltration of the effluent and the water table or bedrock.

All works must be supervised and certified by a suitably qualified Civil Engineer or similar qualified person approved by the Local Authority. Confirmation from the effluent treatment system suppliers that the system has been installed and is functioning correctly, should be obtained by the client.

The client must enter a maintenance contract and the system should be serviced periodically. The tank should be de-sludged periodically (a minimum of once a year) by a licensed contractor.

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[1] note: more than one option may be suitable for a site and this should be recorded

[2] A discharge of sewage effluent to "waters" (definition includes any or any part of any river, stream, lake, canal, reservoir, aquifer, pond, watercourse or other inland waters, whether natural or artificial) will require a licence under the Water Pollution Acts 1977-90. Refer to Section 2.6.2.

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## 6.0 TREATMENT SYSTEM DETAILS

**SYSTEM TYPE:** Septic Tank System

| | | | | | |
|---|---|---|---|---|---|
| Tank Capacity ($m^3$) | | Percolation Area | | Mounded Percolation Area | |
| | | No. of Trenches | | No. of Trenches | |
| | | Length of Trenches (m) | | Length of Trenches (m) | |
| | | Invert Level (m) | | Invert Level (m) | |

**SYSTEM TYPE:** Secondary Treatment System

**Filter Systems**

| Media Type | Area ($m^2$)* | Depth of Filter | Invert Level |
|---|---|---|---|
| Sand/Soil | | | |
| Soil | | | |
| Constructed Wetland | | | |
| Other | | | |

**Package Treatment Systems**

| | |
|---|---|
| Type | See site suitablilty report |
| Capacity PE | 10.00 |
| Sizing of Primary Compartment | 3.50 $m^3$ |

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**SYSTEM TYPE:** Tertiary Treatment System

**Polishing Filter:** Surface Area ($m^2$)* 150.00

or **Gravity Fed:**

No. of Trenches

Length of Trenches (m)

Invert Level (m)

**Package Treatment System:** Capacity (pe) 10.00

**Constructed Wetland:** Surface Area ($m^2$)*

**DISCHARGE ROUTE:**

| | | | |
|---|---|---|---|
| Groundwater | ✓ | Hydraulic Loading Rate * ($l/m^2.d$) | 10.00 |
| Surface Water ** | | Discharge Rate ($m^3/hr$) | |

**TREATMENT STANDARDS:**

| Treatment System Performance Standard (mg/l) | BOD | SS | $NH_4$ - N | Total N | Total P |
|---|---|---|---|---|---|
| See Site Suitability Report & EPA CoP 2009 Table 5.1 page 9 | 20.00 | 30.00 | 20.00 | 5.00 | 2.00 |

**QUALITY ASSURANCE:**

| Installation & Commissioning | On-going Maintenance |
|---|---|
| Installation should be supervised and certified by a suitably qualified Civil Engineer or similar qualified person approved by the Local Authority. Confirmation from the effluent treatment system suppliers that the system has been installed and is functioning correctly, should be obtained by the client. | The client must enter a maintenance contract and the system should be serviced periodically. The tank should be de-sludged periodically (a minimum of once a year) by a licensed contractor. |

* Hydraulic loading rate is determined by the percolation rate of subsoil

** Water Pollution Act discharge licence required

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## 7.0 SITE ASSESSOR DETAILS

Company: DECLAN KEARNS & ASSOCIATES LTD.

Prefix: Mr. First Name: DECLAN Surname: KEARNS

Address: TULLYWEST, KILDARE, CO. KILDARE

Qualifications/Experience: B.Eng., NCEA Dip. Env. Eng., NCEA, Cert. Eng., MIEI, FETAC CERT EF 241859 722383

Date of Report: 06/12/2017

Phone: 0862111590 Fax: e-mail info@dkassociates.ie

Indemnity Insurance Number: PC006257T

Signature: Declan Kearns Digitally signed by Declan Kearns
DN: cn=Declan Kearns, o=DKAL, ou, email=info@dkassociates.ie, c=IE
Date: 2017.12.13 14:00:58 Z

