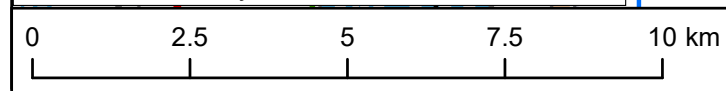


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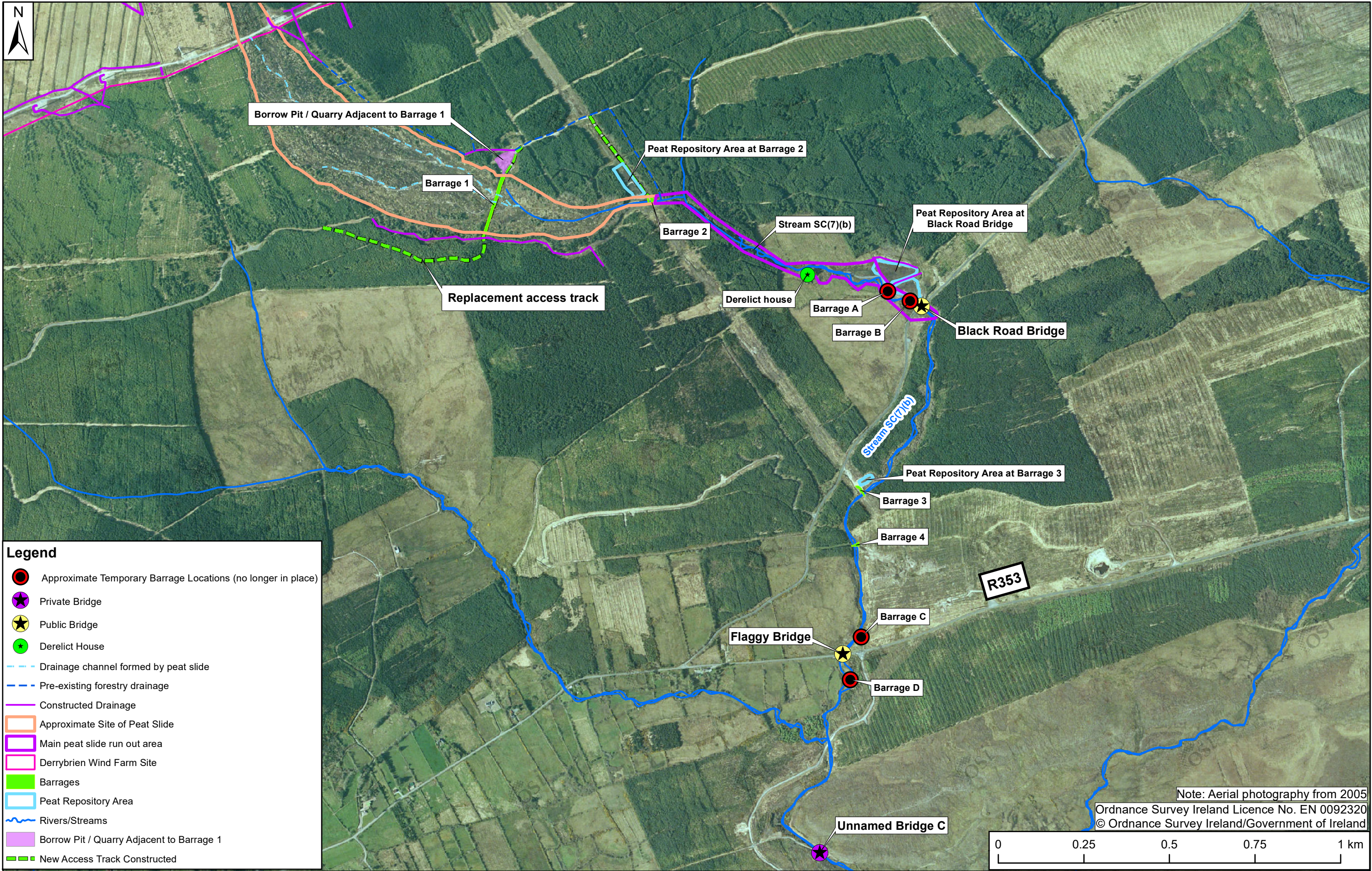


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Legend

- Approximate Temporary Barrage Locations (no longer in place)
