



# Borrow Pit Assessment for Carrigeen Renewable Energy Development, Co. Roscommon, Ireland

## Supplementary Ground Investigation

Report No: 2278-24 BP Rev1

11<sup>th</sup> March 2026

*This document has been prepared by Whiteford Geoservices Ltd  
on behalf of*

***Carraigin Power Ltd  
&  
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## Carrigeen Renewable Energy Development

# [SOILS AND GEOLOGY STUDY – BORROW PIT ASSESSMENT]

### Document Control

SIGN OFF		
Name (Role)	Signature	Date
John Whiteford (Technical Director)		11 <sup>th</sup> Mar 2026
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## 1 INTRODUCTION

In November 2025 Whiteford Geoservices were appointed by Carraigín Power Ltd to investigate two potential sites, (one west of T06 and another east of T06) as a source of suitable aggregate during the construction of Carrigeen Renewable Energy Development, near Frenchpark, Co. Roscommon.

Whiteford Geoservices' proposal consisted of a two-stage investigation process as follows: -

### Stage 1 – Geophysical Reconnaissance

- a) Within each of the Borrow Pit Option areas (See Layout Plan 2278-24C-L1, Appendix A) use geophysical survey methods to map the subsurface to a depth of approximately 20m below existing ground surface and identify areas where rock could be present.
- b) Although a number of suitable geophysical survey techniques were appropriate for this stage, Electrical Resistivity Tomography (ERT) was selected because of both its ability to rapidly map the sub surface, as a series of parallel profiles, and the general accuracy of ground modelling achieved.

### Stage 2 – Exploratory Trial Hole Investigation

- a) Excavation of a series of 10 trial holes within the Borrow Pit sites to physically inspect subsurface ground conditions and provide validation for the geophysical investigations.
- b) Recover suitable samples for laboratory testing where intact rock strata was encountered.

The following report presents the findings of both Stage 1 and 2 investigations.

A plot depicting the location of the two Borrow Pit Options and arrangement of the geophysical profiles and trial holes is contained in Appendix A.

## 2 SITE AND GEOLOGY

### 2.1 The Site

Carrigeen Renewable Energy Development is situated approximately 2.5km east of Frenchpark and 6.5km north-west of Elphin in Co. Roscommon. Refer to Drawings contained within the Appendix for the proposed wind farm site layout plan detailing the positions of the main development infrastructure.

The proposed development site is of generally level topography with lands comprised predominantly of cut-over raised peat bog and isolated areas of coniferous forestry, as well as improved lands used for agriculture.

### 2.2 Published Geology

A study was made of available geological information. This study indicated that the following natural solid (bedrock) and superficial (soil) geology is present across the proposed site of Carrigeen Renewable Energy Development.

#### 2.2.1 Solid Geology

The Carrigeen Renewable Energy Development site is underlain by the following rock formations:

1. **Boyle Sandstone Formation**; sandstone, siltstone and black mudstone.

This formation is described as “poorly bedded conglomerates, associated with red-purple pebbly grits and coarse sandstones, grading upwards into a cyclic sequence with pale grey, sometimes pink, sandstones capped by intervals of red, green and grey mud rock.”

2. **Ballymore Limestone Formation**; dark, fine grained limestone and shale.

This formation is described as “a basal unit of medium bedded crinoidal calcarenites, followed by a middle unit 40m thick of thin bedded dark nodular limestones with thick interbeds of calcareous shale.”

3. **Croghan Limestone Formation**; dark, cherty limestone and shale.

This formation is described as “tin-bedded brown-weathering muddy limestone with irregular development of shale partings.”

## 2.2.2 Superficial Geology

- Cut-over raised Peat or Topsoil
- Glacial Till (Derived mainly from limestone rocks)

## 2.2.3 Palaeo-Karst Features

Karst topography is defined as “An assemblage of topographic forms resulting from dissolution of the bedrock and consisting primarily of closely spaced sinkholes.”<sup>1</sup> Karst topography can form in regions of exceptionally soluble rocks, including Limestone.

The presence of such features has, in some cases, resulted in structural instability.

Limestone is recorded as an uppermost rock formation at the proposed site, however, GSI does **not** record Karst features within the Wind Farm Site boundary, although one was observed during the walkover survey near T06. A number of karst landform features have been recorded by GSI within the study area peripheral to the site, and these are indicated on Figure A3. Limestone formations could still be present below the sandstone / siltstone rocks that dominate the Boyle Sandstone Formation.

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<sup>1</sup> (Skinner and Porter, 1987: p259)

### 3 FIELDWORK

#### 3.1 General

All Stage 1 and Stage 2 fieldwork was carried out in general accordance with BS 5930:2015+A1:2020 and other related standards.

The location of Stage 1 Geophysical ERT Profiles and Stage 2 exploratory holes are identified on the plan 2279-24C- L2 contained in Appendix A of this report.

#### 3.2 Geophysical Surveys

The geophysical survey was undertaken as Stage 1 of the Borrow Pit site investigation campaign and involved the following non-destructive testing techniques.

METHOD	LOCATION	MAXIMUM DEPTH (m)	EQUIPMENT
2D Electrical Resistivity Tomography	7 Nr. profiles, as depicted on SI layout Plan L1, Appendix A	approx. 15m	Mangusta Electrical Resistivity Imaging System.

**Table 1** –Geophysical Methods Deployed

#### 3.3 Exploratory Holes

The exploratory holes undertaken in Stage 2 are detailed within the following table.

METHOD	QUANTITY	MAXIMUM DEPTH (m)	REMARKS
Trial Holes	10 Nr.	4.0m (TP-BP8)	All trial holes were undertaken using a 13T Zaxis 130 LCN Wide-Tracked Excavator.

**Table 2** Exploratory Holes

The engineering logs contained within Appendix B provide descriptions of the strata encountered, together with observations made during excavation works.

Please refer to Appendix D for photographs recorded during trial pitting works.

#### 3.4 Topographical Survey

A topographical survey of exploratory hole locations was undertaken post-completion of all associated investigation works and is detailed in the table below.

EQUIPMENT	COORDINATE SYSTEM
Leica RTK / GNSS DGPS System	Irish Transverse Mercator (ITM) / Malin Head (Ordnance Datum)

**Table 3** – Topographic Surveying Details

## 4 SURVEY RESULTS

### 4.1 Introduction

The interpreted results of the Investigations are contained in Appendices B and C as an annotated plan detailing the assessment findings and engineering trial pit logs.

### 4.2 Summary of Results for Stage 1 - Geophysical Surveys

- a. All geophysical profiles identified low resistivity superficial peats, topsoils and higher resistivity glacial till soils overlying dense / rock materials with contrasting resistivity to depths of approximately 3 – 8m b.g.l.  
These zones of contrasting resistivity are such that they are indicative of fractured, weathered, water saturated LIMESTONE rock.
- b. Most geophysical profiles indicate that a significant thickness of the “rock” formation is weathered in this way. The exception to this are profiles West L5, West L7 and West L25 that indicate significantly less weathering within the underlying limestone rock formation (Highlighted “yellow” in Table 4), below.

Consequently the Western Borrow Pit location offers the best potential with respect to suitability as a borrow pit.

This Stage 1 investigation was followed up by a targeted trial hole geotechnical investigation. The following table summarises the combined findings of both the geophysical and geotechnical surveys .

Borrow Pit Area (TP Refs)	Geophysical Profile Nr	Depth of Rock Layer (m)	Resistivity ( $\Omega$ m)	Predicted Rock Type
East (TP-BP1, 3 & 5)	L3	4.0 – 7.0	100 - 600	LIMESTONE (Weathered to 15m)
East (TP-BP2, 4 & 5)	L4	3.0 – 8.0	100 - 600	LIMESTONE (Weathered to 12m)
West (TP-BP6 & 7)	L5	3.0 – 8.0	100 - 600	LIMESTONE (Intermittently weathered from 7m)
West (TP-BP7)	L26	3.0 – 5.0	100 - 600	LIMESTONE (Weathered to 12m)
West (TP-BP9 & 10)	L7	4.0 – 7.0	100 - 600	LIMESTONE (Intermittently weathered from 7m)
West (TP-BP6, 8 & 10)	L25	5.0 – 8.0	100 - 600	LIMESTONE

				(Intermittently weathered from 8m)
West	L6	5.0 – 7.0	100 - 600	LIMESTONE (Generally weathered to 17m)

**Table 4** – Potential Targets identified following analysis of Stage 1 ERT data

### 4.3 Summary of Results for Stage 2 Investigation

#### 4.3.1 Trial Pit Investigation

The following table summarises the trial pit investigation results

Trial Hole Reference	Easting	Northing	Depth to rock (m)	Peat / <u>Topsoil</u> Thickness (m)	Depth to Weathered Rock layer (m)
TP-BP1	576816	789101	Not Identified	0.80	2.30
TP-BP2	576718	789083	Not Identified	<u>0.40</u>	2.60
TP-BP3	576801	789006	Not Identified	<u>0.30</u>	2.60
TP-BP4	576855	789086	Not Identified	0.60	3.00
TP-BP5	576802	789075	Not Identified	<u>0.30</u>	3.10
TP-BP6	576425	789178	Not Identified	0.30	3.30
TP-BP7	576376	789133	Not Identified	<u>0.10</u>	2.90
TP-BP8	576463	789036	Not Identified	<u>0.40</u>	>4.00
TP-BP9	576545	789114	Not Identified	<u>0.20</u>	2.80
TP-BP10	576440	789133	Not Identified	<u>0.20</u>	3.20

**Table 5** – Summary of Stage 2 findings with respect to rock identification

## 5 DISCUSSION

The two borrow pit options were investigated by excavating 10nr trial holes, using a 13T wide tracked 360° excavator.

The following is an illustration of the findings of the trial pitting works: -

1. None of the trial holes encountered unweathered rock, which from previous analysis is anticipated to be LIMESTONE rock.
2. Trial hole TP-BP8 encountered no refusal, but was stopped at 4.0m, the maximum reach of the plant employed.

All other trial holes refused on a stratum that is recorded as Dense BOULDERS at depths of between 2.3m and 3.3m. This is the typical description for weathered LIMESTONE when initially encountered during excavation. From past experience this weathering tends to extend for 3.0m to 5.0m in thickness, which is in agreement with the findings of the geophysical surveys.

3. PEAT or TOPSOIL thickness varied from 0.10m to 0.80m.
4. The natural soils underlying the PEAT or TOPSOIL are cohesive glacial tills, consisting of either sandy, gravelly SILT or CLAY. Initially soft to firm, these soils tend to stiffen around 2m in depth and contain initially low quantities of cobbles and boulders.
5. Boulder content of medium to high content is the cause of refusal at TP-BP1, 2, 3, 4, 5, 6, 7, 9 and TP-BP10.

In summary, the following overall opinion can be formed from the borrow pit investigations: -

- A. Rock is present at the site of the two Borrow Pit Options (East and West of T06) appraised for Carrigeen Renewable Energy Development site. This rock is a fine-grained LIMESTONE which will be weak, fractured and weathered. Intact rock will be medium strong to strong. The weathered rock is likely to create significant sand content when crushed but useful as a construction fill material.
- B. The Western Borrow Pit option is identified as the most favourable location at which to extract limestone aggregate.

- C. Approx. 3m to 8m of overburden removal is estimated to be required to access suitable limestone rock, from which construction grade aggregate can be produced.

## 6 REFERENCES

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

BS 1377: Part 3 (2018) : Methods of test for soils for civil engineering purposes. British Standards Institution.

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

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

BS EN ISO 14688-1: 2002 : Geotechnical investigation and testing - Identification and classification of soil - Part 1 Identification and description. British Standards Institution.

BS EN ISO 14689-1: 2003 : Geotechnical investigation and testing - Identification and classification of rock - Part 1 Identification and description. British Standards Institution.

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BS EN ISO 22476-2: 2005 : Geotechnical investigation and testing - Field testing - Part 2 Dynamic probing. British Standards Institution.

BS EN ISO 22476-3: 2005 : Geotechnical investigation and testing - Field testing - Part 3 Standard penetration test. British Standards Institution.

ISRM: 2007: The Complete ISRM Suggested Methods for Rock Characterisation, Testing and Monitoring (1974-2006). Commission on Testing Methods, International Society for Rock Mechanics (Editors Ulusay R & Hudson JA).