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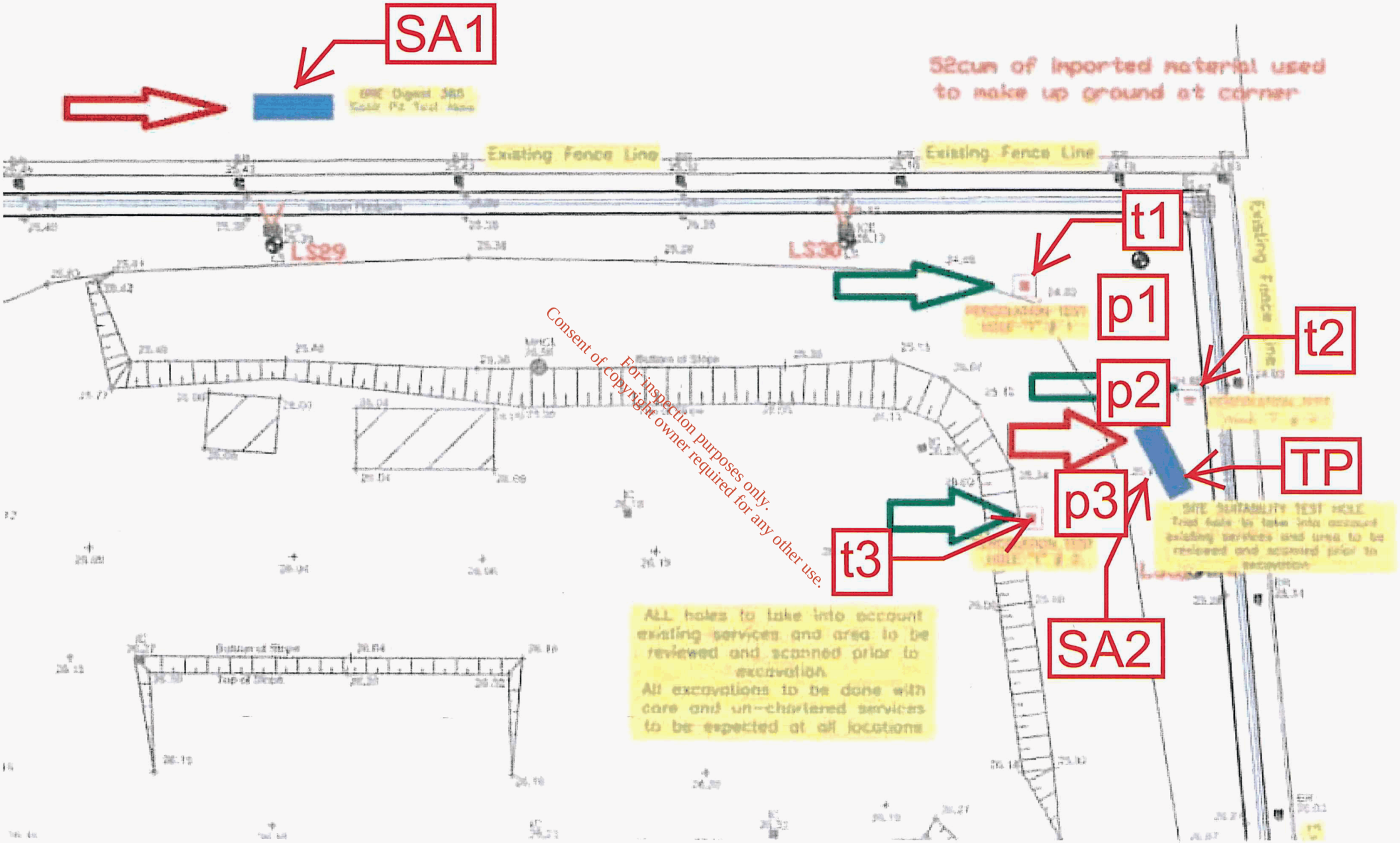


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GREAT ISLAND POWER STATION - Site Characterisation Test Photos