- Private Bridge
- Public Bridge
- Derelict House
- Drainage channel formed by peat slide
- Pre-existing forestry drainage
- Constructed Drainage
- Approximate Site of Peat Slide
- Main peat slide run out area
- Derrybrien Wind Farm Site
- Barrages
- Peat Repository Area
- Rivers/Streams
- Borrow Pit / Quarry Adjacent to Barrage 1
- New Access Track Constructed

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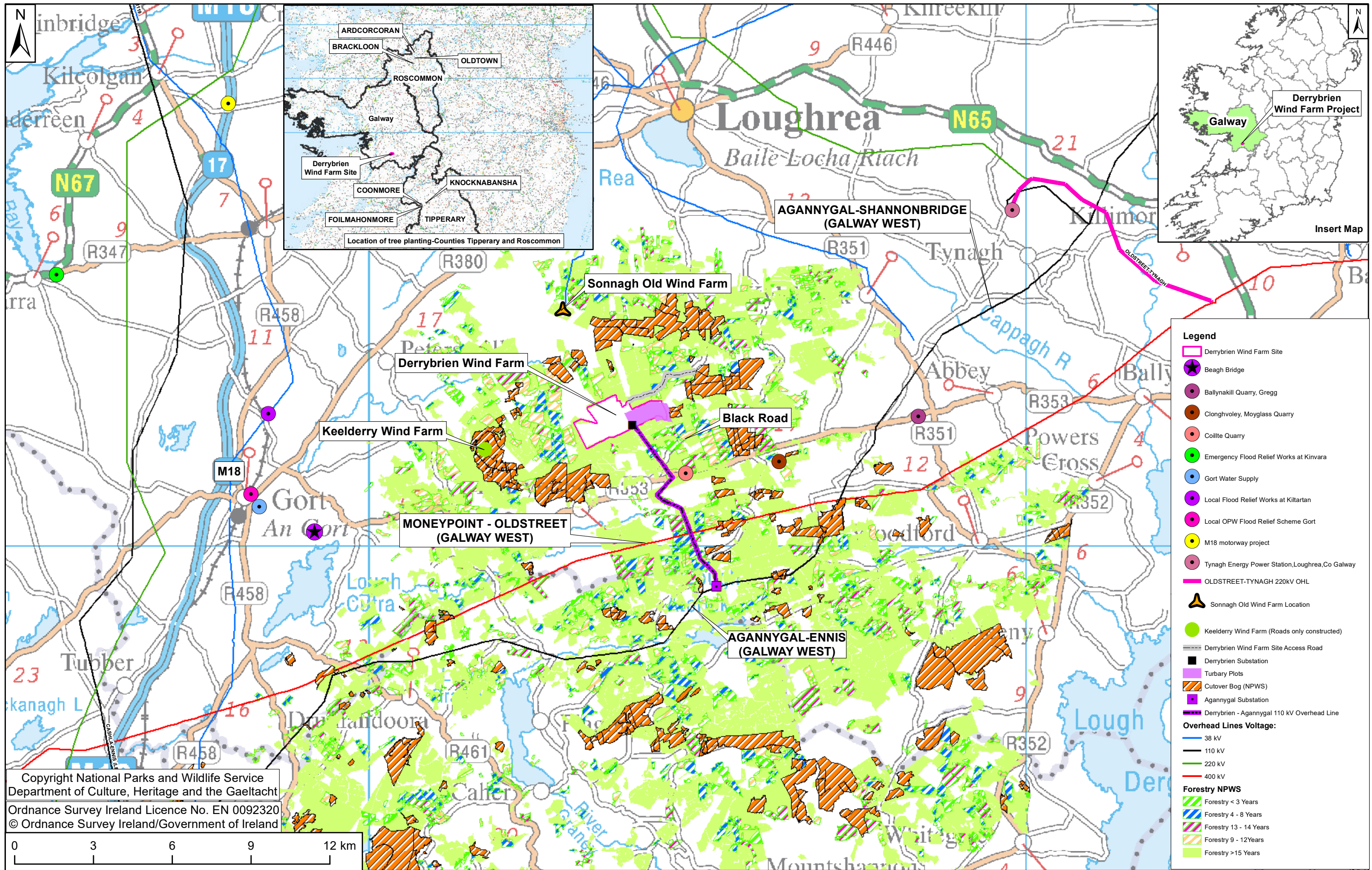


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