ASTM D5731-08: Standard test method for determination of the point load strength index of rock and application to rock strength

## APPENDICES

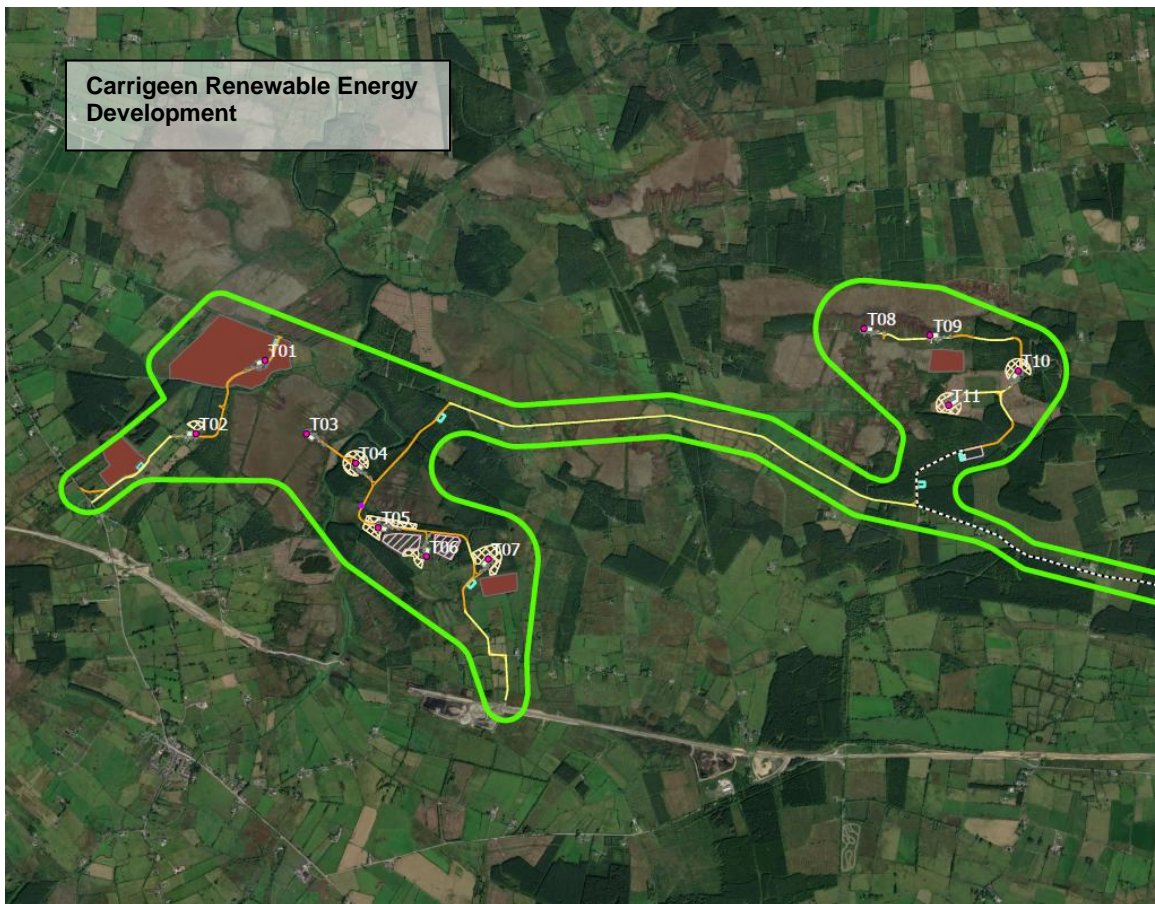
Appendix A	Drawings
Appendix B	Exploratory Holes
Appendix C	Geophysical Profiles
Appendix D	Site Photographs

## APPENDIX A DRAWINGS

General Site Location Plan Solid Geology <b>Figures P1 &amp; P2</b>	1 x A4
Geological Mapping (Courtesy of GSI – 11 <sup>th</sup> March 2026)	17 x A4
Site Layout Plan showing position of Exploratory Holes and Geophysical Tests <b>Figure L2</b>	1 x A3

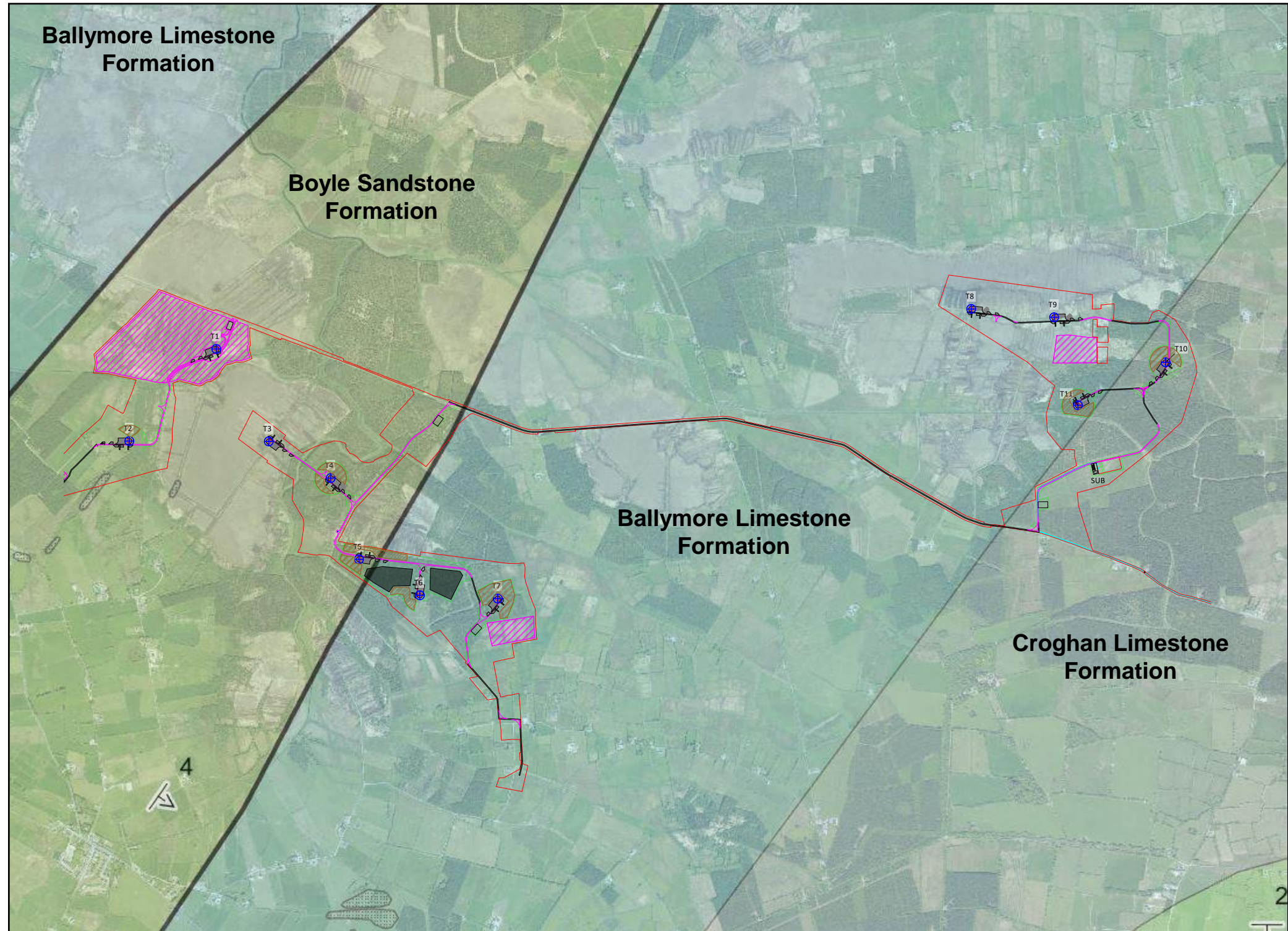


P1 - General Location Plan



P2 – Wind Farm Layout Plan

GSI – Solid Geology

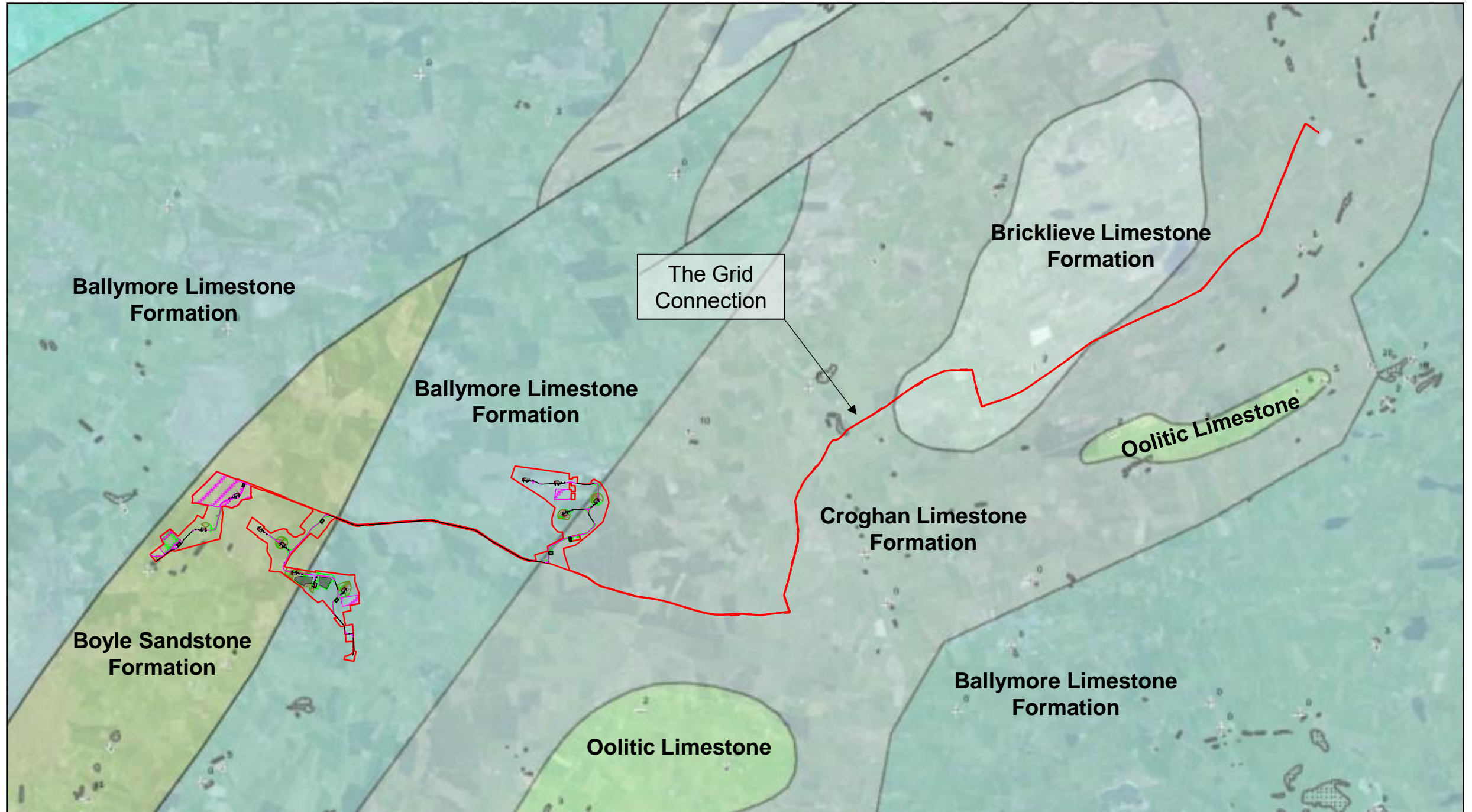


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				Edition 2	Sheet 2

GSI – Solid Geology

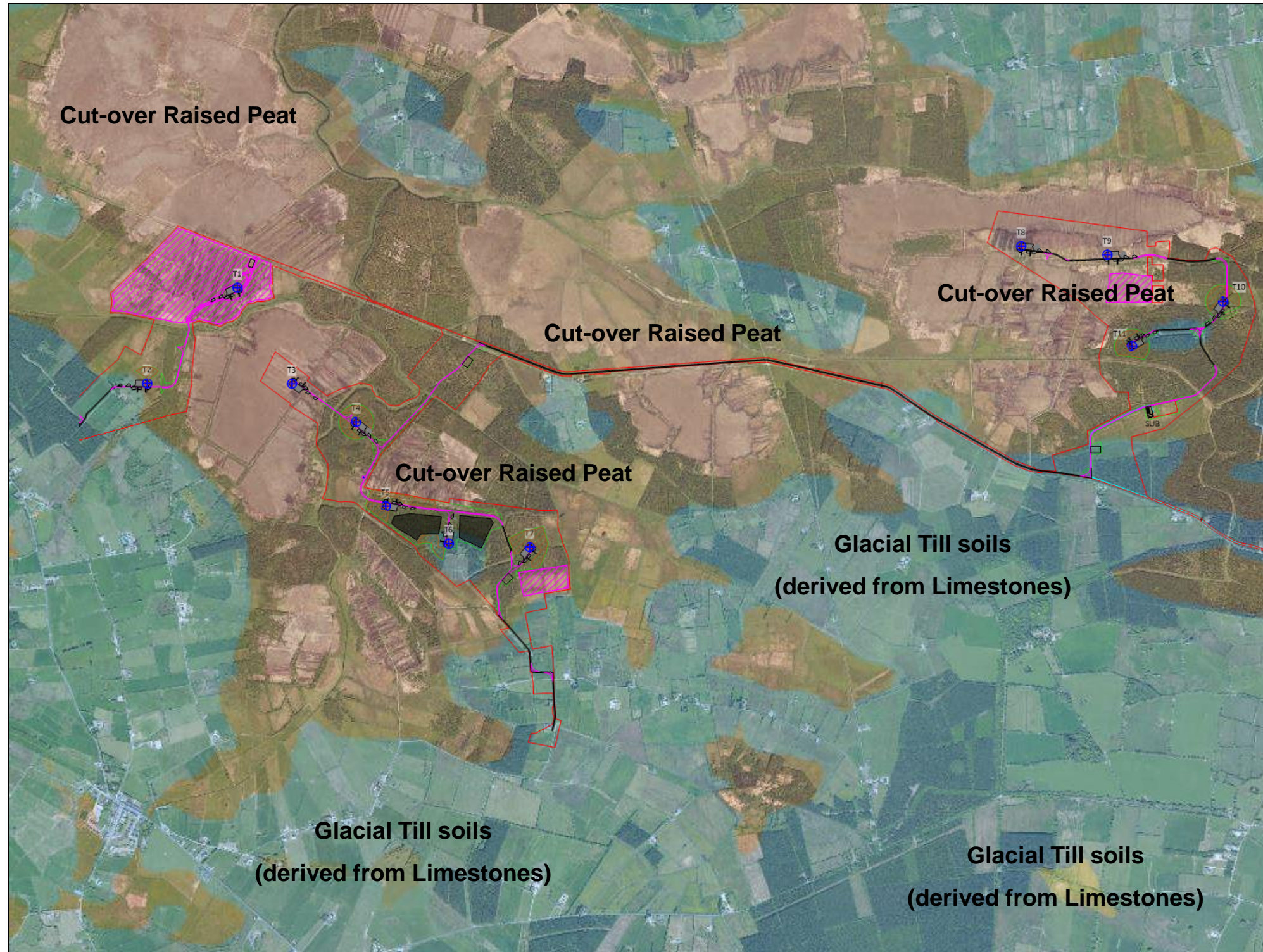


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Carrigeen Renewable Energy Development Soils and Geology Assessment				Edition 2	Sheet