Figure 1. Trial Pit

Figure 2. T- Test 1

Figure 3. T- Test 2

Figure 4. T- Test 3

Figure 5. View of Site

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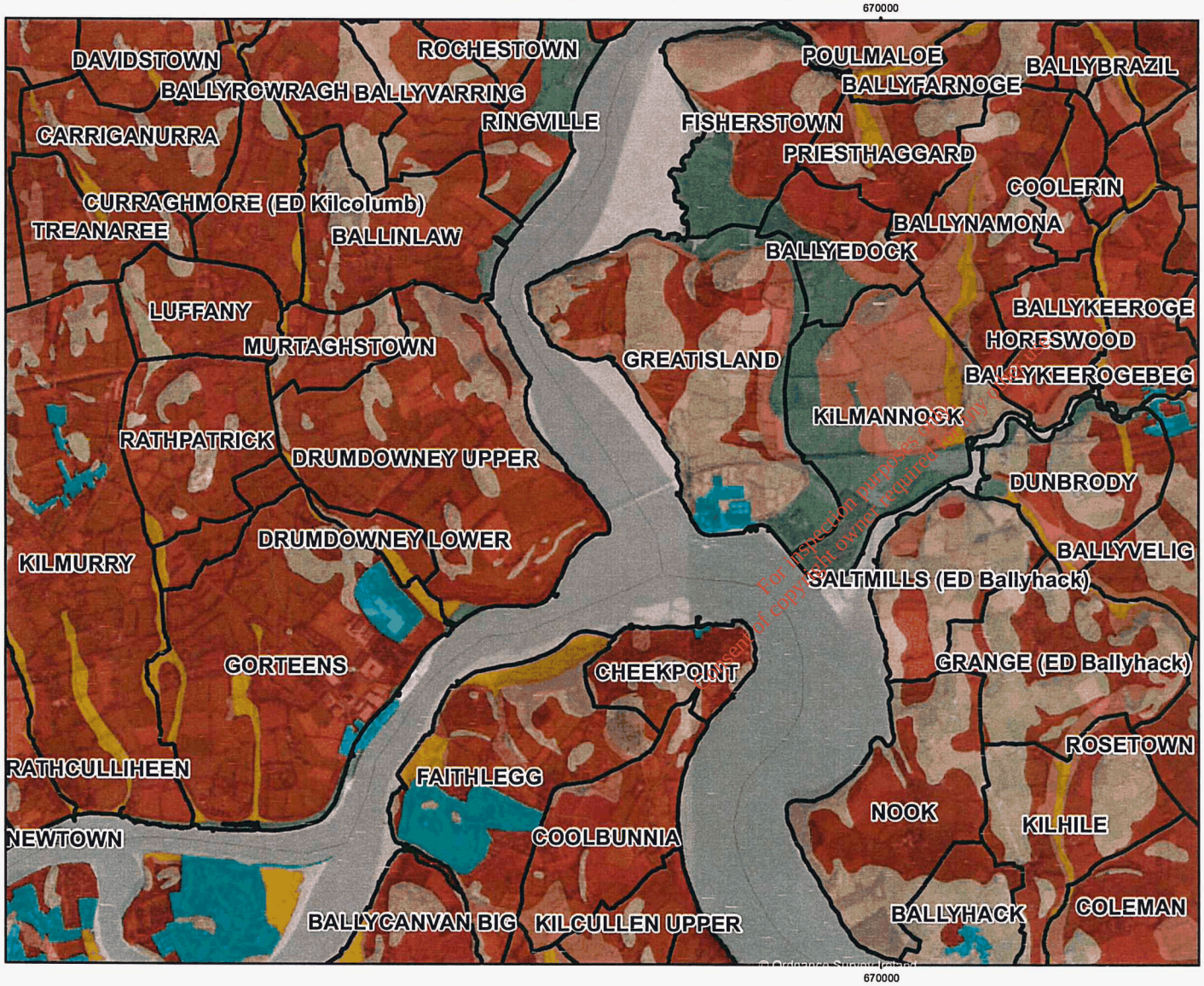
# SOILS MAP




## Legend

- AminDW - Deep well drained mineral (Mainly acidic)
- AminPD - Mineral poorly drained (Mainly acidic)
- AminPDPT - Peaty poorly drained mineral (Mainly acidic)
- AminSW - Shallow well drained mineral (Mainly acidic)
- AminSP - Shallow poorly drained mineral (Mainly acidic)
- AminSRPT - Shallow, rocky, peaty/non-peatymineral complexes (Mainly acidic)
- Cut - Cutover/cutaway peat
- AlluvMIN - Alluvial (mineral)
- Lac - Lacustrine type soils
- MarSed - Marine/estuarine sediments
- Made - Made ground
- Water - Water