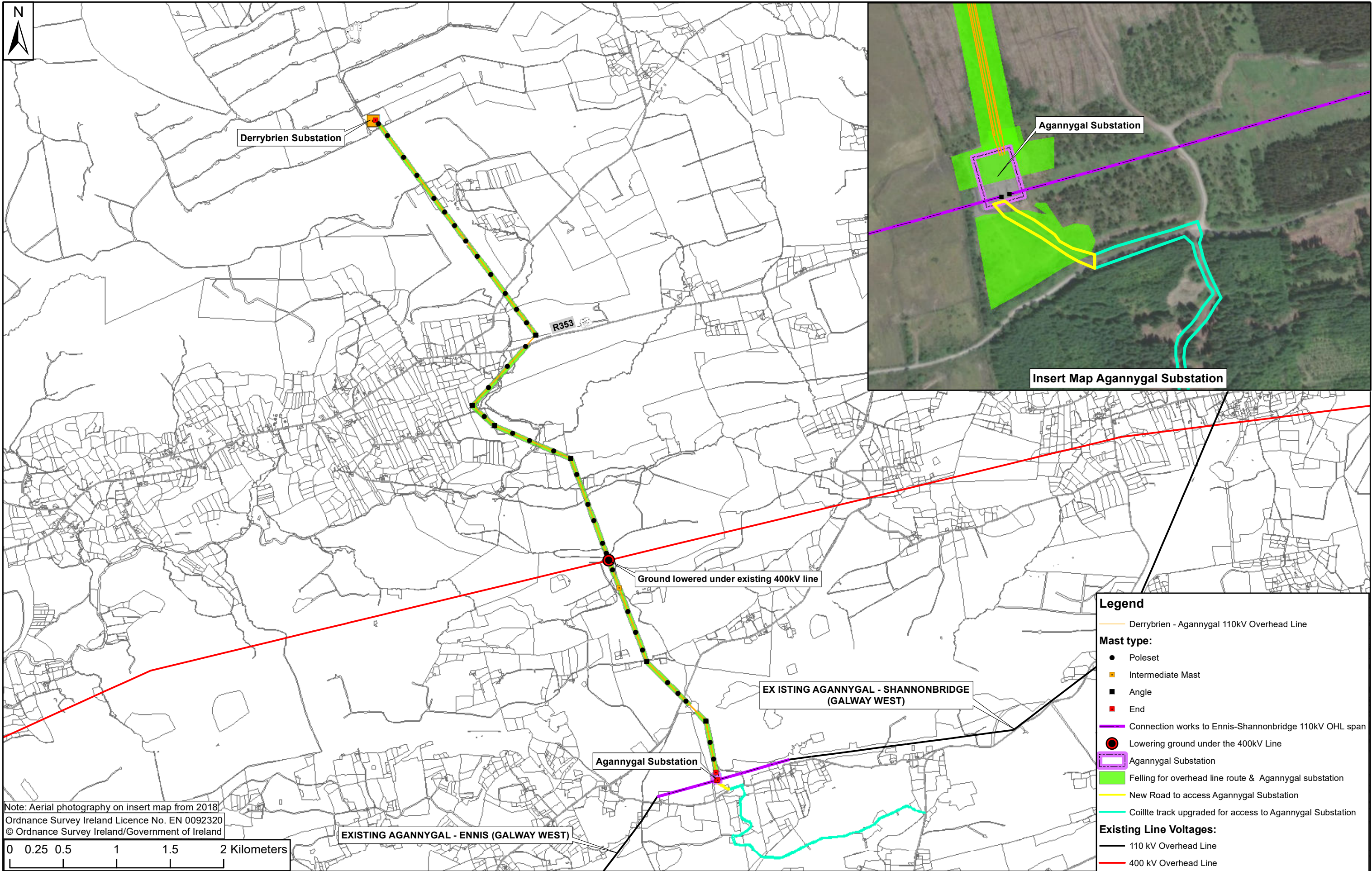


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Note: Aerial photography on insert map from 2018
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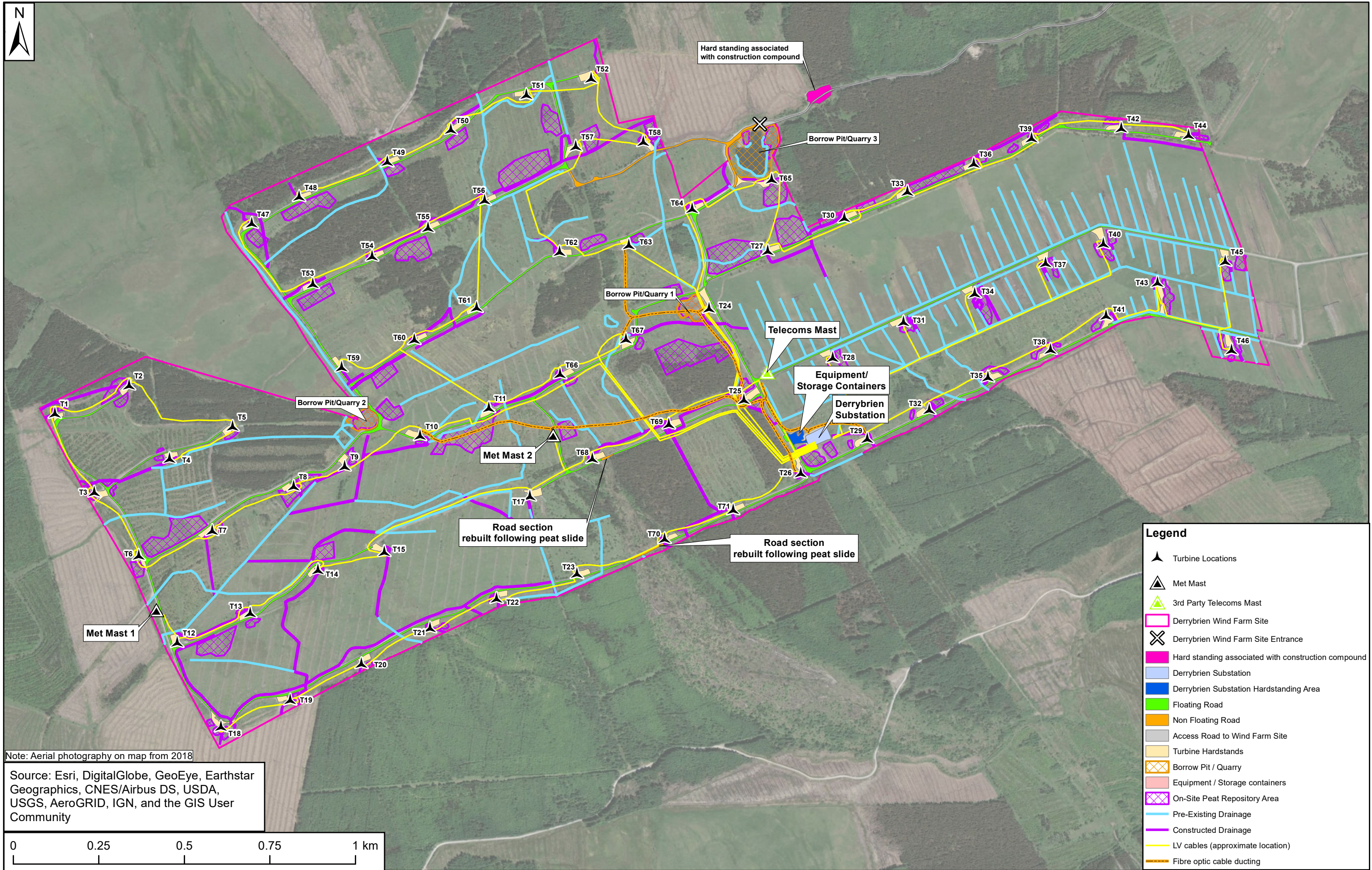