GSI – Superficial Geology

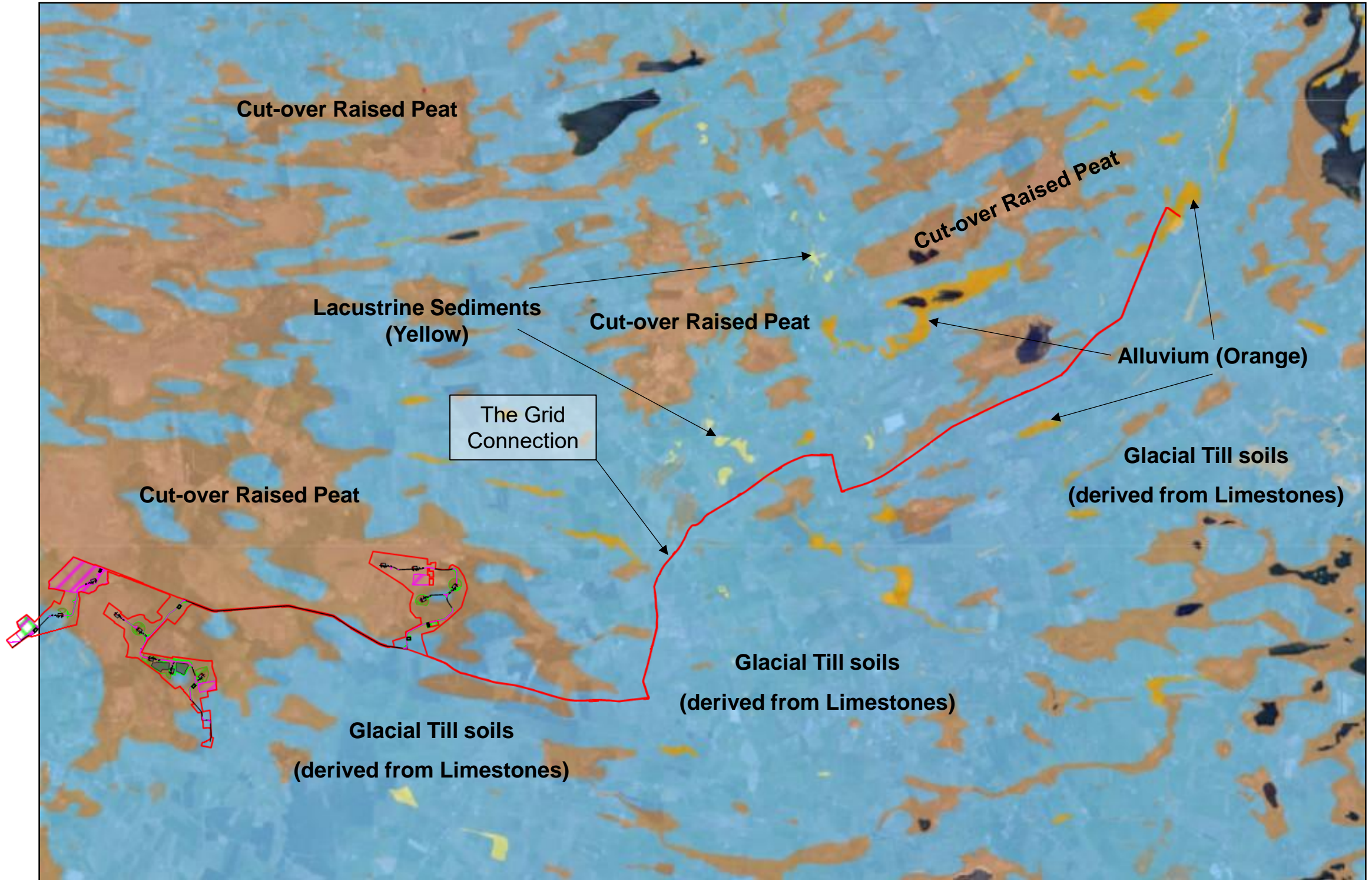


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GSI – Superficial Geology



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GSI – Groundwater Features, Karst Features, Springs and Abstraction Points

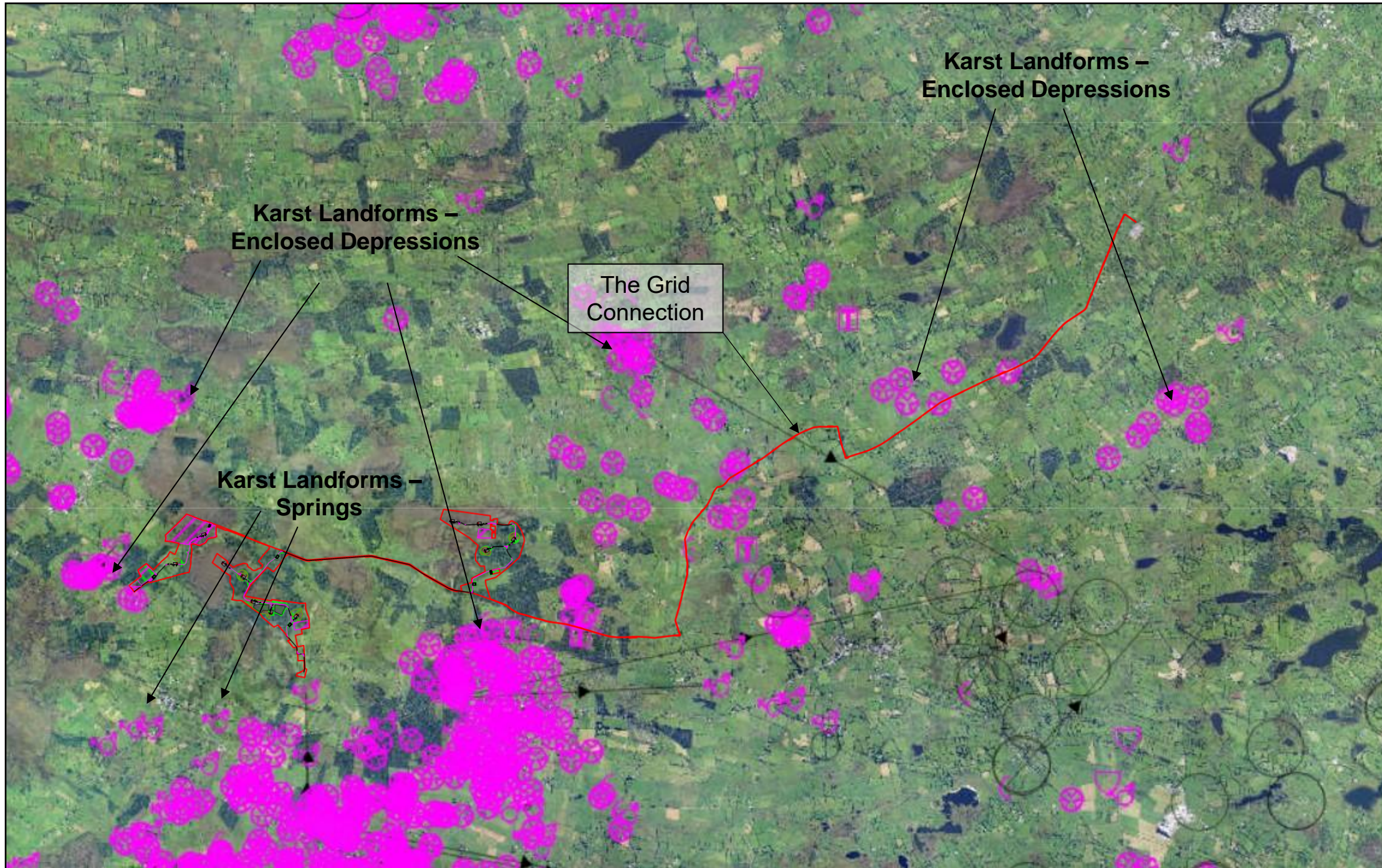


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				Edition 2	Sheet

GSI – Groundwater Features, Karst Features, Springs and Abstraction Points



- Borehole
- Cave
- Dry Valley
- Enclosed Depression
- Estavelle
- Spring
- Superficial Solution Feature
- Swallow Hole
- Turlough

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				Edition 2	Sheet 16

GSI – Landslide Susceptibility



Carrigeen  
Renewable Energy  
Development  
location

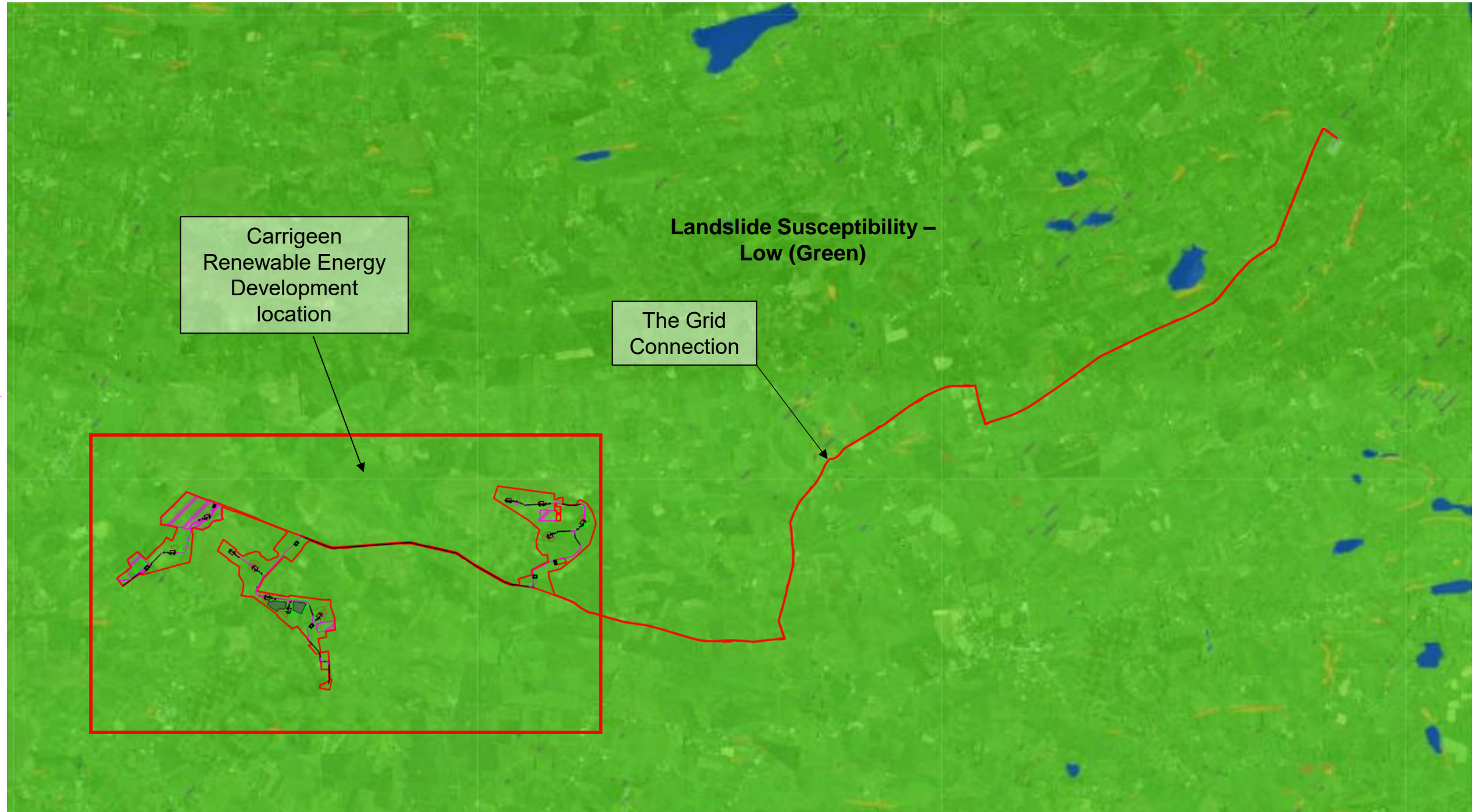
Landslide Susceptibility –  
Low (Green)

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Carrigeen Renewable Energy Development Soils and Geology Assessment				Edition 2	Sheet 2

GSI – Landslide Susceptibility

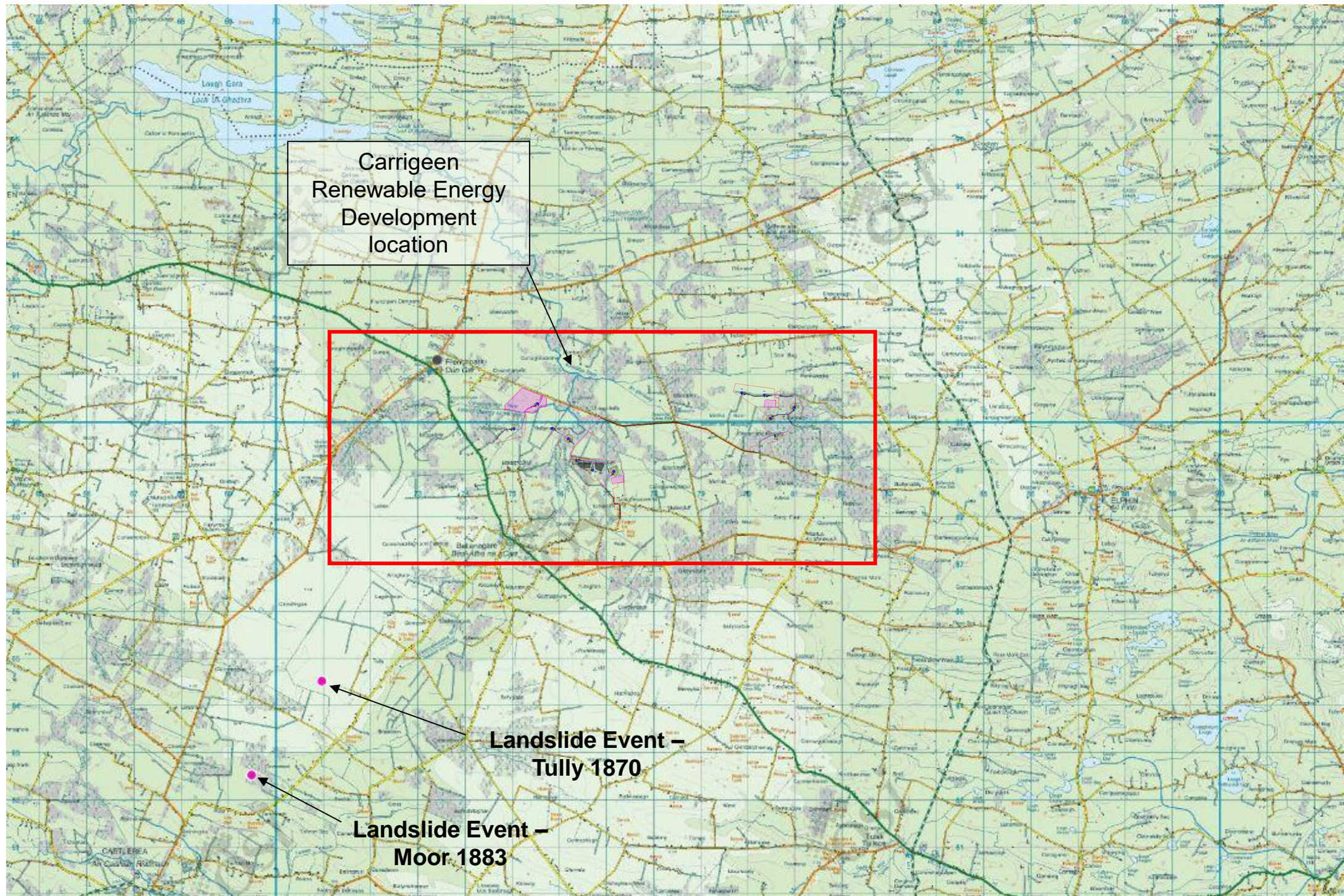


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Carrigeen Renewable Energy Development Soils and Geology Assessment				Edition 2	Sheet