Scale: 1:50,000

**Geological Survey Ireland**

N W E S

0 0.35 0.7 1.4 mi
0 0.5 1 2 km

Map Centre Coordinates (ITM) 667,749 614,911
Snapshot Date: November 28, 2017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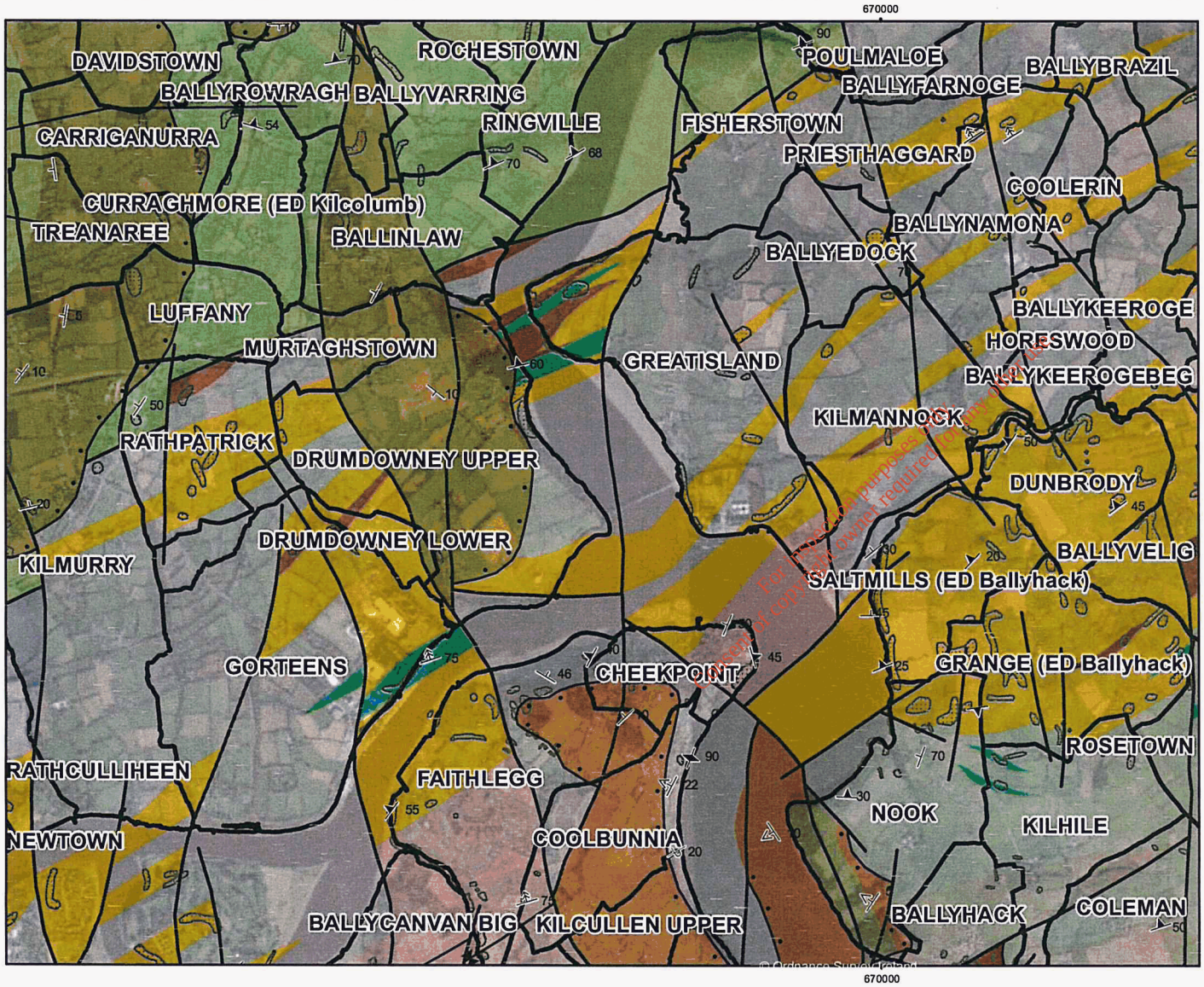
# BEDROCK MAP




Scale: 1:50,000

**Geological Survey Ireland**

N W E S

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Map Centre Coordinates (ITM) 667,749 614,911
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## Legend

### Bedrock Structural Symbols

- Dip of bedding or main foliation, old GSI data
- Strike and dip of bedding, right way up
- Strike and dip of bedding, way up unknown
- Strike and dip of first foliation
- Strike and dip of overturned bedding
- Strike of vertical first foliation

### Bedrock Stratigraphic and Structural lines

- Fault
- Synclinal Axis
- Unconformity, dots on younger side

### Bedrock Outcrop

- Bedrock Outcrop

### Bedrock Rock Units

- Carrigmaclea Formation
- Harrylock Formation
- Kiltorcan Formation
- Templetown Formation
- Knockavellish Member (Templetown Formation)
- Brownstown Head Member (Templetown Formation)
- Dolerite (Slieve Gullion Complex)
- Ballylane Shale Formation
- Ballynaclogh Formation
- Campile Formation
- Arthurstown Member (Campile Formation)
- Ballyhack Member (Campile Formation)
- Intermediate volcanics (Ballyhack Member)
- Ross Member (Campile Formation)
- Felsic volcanics (Campile Formation)
- Intermediate volcanics (Campile Formation)

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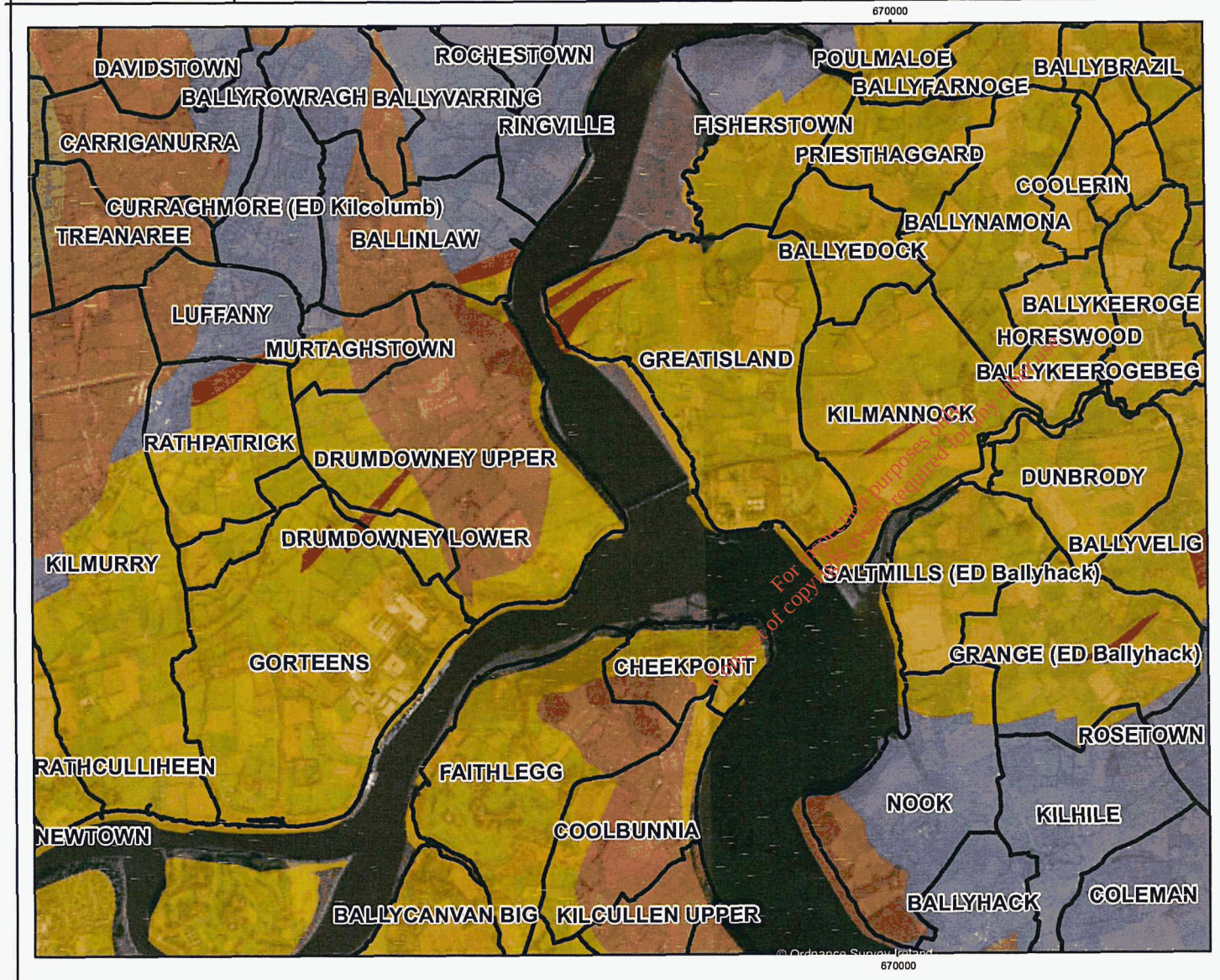
# BEDROCK MAP