GSI – Recorded Landslide Events

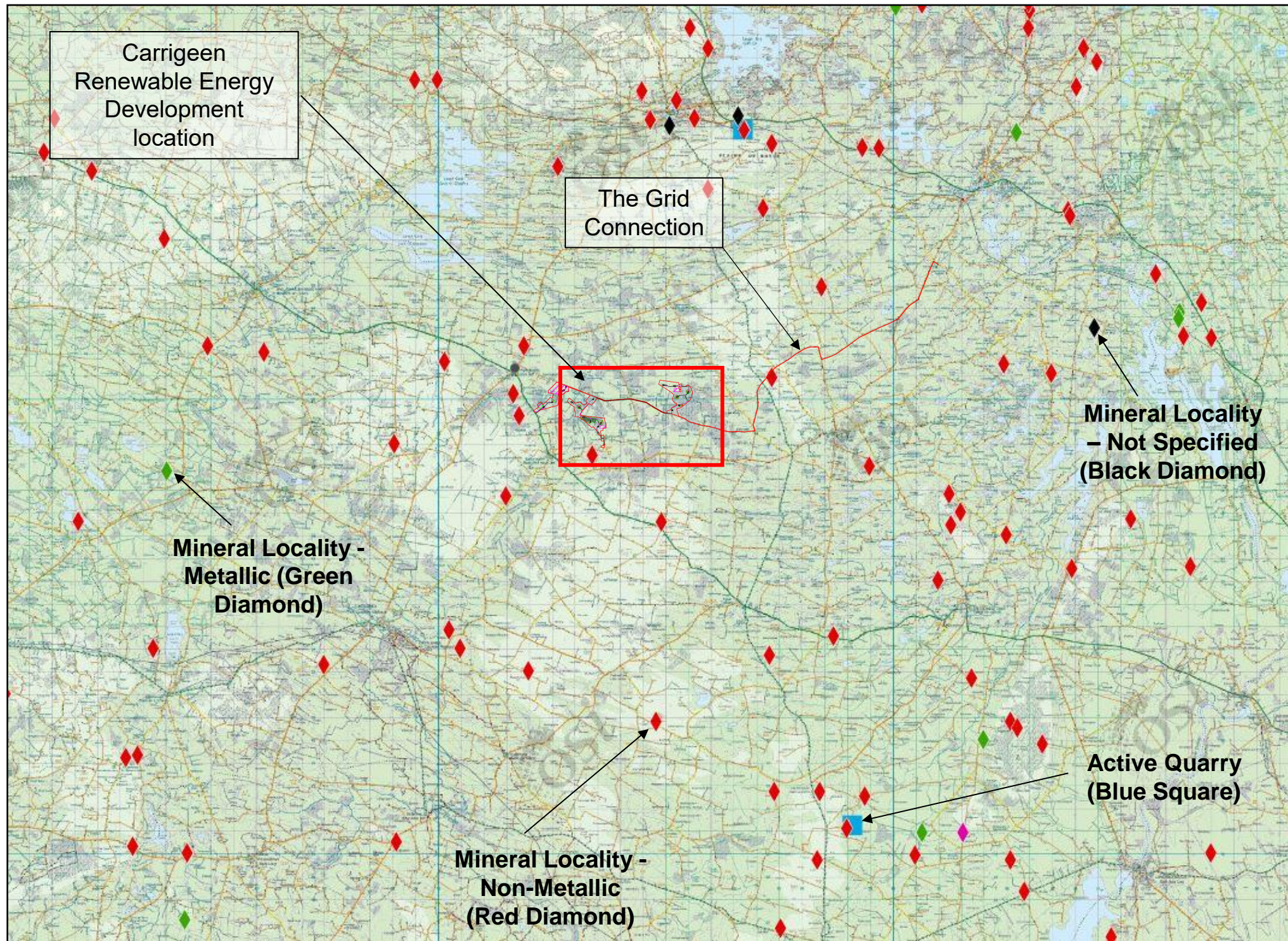


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GSI – Active Quarries and Mineral Occurrences

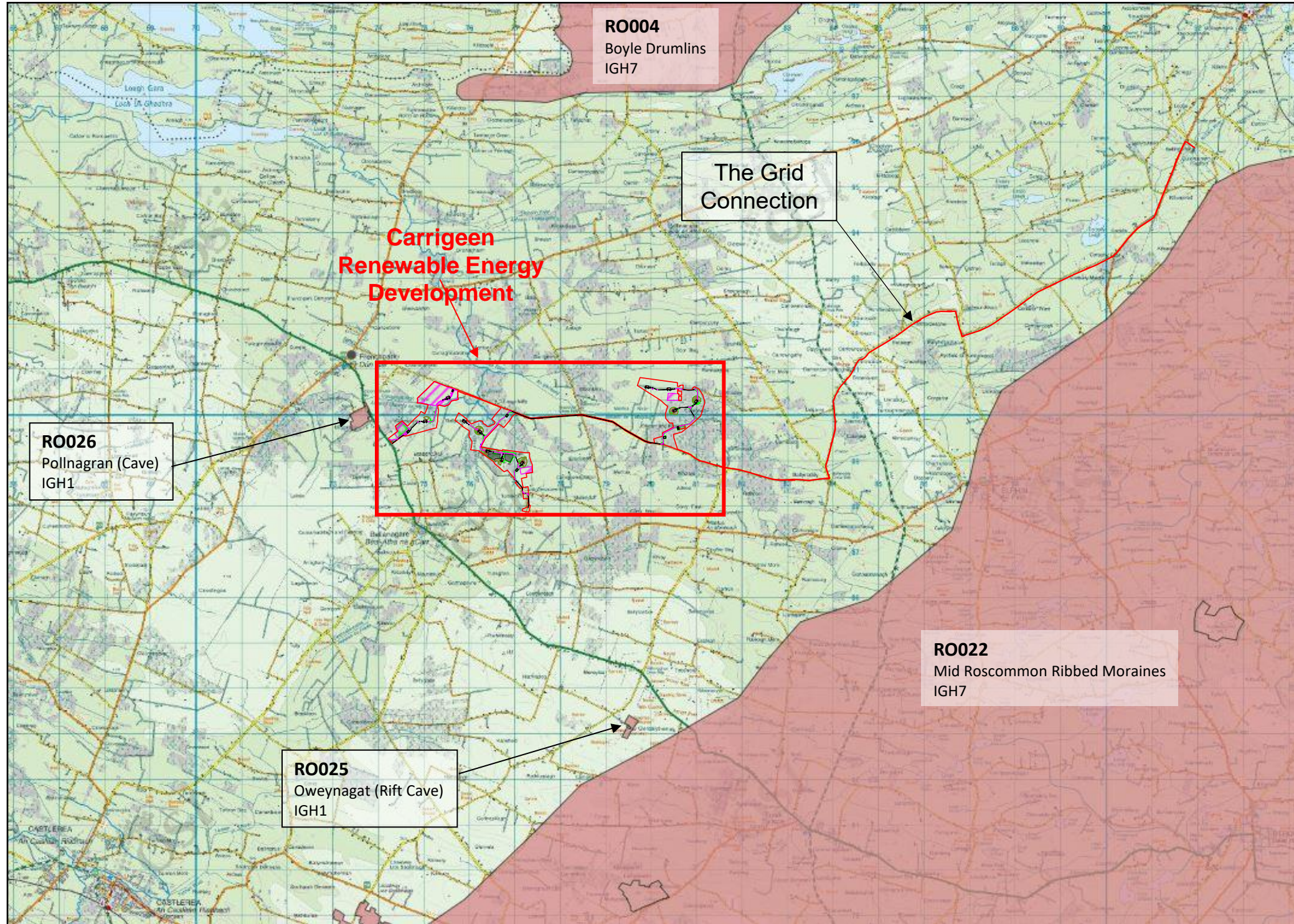


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GSI – Geological Audited and Un-audited Sites

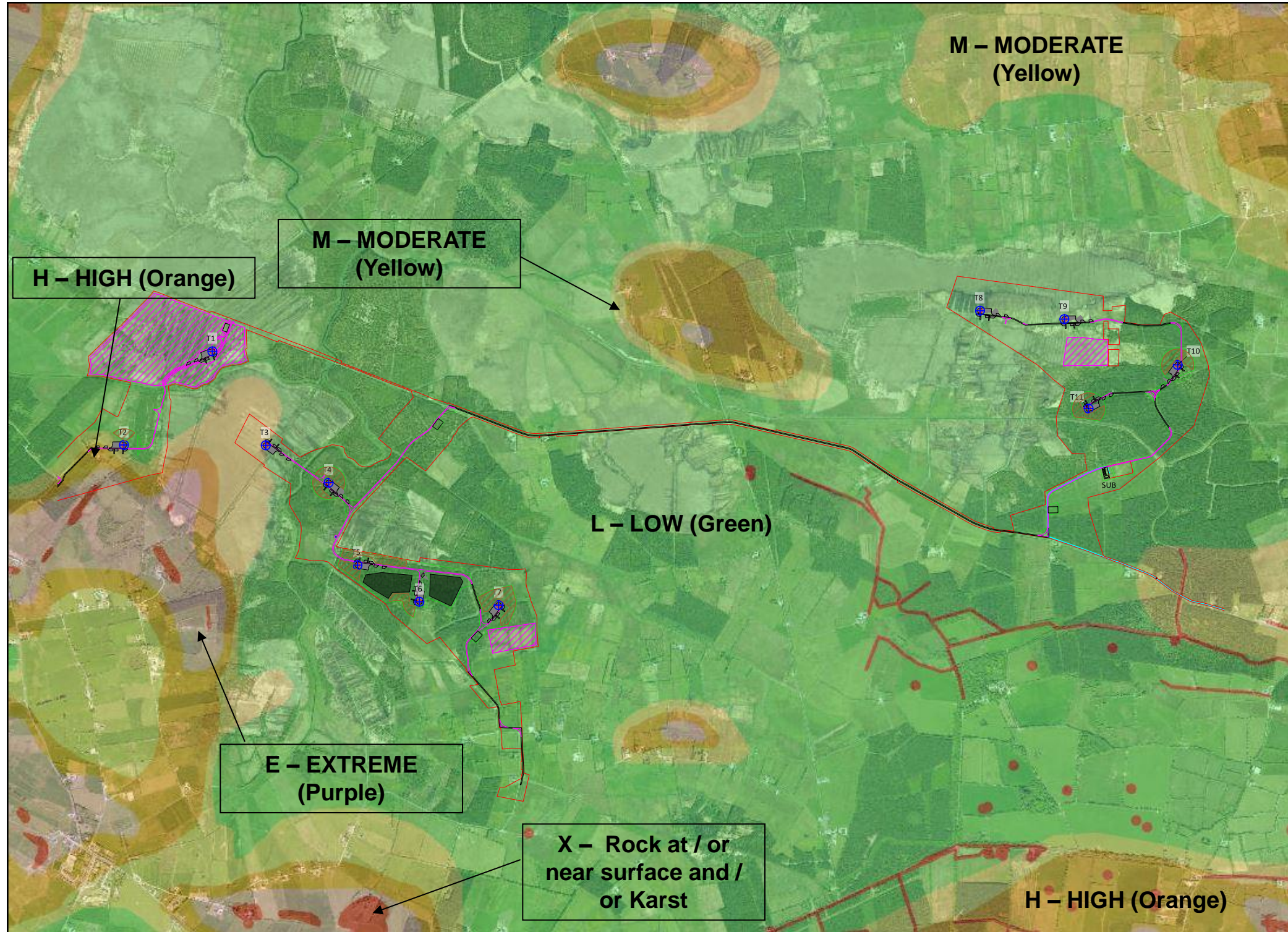


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GSI – Groundwater Vulnerability