## Legend

### Groundwater Rock Units

- Devonian Kiltorcan-type Sandstones
- Devonian Old Red Sandstones
- Granites & other Igneous Intrusive rocks
- Ordovician Metasediments
- Ordovician Volcanics

Scale: 1:50,000

**Geological Survey Ireland**

N W E S

0 0.35 0.7 1.4 mi

0 0.5 1 2 km

Map Centre Coordinates (ITM) 667,749 614,911

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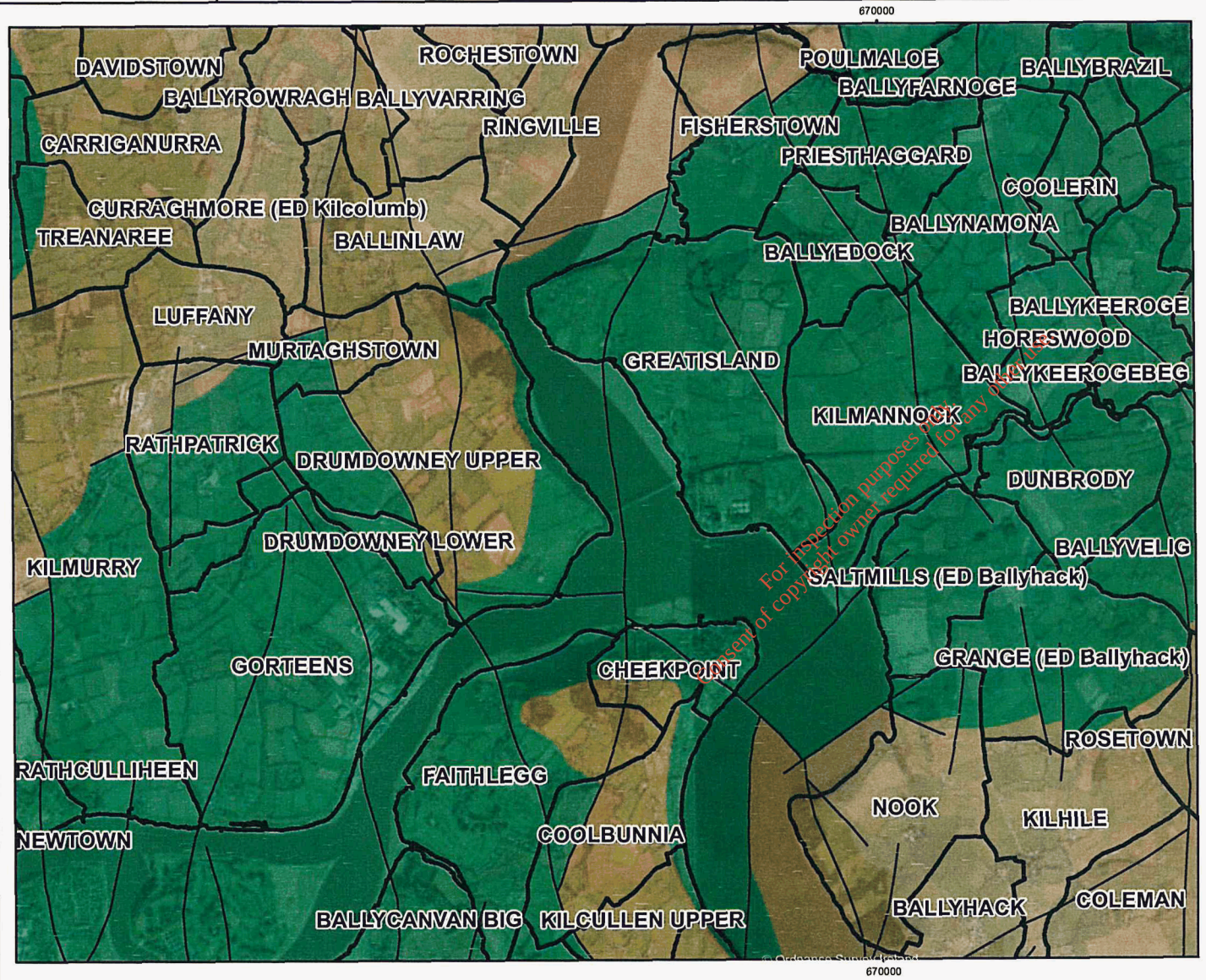
# AQUIFER MAP

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## Legend

### Bedrock Aquifer Faults

— Bedrock Aquifer Faults

### Bedrock Aquifer

Rf - Regionally Important Aquifer - Fissured bedrock

Ll - Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones

Pl - Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones

Scale: 1:50,000

**Geological Survey Ireland**

N W E S

0 0.35 0.7 1.4 mi
0 0.5 1 2 km

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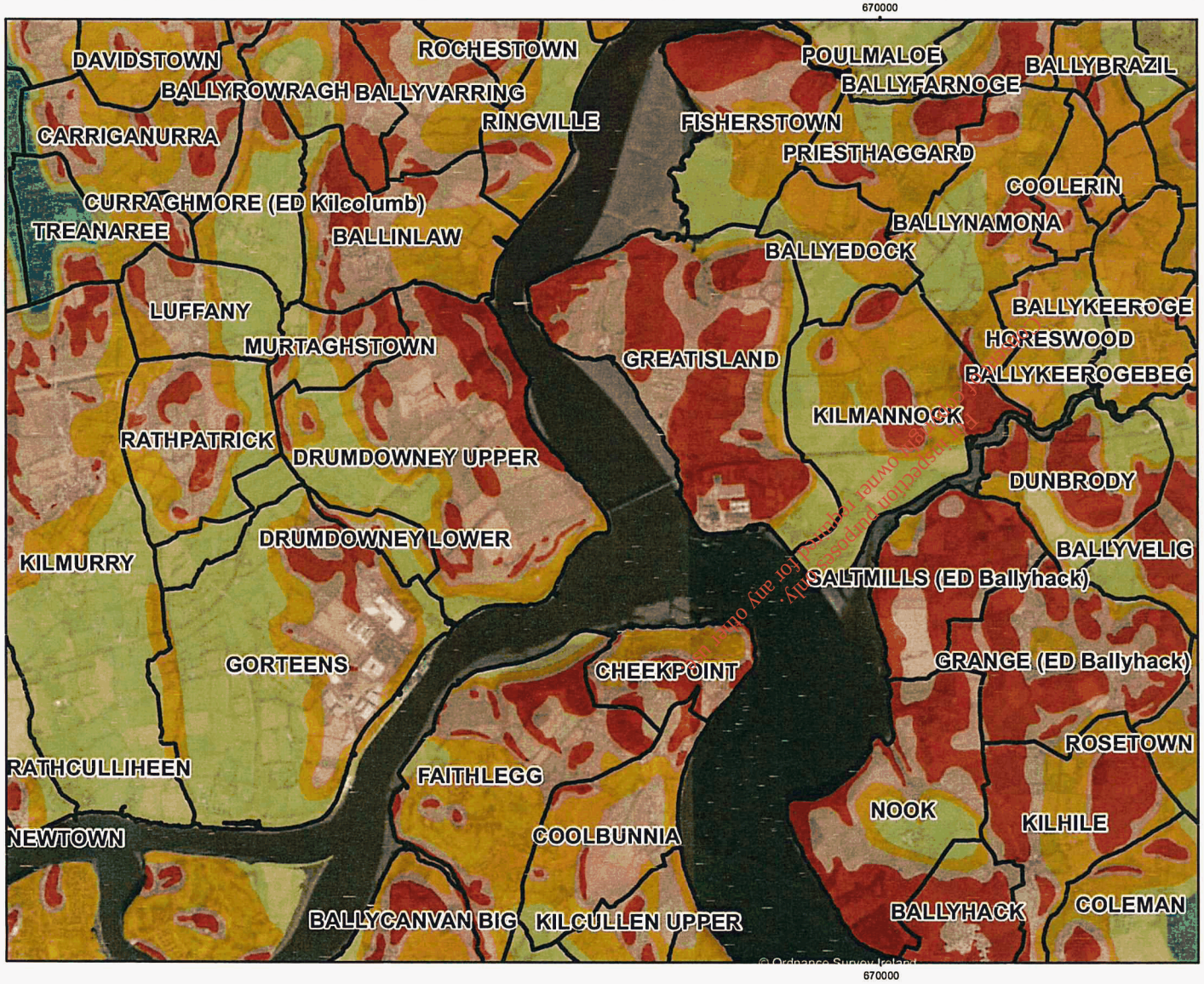
# VULNERABILITY MAP