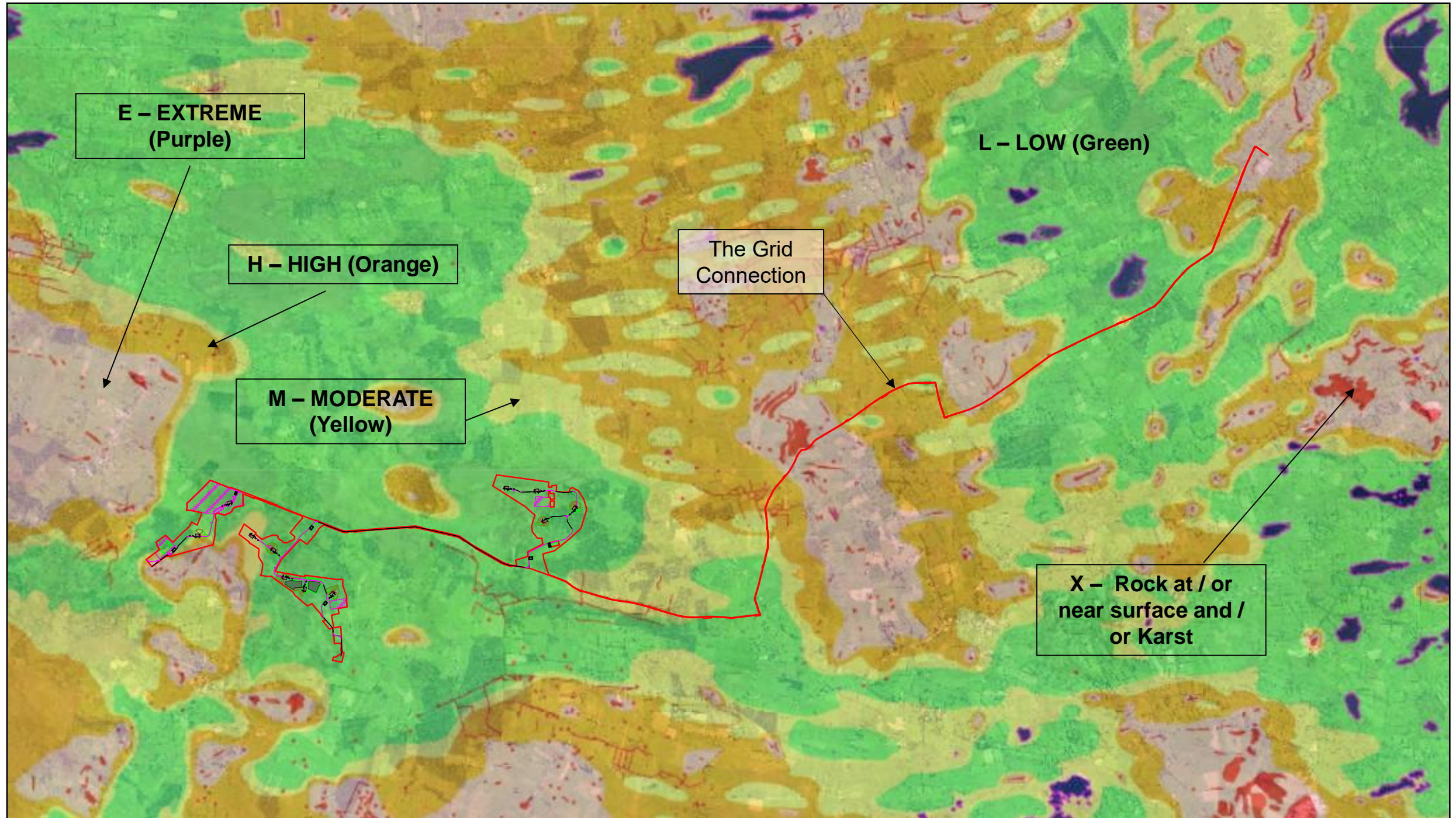


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GSI – Groundwater Vulnerability

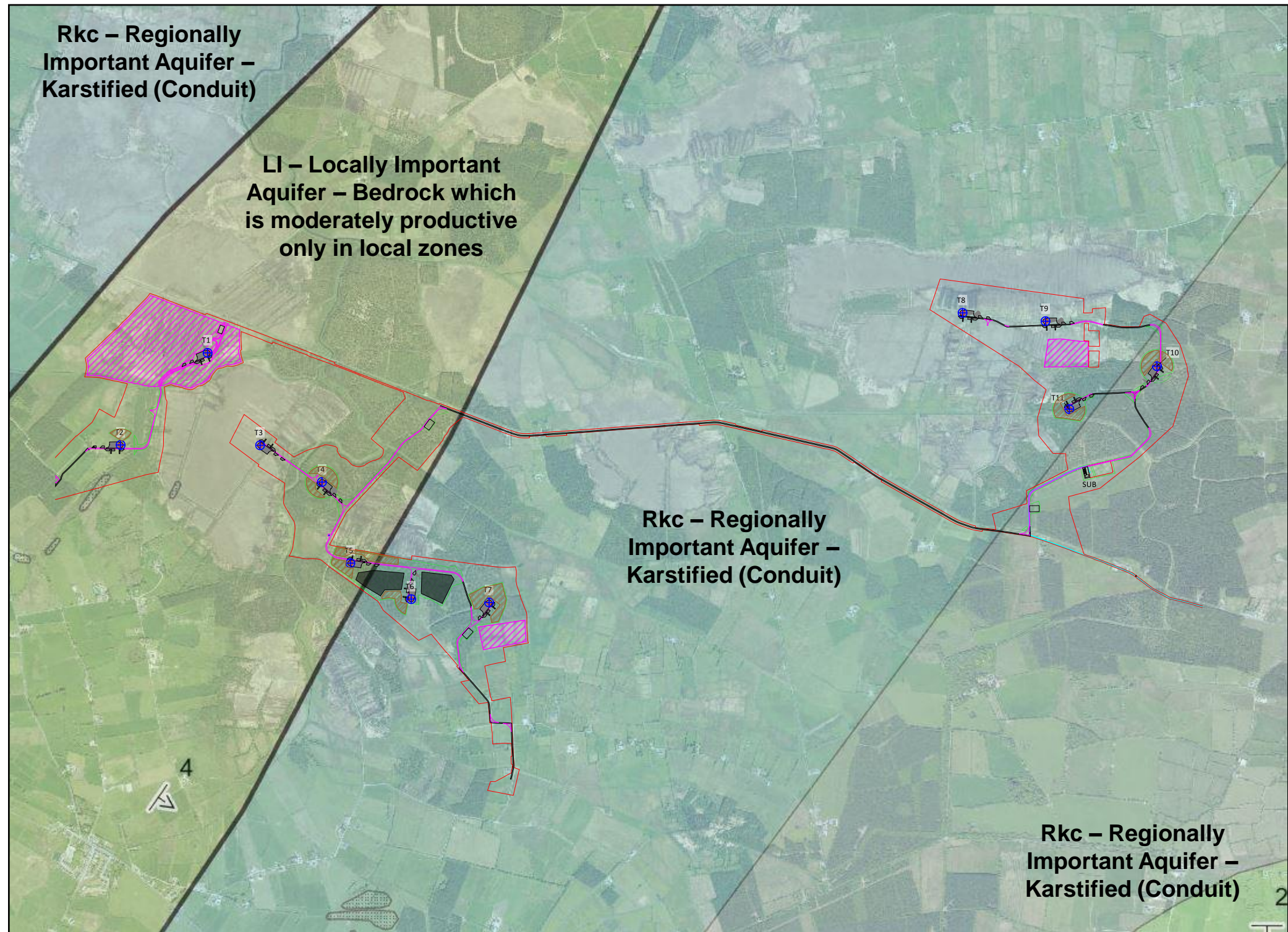


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GSI – Groundwater Resources / Bedrock Aquifer Potential

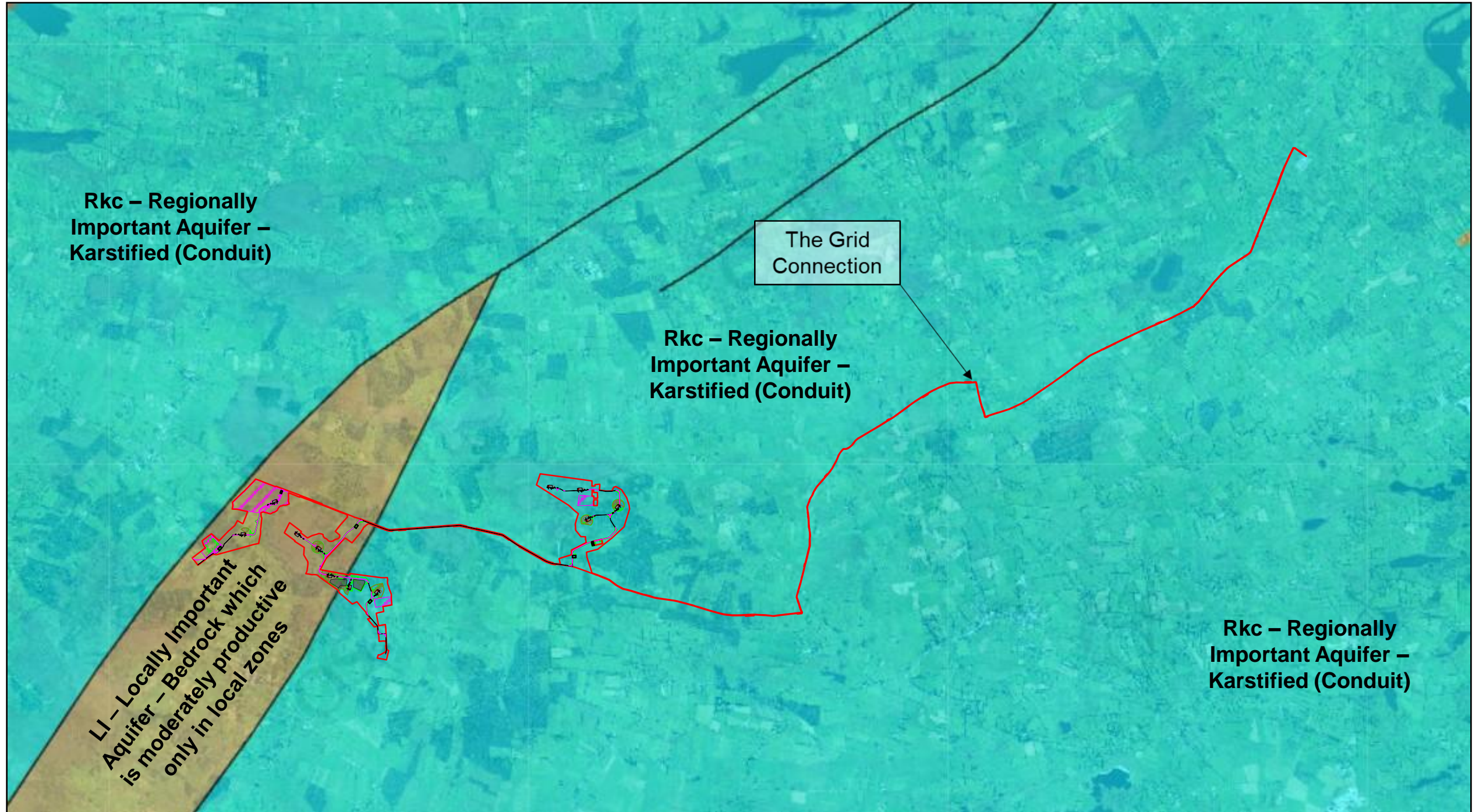


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Whiteford Geoservices Ltd Straid House 2 Main Street, Straid, BALLYCLARE, Co. Antrim, UK BT39 9 NE			Geological Survey of Ireland Online Mapping Database Groundwater Resources Carrigeen Renewable Energy Develop- ment Soils and Geology Assessment		
				Edition 2	Sheet 2

GSI – Groundwater Resources / Bedrock Aquifer Potential

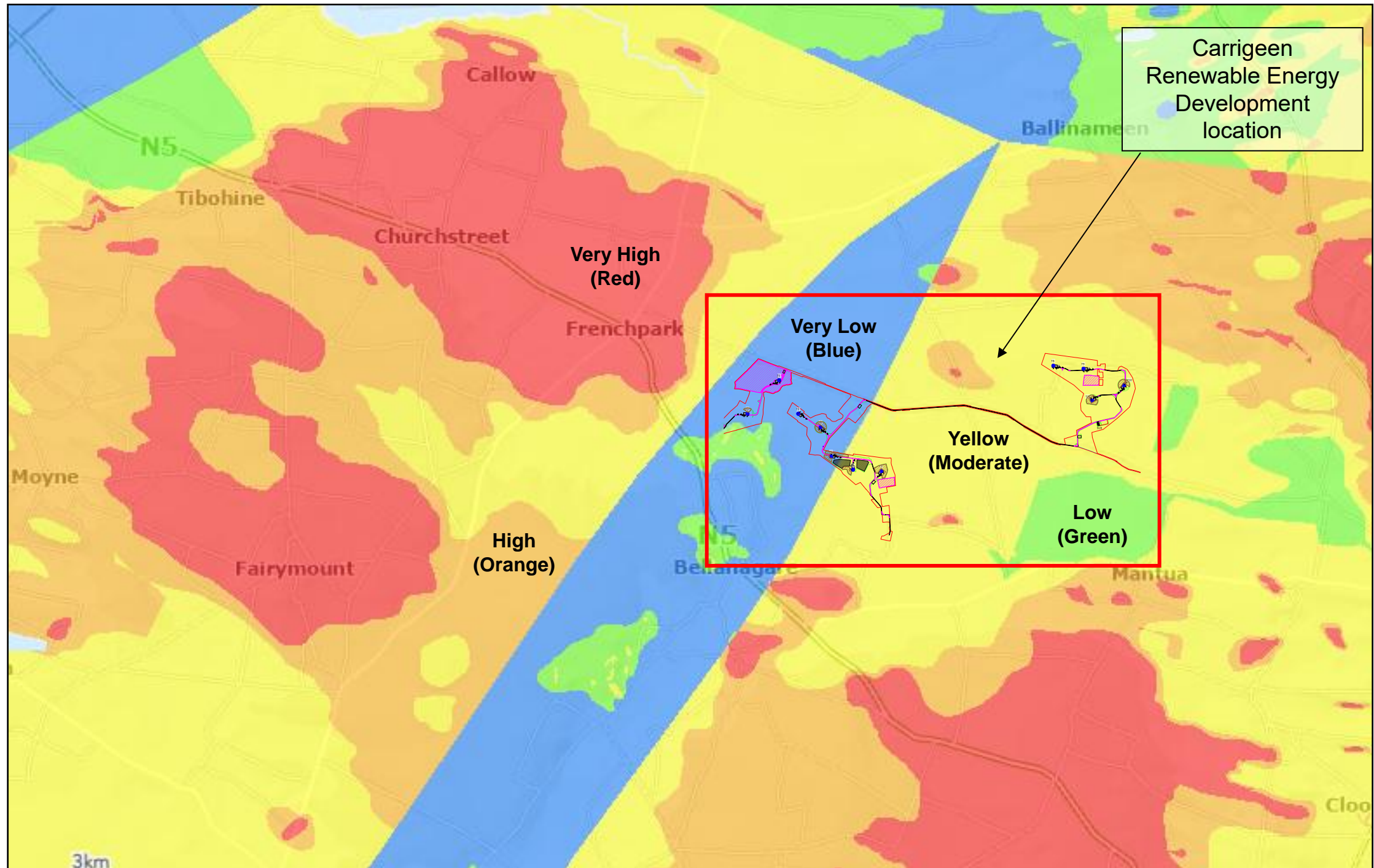


Notes:

1. GSI Copyright Reserved, Geological Survey Ireland DECC
2. Where indicated all elevation relate to Malin Head Datum
3. Background Mapping Source: OSI Digital Globe.