Scale: 1:50,000

**Geological Survey Ireland**

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0 0.5 1 2 km

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## Legend

### Groundwater Vulnerability

- X - Rock at or near surface or Karst
- E - Extreme
- H - High
- M - Moderate
- L - Low

# Appendix 3 – Site Plan

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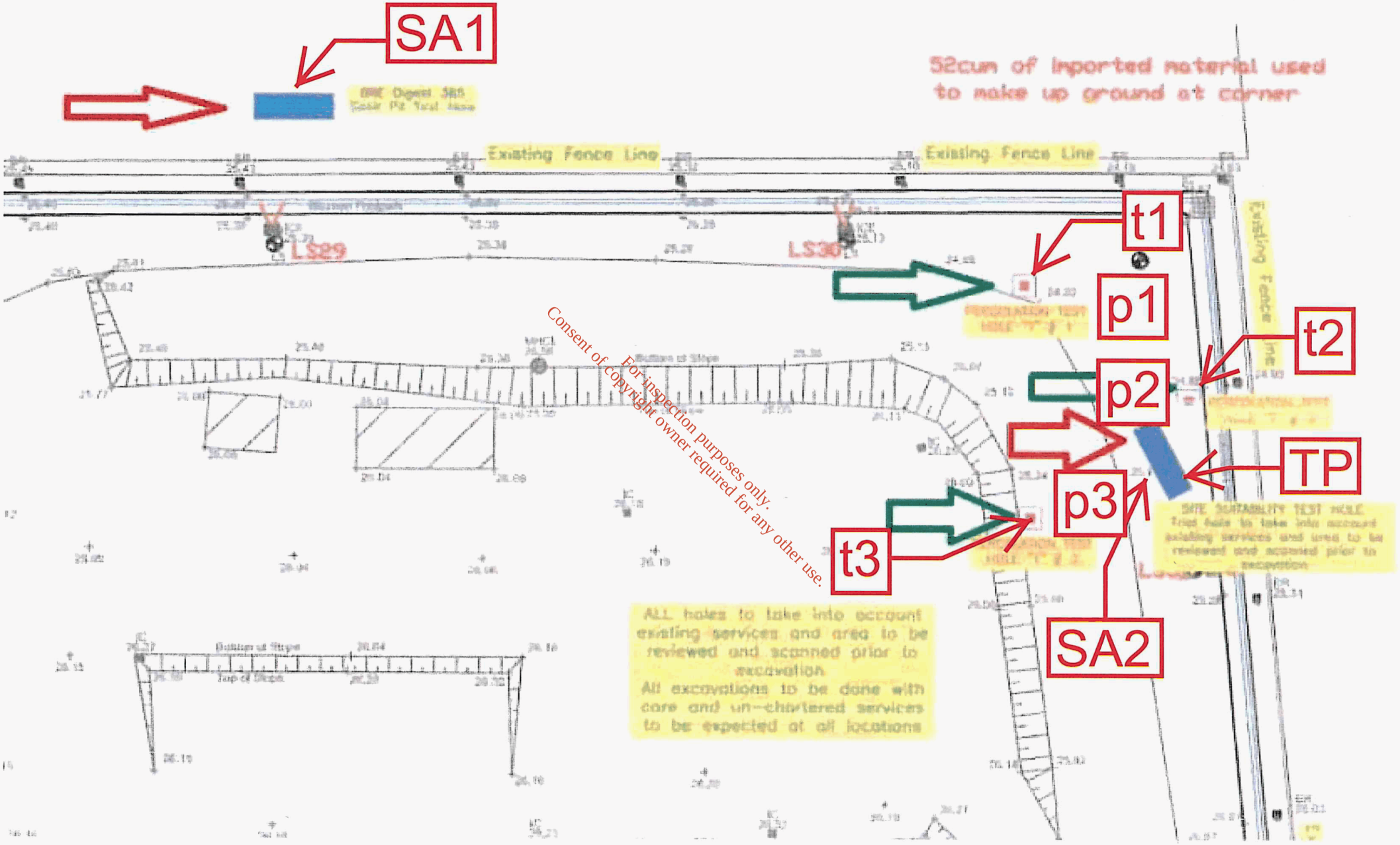


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