Designed by J.R.	Checked by J.W.	Approved by - date J.W. / Mar 2026	Drawing No. Figure A9-1.	Date 10/03/2026	Scale NTS
Whiteford Geoservices Ltd Straid House 2 Main Street, Straid, BALLYCLARE, Co. Antrim, UK BT39 9 NE			Geological Survey of Ireland Online Mapping Database Groundwater Resources		
Carrigeen Renewable Energy Development Soils and Geology Assessment				Edition 2	Sheet 2

GSI – Bedrock Aggregate Potential

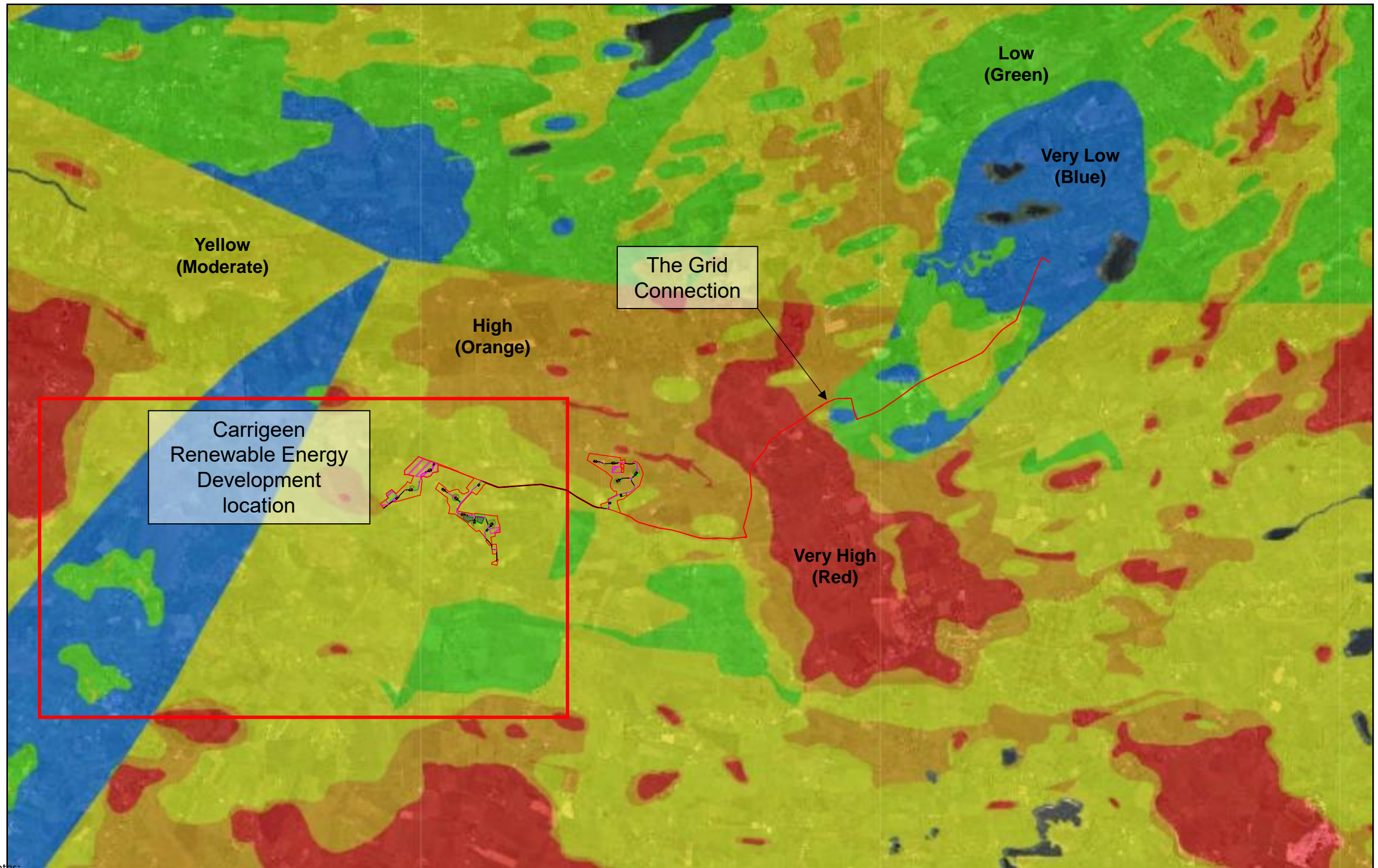


Notes:

1. GSI Copyright Reserved, Geological Survey Ireland DECC
2. Where indicated all elevation relate to Malin Head Datum
3. Background Mapping Source: OSI Digital Globe.

Designed by J.R.	Checked by J.W.	Approved by - date J.W. / Mar 2026	Drawing No. Figure A10.	Date 10/03/2026	Scale NTS
Whiteford Geoservices Ltd Straid House 2 Main Street, Straid, BALLYCLARE, Co. Antrim, UK BT39 9 NE			Geological Survey of Ireland Online Mapping Database Bedrock Aggregate Potential		
Carrigeen Renewable Energy Development Soils and Geology Assessment				Edition 2	Sheet 2

GSI – Bedrock Aggregate Potential



Notes:

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2. Where indicated all elevation relate to Malin Head Datum
3. Background Mapping Source: OSI Digital Globe.

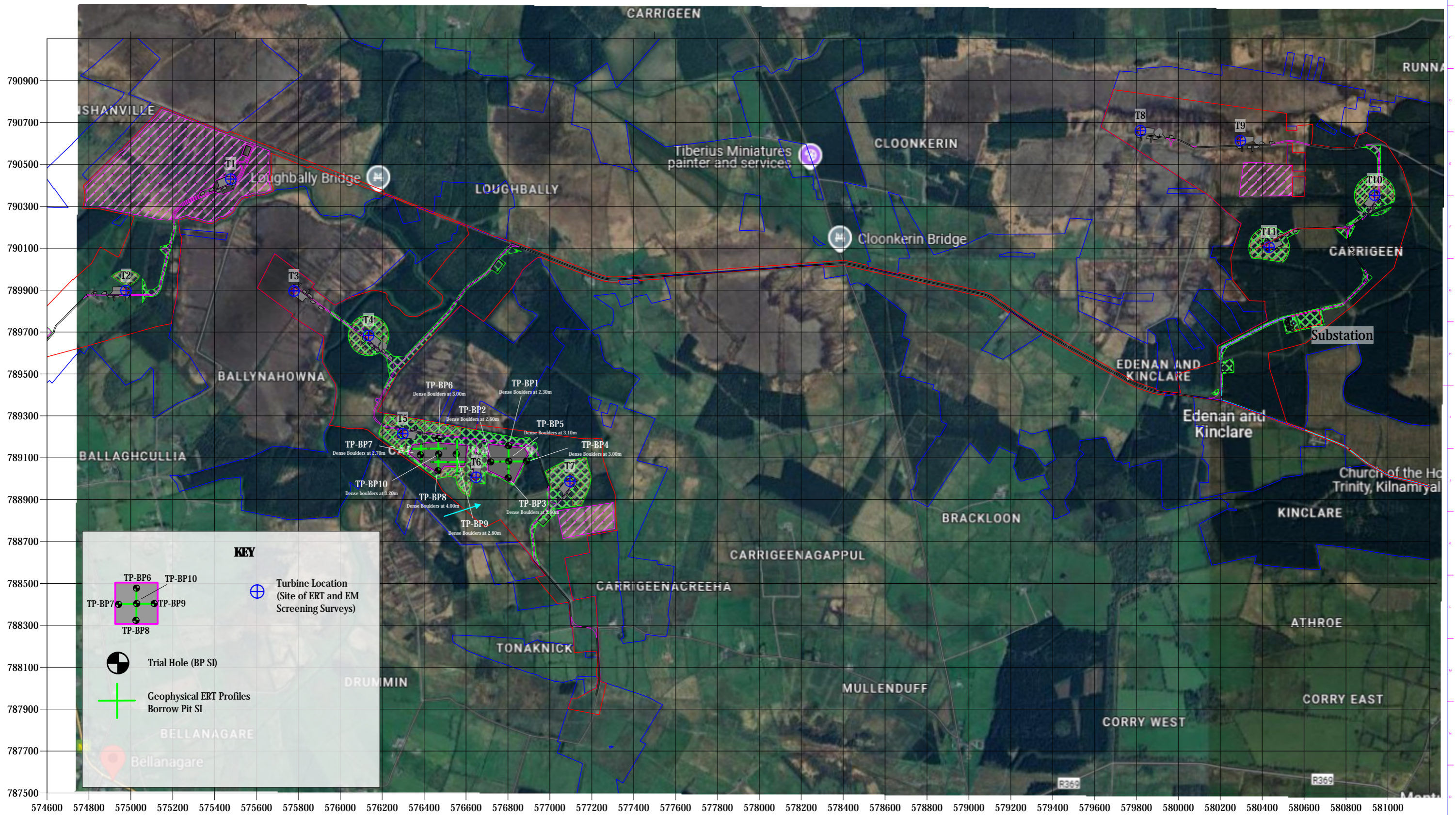
Designed by J.R.	Checked by J.W.	Approved by - date J.W. / Mar 2026	Drawing No. Figure A10-1	Date 10/03/2026	Scale NTS
Whiteford Geoservices Ltd Straid House 2 Main Street, Straid, BALLYCLARE, Co. Antrim, UK. BT39 9 NE			Geological Survey of Ireland Online Mapping Database Bedrock Aggregate Potential		
Carrigeen Renewable Energy Development Soils and Geology Assessment				Edition 2	Sheet 2

# 2278-24 Carrigeen Renewable Energy Development - Soils and Geology Assessment

Turbine Layout: Dated 11-02-2026

Borrow Pit Investigations - Layout Plan

Combination of Geophysical Surveys and Trial Hole Investigations



10th March 2026

Designed by JW	Checked by JW	Approved by date JM 11/03/2026	Drawing No. 2278-24C I2	Date 11/03/2026	Scale 1:17,500
Whiteford Geoservices Ltd Straid House 2 Main Street, Straid, BALLYCLARE, Co. Antrim, UK BT39 9 NE			Carrigeen Renewable Energy Development - PLHA		
Main SI - Layout Plan			Sheet 7A	A3	

## APPENDIX B

### IN-SITU TEST RESULTS AND LOGS OF EXPLORATORY HOLES

Trial Hole Logs

10 x A4

Project Name: Carrageen Renewable Energy Development	Project No: 2278-24	Client: Carragain Power Ltd	Date: 17/11/2025
		Contractor: Whiteford Geoservices Ltd	Co-ords: E576815.54 N789100.64

Location:	Sub Contractor:	Equipment: Hitachi Zaxis 13T
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Location Number TP BP1	Location Type TP	Level 67.77m AoD	Logged By JR	Scale 1:25	Page Number Sheet 1 of 1
---------------------------	---------------------	---------------------	-----------------	---------------	-----------------------------

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
Well		0.50		HVP=18	0.80	66.97	Soft, dark brown, slightly clayey, fibrous PEAT	1	
		1.00 1.10 - 1.20	B	HVP=47			Soft to firm, grey, slightly gravelly, slightly silty CLAY containing low sub rounded cobble and boulder content		
		2.00 - 2.10 2.00	B PP	133 kPa	Clay becomes stiff	2			
		2.20 - 2.30	B		End of Pit at 2.300m	3			
				2.30	65.47			4	

Dimensions		Trench Comments			Backfill Details		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Top	Base	Description
2.90	2.30	Stable	None		0.00	2.30	Arisings

Remarks	
---------	---

Project Name: Carrigeen Renewable Energy Development	Project No: 2278-24	Client: Carragain Power Ltd	Date: 17/11/2025
		Contractor: Whiteford Geoservices Ltd	Co-ords: E576718.41 N789083.15

Location:	Sub Contractor:	Equipment: Hitachi Zaxis 13T
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Location Number TP BP2	Location Type TP	Level 71.09m AoD	Logged By JR	Scale 1:25	Page Number Sheet 1 of 1
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Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
Well	Water Strikes	0.50		HVP=53	0.40	70.69		Soft, brown, silty TOPSOIL with rootlets	
		1.00		HVP=65	1.00	70.09		Firm, brown, slightly gravelly, silty CLAY	1
		1.10 - 1.20	B		1.60	69.49		Firm, brown, silty, gravelly CLAY containing low sub rounded cobble and boulder content. Gravels are fine grained and sub rounded.	
		1.80 - 1.90	B		2.40 - 2.50			Stiff grey, slightly gravelly, slightly silty CLAY containing low sub rounded cobble and boulder content	2
		2.40 - 2.50	B		2.60	68.49		End of Pit at 2.600m	3
								4	

Dimensions		Trench Comments			Backfill Details		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Top	Base	Description
3.30	0.90	Instable	None		0.00	2.60	Arisings

Remarks	
---------	---

Project Name: Carrageen Renewable Energy Development	Project No: 2278-24	Client: Carragain Power Ltd	Date: 17/11/2025
		Contractor: Whiteford Geoservices Ltd	Co-ords: E576801.27 N789005.85

Location:	Sub Contractor:	Equipment: Hitachi Zaxis 13T
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Location Number TP BP3	Location Type TP	Level 72.20m AoD	Logged By JR	Scale 1:25	Page Number Sheet 1 of 1
---------------------------	---------------------	---------------------	-----------------	---------------	-----------------------------

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
		0.30			0.30	71.90		Soft, brown, clayey TOPSOIL		
		0.50		HVP=66				Firm, greyish brown, clayey SILT <u>Bright orange patches</u>		
		1.00 - 1.10 1.00	B	HVP=64	0.90	71.30		Firm, brown, clayey SILT containing low sub rounded cobble and boulder content		1
		1.80 - 1.90	B		1.60	70.60		Firm, dark grey, slightly gravelly, slightly silty CLAY containing low sub rounded cobble content. Gravels are fine grained and sub angular		2
		2.50 - 2.60	B		2.60	69.60		End of Pit at 2.600m	3	
									4	

Dimensions		Trench Comments			Backfill Details		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Top	Base	Description
3.10	0.90	Stable	None		0.00	2.60	Arisings

Remarks	
---------	---

Project Name: Carrigeen  
Renewable Energy  
Development

Project No:  
2278-24

Client: Carragain Power Ltd

Date: 18/11/2025

Contractor: Whiteford Geoservices Ltd

Co-ords: E576855.39 N789085.88

Location:

Sub Contractor:

Equipment: Hitachi Zaxis 13T

Location Number TP BP4		Location Type TP		Level 67.73m AoD		Logged By JR		Scale 1:25		Page Number Sheet 1 of 1	
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth (m)	Type	Results							
Well	Strikes	0.50		HVP=30	0.60	67.13	[Symbol]	Soft, brown, slightly clayey PEAT			
		1.00 - 1.10 1.00	B	HVP=66			[Symbol]	Soft to firm, grey, slightly gravelly, slightly silty CLAY containing low sub rounded cobble and boulder content			
		1.90 - 2.00	B				[Symbol]	<i>Clay is stiff</i>			
		2.90 - 3.00	B		3.00	64.73	[Symbol]	End of Pit at 3.000m			

Dimensions		Trench Comments			Backfill Details		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Top	Base	Description
3.00	0.90	Stable	None		0.00	3.00	Arisings

Remarks



Project Name: Carrageen Renewable Energy Development	Project No: 2278-24	Client: Carragain Power Ltd	Date: 18/11/2025
		Contractor: Whiteford Geoservices Ltd	Co-ords: E576801.73 N789075.02

Location:	Sub Contractor:	Equipment: Hitachi Zaxis 13T
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Location Number TP BP5	Location Type TP	Level 69.56m AoD	Logged By JR	Scale 1:25	Page Number Sheet 1 of 1
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Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
[Hatched Pattern]		0.50		HVP=39	0.30	69.26	[Hatched Pattern]	Soft, brown, clayey TOPSOIL	
		1.00 - 1.10	B	HVP=66	0.90	68.66	[Cross-hatch Pattern]	Firm, greyish brown, clayey SILT	1
		1.00						Firm, brown, clayey, gravelly SILT containing low sub rounded cobble and boulder content	
		2.00 - 2.10	B		1.80	67.76	[Dotted Pattern]	Firm, dark grey, slightly silty, gravelly CLAY containing low sub rounded cobble content. Gravels are fine grained and sub angular <i>Clay becomes stiff and crumbly</i>	2
		3.00 - 3.10	B		3.10	66.46		End of Pit at 3.100m	3
									4

Dimensions		Trench Comments			Backfill Details		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Top	Base	Description
3.20	0.90	Instable	None		0.00	3.10	Arisings

Remarks	
---------	---

Project Name: Carrageen Renewable Energy Development	Project No: 2278-24	Client: Carragain Power Ltd	Date: 19/11/2025
		Contractor: Whiteford Geoservices Ltd	Co-ords: E576428.93 N789167.40

Location:	Sub Contractor:	Equipment: Hitachi Zaxis 13T
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Location Number TP BP6	Location Type TP	Level 69.37m AoD	Logged By JR	Scale 1:25	Page Number Sheet 1 of 1
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Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
Well	Water Strikes	0.50	B	HVP=45	0.10	69.27		Soft, brown, silty TOPSOIL	1	
					0.30	69.07		Soft, black, slightly gravelly, silty PEAT		
					0.60	68.77		Firm, orangey brown, clayey SILT		
					1.00			Firm to stiff, greyish brown, slightly sandy, slightly gravelly, clayey SILT. Gravels are fine grained and sub angular.		
		1.10 - 1.20	B	HVP=99	1.60	67.77		Stiff, dark grey, gravelly CLAY with low cobble content. Gravels are fine grained and sub angular to sub rounded.		2
		2.20 - 2.30	B		3.10	66.27		Soft to stiff, black, slightly gravelly, clayey SAND with low sub angular cobble content		3
		2.80 - 2.90	B		3.30	66.07		End of Pit at 3.300m		4
		3.20 - 3.30	B							

Dimensions		Trench Comments			Backfill Details		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Top	Base	Description
3.00	0.90	Stable	None		0.00	3.30	Arisings

Remarks	
---------	--

Project Name: Carrageen Renewable Energy Development	Project No: 2278-24	Client: Carragain Power Ltd	Date: 19/11/2025
		Contractor: Whiteford Geoservices Ltd	Co-ords: E576375.73 N789133.11

Location:	Sub Contractor:	Equipment: Hitachi Zaxis 13T
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Location Number TP BP7	Location Type TP	Level 69.78m AoD	Logged By JR	Scale 1:25	Page Number Sheet 1 of 1
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Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
Well	Water Strikes	0.10			0.10	69.68		Soft, brown, silty TOPSOIL	
		0.50		HVP=48	0.60	69.18		Firm, greyish brown, slightly gravelly, slightly clayey SILT. Gravels are fine grained and sub angular	
		1.00 - 1.10 1.00	B	HVP=62	1.80	67.98		Soft to firm, brown, slightly gravelly, slightly clayey SILT containing low sub rounded cobble content	
		1.90 - 2.00	B		2.60 - 2.70	B		Stiff, dark grey, gravelly CLAY with low cobble content. Gravels are fine grained and sub angular to sub rounded.	
				2.90	66.88		End of Pit at 2.900m		

Dimensions		Trench Comments			Backfill Details		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Top	Base	Description
3.30	0.90	Stable	None		0.00	2.90	Arisings

Remarks	
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Project Name: Carrageen  
 Renewable Energy  
 Development

 Project No:  
 2278-24

Client: Carragain Power Ltd

Date: 19/11/2025

Contractor: Whiteford Geoservices Ltd

Co-ords: E576463.30 N789036.22

Location:

Sub Contractor:

Equipment: Hitachi Zaxis 13T

Location Number TP BP8		Location Type TP		Level 70.09m AoD		Logged By JR		Scale 1:25		Page Number Sheet 1 of 1		
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description				
		Depth (m)	Type	Results								
		0.50		HVP=62	0.40	69.69		Soft, brown, silty TOPSOIL				
		1.00 - 1.10	B	HVP=64	1.00	69.09		Firm, greyish brown, slightly gravelly, slightly clayey SILT. Gravels are fine grained and sub angular				
		1.00							Soft to firm, brown, slightly gravelly, slightly clayey SILT containing low sub rounded cobble content			
		2.10 - 2.20	B									
		2.10 - 2.20	B					2				
		3.00 - 3.10	B	270 kPa	2.70	67.39		Stiff, dark grey, gravelly CLAY with low cobble content. Gravels are fine grained and sub angular to sub rounded. <u>1-2 boulders per scoop</u>				
		3.00	PP					3				
					4.00	66.09		End of Pit at 4.000m				
								4				

Dimensions		Trench Comments				Backfill Details		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks		Top	Base	Description
3.40	0.90	Instable	None			0.00	4.00	Arisings

Remarks



Project Name: Carrigeen Renewable Energy Development	Project No: 2278-24	Client: Carragain Power Ltd	Date: 19/11/2025
		Contractor: Whiteford Geoservices Ltd	Co-ords: E576545.28 N789114.17

Location:	Sub Contractor:	Equipment: Hitachi Zaxis 13T
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Location Number TP BP9	Location Type TP	Level 70.67m AoD	Logged By JR	Scale 1:25	Page Number Sheet 1 of 1
---------------------------	---------------------	---------------------	-----------------	---------------	-----------------------------

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
Well	Water Strikes	0.50		HVP=47	0.20	70.47	[Pattern]	Soft, brown, silty TOPSOIL	1	
		1.10 - 1.20	B	HVP=57	0.80	69.87	[Pattern]	Firm, greyish brown, slightly gravelly, slightly clayey SILT. Gravels are fine grained and sub angular		
		2.00 - 2.10	B		1.90	68.77	[Pattern]	Soft to firm, brown, slightly gravelly, slightly clayey SILT containing low sub rounded cobble content		
		2.60 - 2.70	B		2.80	67.87	[Pattern]	Stiff, dark grey, gravelly CLAY with low cobble content. Gravels are fine grained and sub angular to sub rounded. <i>Dominantly very stiff cobble sized chunks of clay</i>  <i>Medium cobble content</i>		2
		End of Pit at 2.800m								3
4										

Dimensions		Trench Comments			Backfill Details		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Top	Base	Description
3.30	0.90	Semi stable	None		0.00	2.80	Arisings

Remarks	
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Project Name: Carrigeen  
 Renewable Energy  
 Development

 Project No:  
 2278-24

Client: Carragain Power Ltd

Date: 19/11/2025

Contractor: Whiteford Geoservices Ltd

Co-ords: E576439.78 N789133.41

Location:

Sub Contractor:

Equipment: Hitachi Zaxis 13T

Location Number		Location Type		Level		Logged By		Scale		Page Number	
TP BP10		TP		69.82m AoD		JR		1:25		Sheet 1 of 1	
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth (m)	Type	Results							
TP BP10		0.20			0.20	69.62		Soft, brown, silty TOPSOIL			
		0.50		HVP=32				Firm, greyish brown, slightly gravelly, slightly clayey SILT containing medium sub rounded boulder content. Gravels are fine grained and sub angular			
		1.00		HVP=54				1			
		1.20 - 1.30	B		1.30	68.52					
		2.20 - 2.30	B		1.80	68.02		2			
	2.90 - 3.00	B					Stiff, dark grey, gravelly CLAY with low cobble content. Gravels are fine grained and sub angular to sub rounded.				
				3.20	66.62		3				
End of Pit at 3.200m								4			

Dimensions		Trench Comments			Backfill Details		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Top	Base	Description
2.90	0.90	Stable	None		0.00	3.20	Arisings

Remarks



## APPENDIX C

### INTERPRETED GEOPHYSICAL SURVEY DATA

Annotated Electrical Resistivity Tomography (ERT) Profiles:

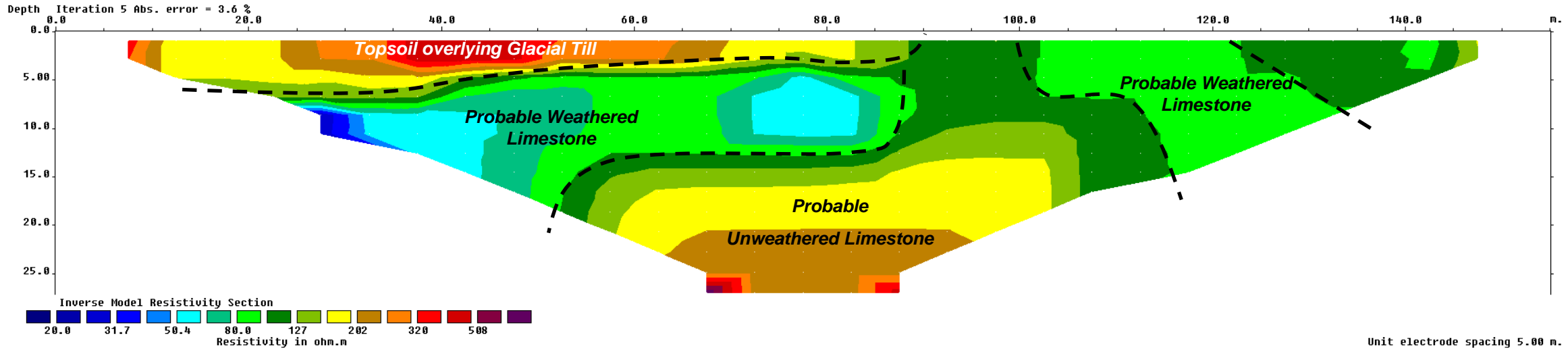
BP East – ERT Profiles L3 / L4	1 x A3
BP West – ERT Profiles L5 / L26	1 x A3
BP West – ERT Profiles L7 / L25	1 x A3
BP West – ERT Profiles L6	1 x A3

# 2278-24 Carrigeen Renewable Energy Development – Site Investigation

## 2D Electrical Resistivity Tomography Survey – Interpretation of ERT Data at Potential Borrow Pit

E =  
N =  
Z =

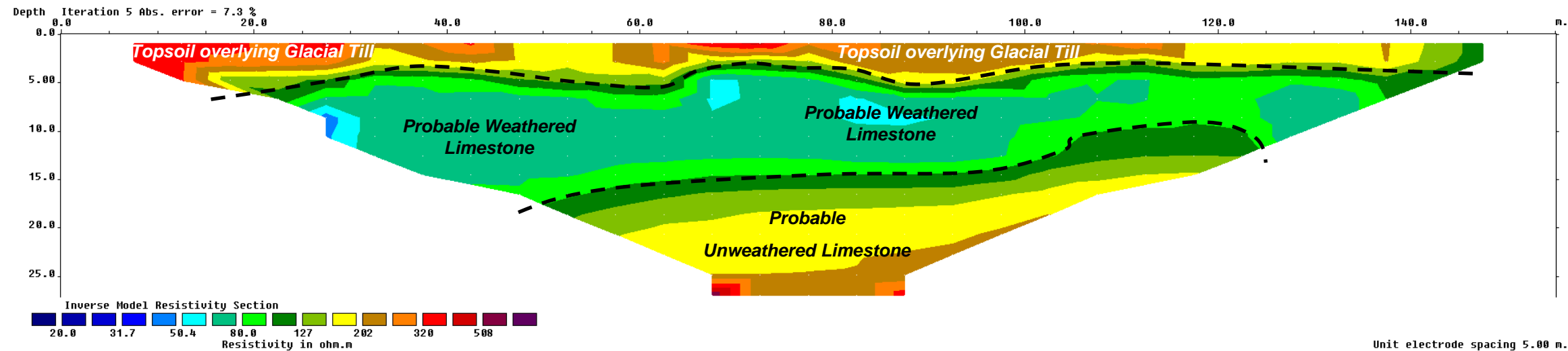
### BP East, Profile L3 (E-W) (Up to 6m overburden over rock)



= E  
= N  
= Z

E =  
N =  
Z =

### BP East, Profile L4 (S-N) (5 - 8m overburden over rock)



= E  
= N  
= Z

#### Notes:

1. Interpretation is based only on the geophysical survey data acquired and available records for the site.
2. Coordinates and elevations provided are to Irish Transverse Mercator (ITM) and Malin Head Ordnance Datum.
3. Drawings are Not To Scale.

#### Key To Sections

Each Profile indicates variation in the electrical resistivity of the Subsurface with depth.

- Natural Soils (generally 10 - 300Ωm)
- Peat (generally, 5 - 150Ωm)
- Glacial till (generally >200Ωm)
- Wet glacial till (generally 10 - 150 Ωm)
- Sandstone (generally >200Ωm)
- Weathered Sandstone (generally 50 - 200Ωm)
- Limestone (generally >1000 Ωm)
- Weathered limestone (generally 20 - 400 Ωm)

Designed by	Checked by	Approved by - date	Drawing No.	Date	Scale
Whiteford Geoservices Ltd Straid House, Straid, BALLYCLARE, Co. Antrim, UK BT39 9 NE			Interpreted Electrical Resistivity Data Borrow Pit – East (L3 and L4) Carrigeen Renewable Energy Borrow Pit Assessment		
				Edition	Sheet

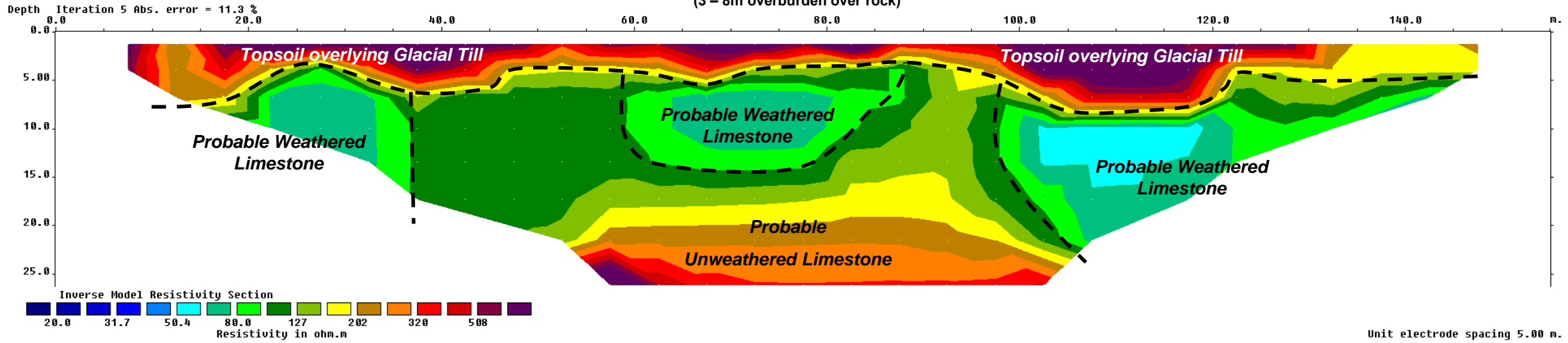
# 2278-24 Carrigeen Renewable Energy Development – Site Investigation

## 2D Electrical Resistivity Tomography Survey – Interpretation of ERT Data at Potential Borrow Pit

E =  
N =  
Z =

### BP West, Profile L5 (W-E)

(3 – 8m overburden over rock)

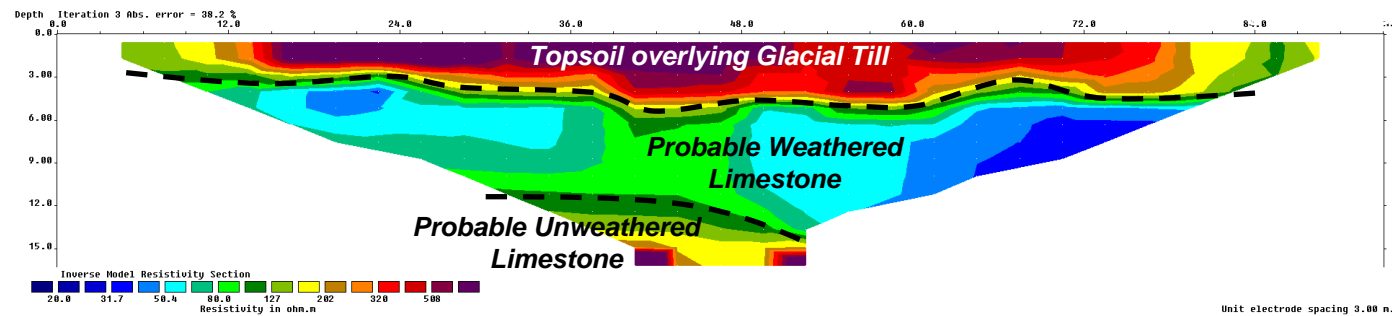


= E  
= N  
= Z

E =  
N =  
Z =

### BP West, Profile L26 (S-N)

(3 – 5m overburden over rock)



= E  
= N  
= Z

#### Notes:

1. Interpretation is based only on the geophysical survey data acquired and available records for the site.
2. Coordinates and elevations provided are to Irish Transverse Mercator (ITM) and Malin Head Ordnance Datum.
3. Drawings are Not To Scale.

#### Key To Sections

Each Profile indicates variation in the electrical resistivity of the Subsurface with depth.

- Natural Soils (generally 10 - 300Ωm)
- Peat (generally, 5 - 150Ωm)
- Glacial till (generally >200Ωm)
- Wet glacial till (generally 10 - 150 Ωm)
- Sandstone (generally >200Ωm)
- Weathered Sandstone (generally 50 - 200Ωm)
- Limestone (generally >1000 Ωm)
- Weathered limestone (generally 20 - 400 Ωm)

Designed by	Checked by	Approved by - date	Drawing No.	Date	Scale
Whiteford Geoservices Ltd Straid House 2 Main Street, Straid, BALLYCLARE, Co. Antrim, UK BT39 9 NE			Interpreted Electrical Resistivity Data Borrow Pit – West (L26 and L5) Carrigeen Renewable Energy Borrow Pit Assessment		
				Edition	Sheet

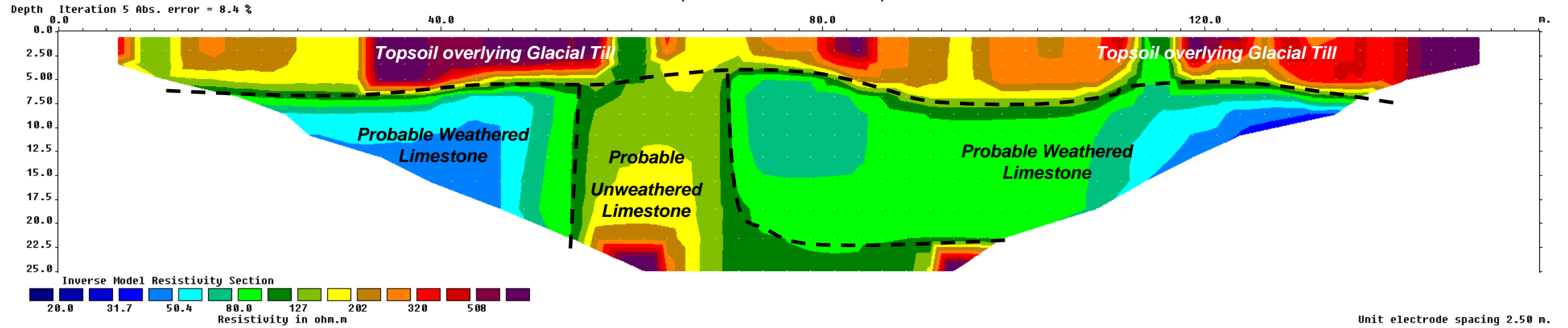
# 2278-24 Carrigeen Renewable Energy Development – Site Investigation

## 2D Electrical Resistivity Tomography Survey – Interpretation of ERT Data at Potential Borrow Pit

E =  
N =  
Z =

### BP West, Profile L7 (E-W)

(4 – 7m overburden over rock)

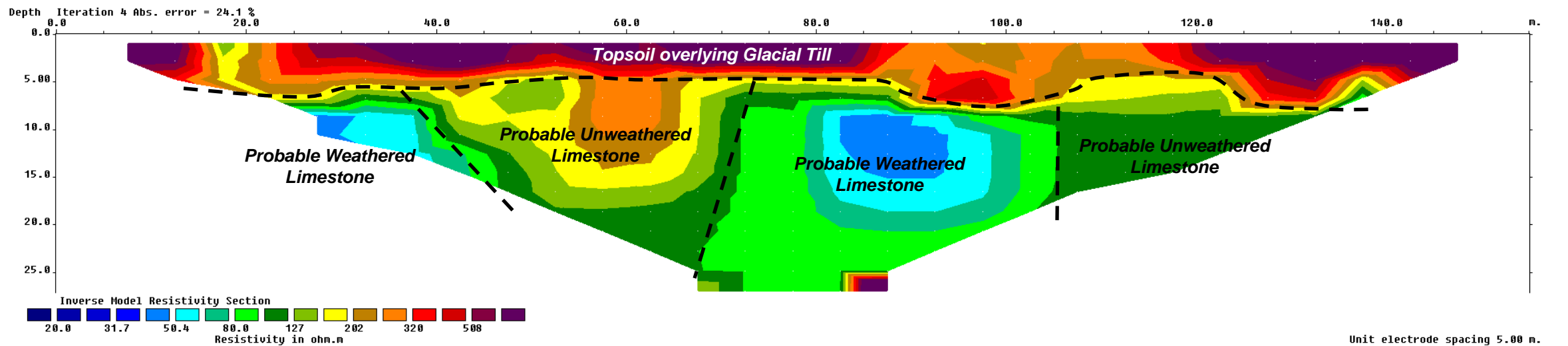


= E  
= N  
= Z

E =  
N =  
Z =

### BP West, Profile L25 (S-N)

(5 – 8m overburden over rock)



= E  
= N  
= Z

#### Notes:

1. Interpretation is based only on the geophysical survey data acquired and available records for the site.
2. Coordinates and elevations provided are to Irish Transverse Mercator (ITM) and Malin Head Ordnance Datum.
3. Drawings are Not To Scale.

#### Key To Sections

Each Profile indicates variation in the electrical resistivity of the Subsurface with depth.

- Natural Soils (generally 10 - 300Ωm)
- Peat (generally, 5 - 150Ωm)
- Glacial till (generally >200Ωm)
- Wet glacial till (generally 10 - 150 Ωm)
- Sandstone (generally >200Ωm)
- Weathered Sandstone (generally 50 - 200Ωm)
- Limestone (generally >1000 Ωm)
- Weathered limestone (generally 20 - 400 Ωm)

Designed by	Checked by	Approved by - date	Drawing No.	Date	Scale
Whiteford Geoservices Ltd Straid House, 2 Main Street, Straid, BALLYCLARE, Co. Antrim, UK BT39 9 NE			Interpreted Electrical Resistivity Data Borrow Pit – West (L25 and L7) Carrigeen Renewable Energy Borrow Pit Assessment		
				Edition	Sheet

# 2278-24 Carrigeen Renewable Energy Development – Site Investigation

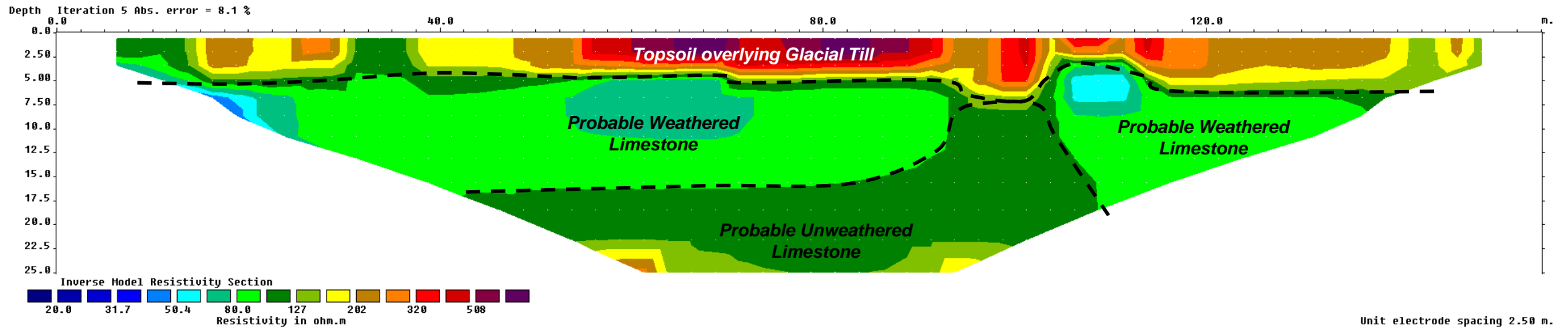
## 2D Electrical Resistivity Tomography Survey – Interpretation of ERT Data at Potential Borrow Pit

E =  
N =  
Z =

### BP West, Profile L6 (N-S)

(5 – 7m overburden over rock)

= E  
= N  
= Z



### Notes:

1. Interpretation is based only on the geophysical survey data acquired and available records for the site.
2. Coordinates and elevations provided are to Irish Transverse Mercator (ITM) and Malin Head Ordnance Datum.
3. Drawings are Not To Scale.

### Key To Sections

Each Profile indicates variation in the electrical resistivity of the Subsurface with depth.

- Natural Soils (generally 10 - 300Ωm)
- Peat (generally, 5 - 150Ωm)
- Glacial till (generally >200Ωm)
- Wet glacial till (generally 10 - 150 Ωm)
- Sandstone (generally >200Ωm)
- Weathered Sandstone (generally 50 - 200Ωm)
- Limestone (generally >1000 Ωm)
- Weathered limestone (generally 20 - 400 Ωm)

Designed by	Checked by	Approved by - date	Drawing No.	Date	Scale
Whiteford Geoservices Ltd Straid House, 2 Main Street, Straid, BALLYCLARE, Co. Antrim, UK BT39 9 NE			Interpreted Electrical Resistivity Data Borrow Pit – West ( L6) Carrigeen Renewable Energy Borrow Pit Assessment		
				Edition	Sheet

## APPENDIX D

### PHOTOGRAPHIC RECORD

Photographic Plates

Trial Hole Investigation

15 x A4



Plate 1—TP-BP1



Plate 2—TP-BP1



Plate 3—TP-BP1



Plate 4—TP-BP2



Plate 5—TP-BP2



Plate 6—BP-BP2



Plate 7—TP-BP3



Plate 8—TP-BP3



Plate 9—TP-BP3



Plate 10—TP-BP4



Plate 11—TP-BP4



Plate 12—TP-BP4



Plate 13—TP-BP5



Plate 14—TP-BP5



Plate 15—TP-BP5



Plate 16—TP-BP6



Plate 17—TP-BP6



Plate 18—TP-BP6



Plate 19—TP-BP7



Plate 20—TP-BP7



Plate 21—TP-BP7



Plate 22—TP-BP8



Plate 23—TP-BP8



Plate 24—TP-BP8



Plate 25—TP-BP9



Plate 26—TP-BP9



Plate 27—TP-BP9



Plate 28—TP-BP10



Plate 29—TP-BP10



Plate 30—TP-BP10