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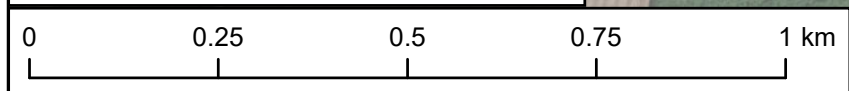
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Note: Aerial photography on map from 2018

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



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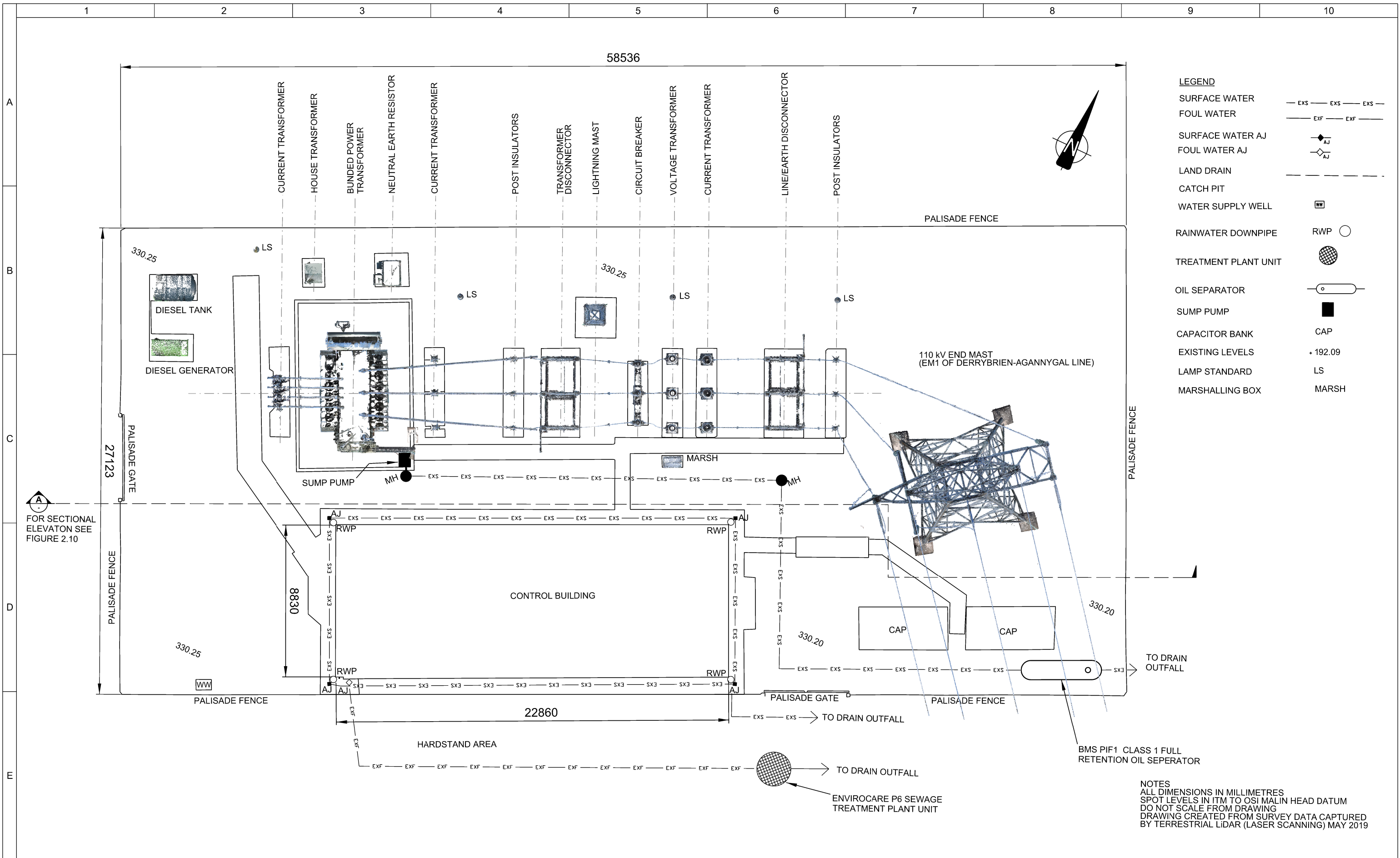
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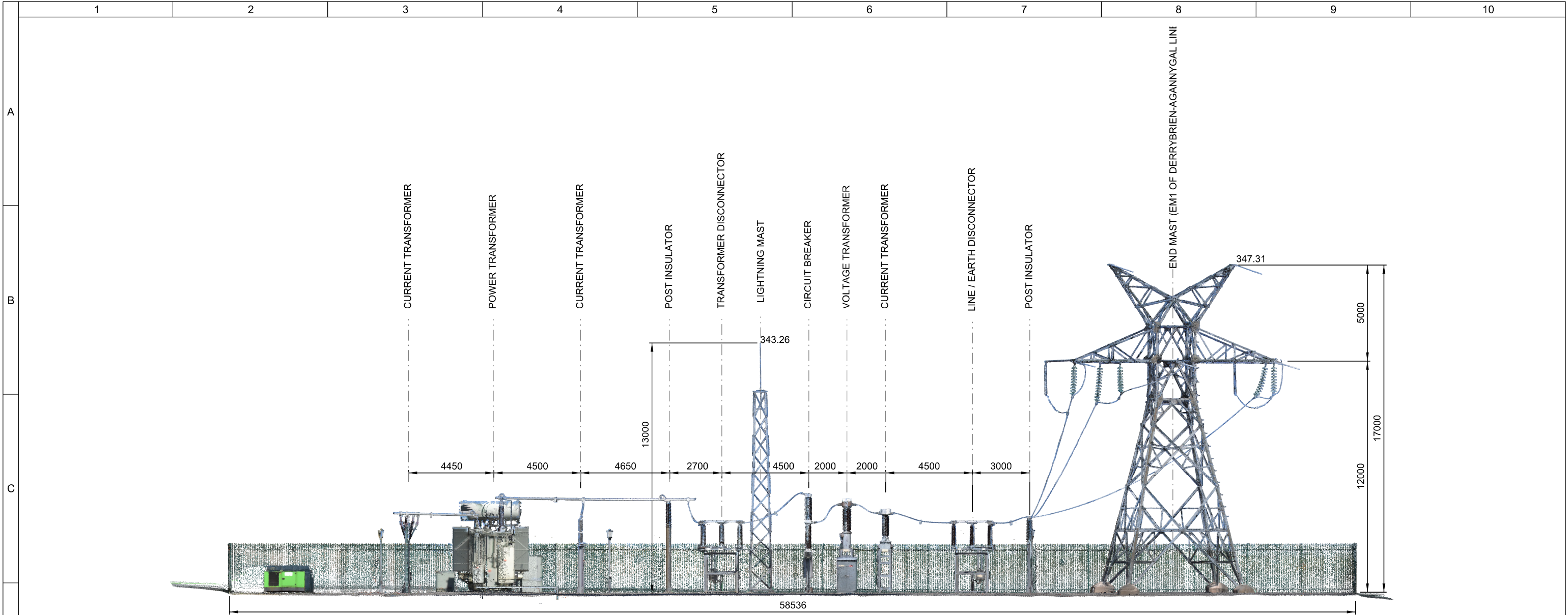
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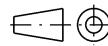


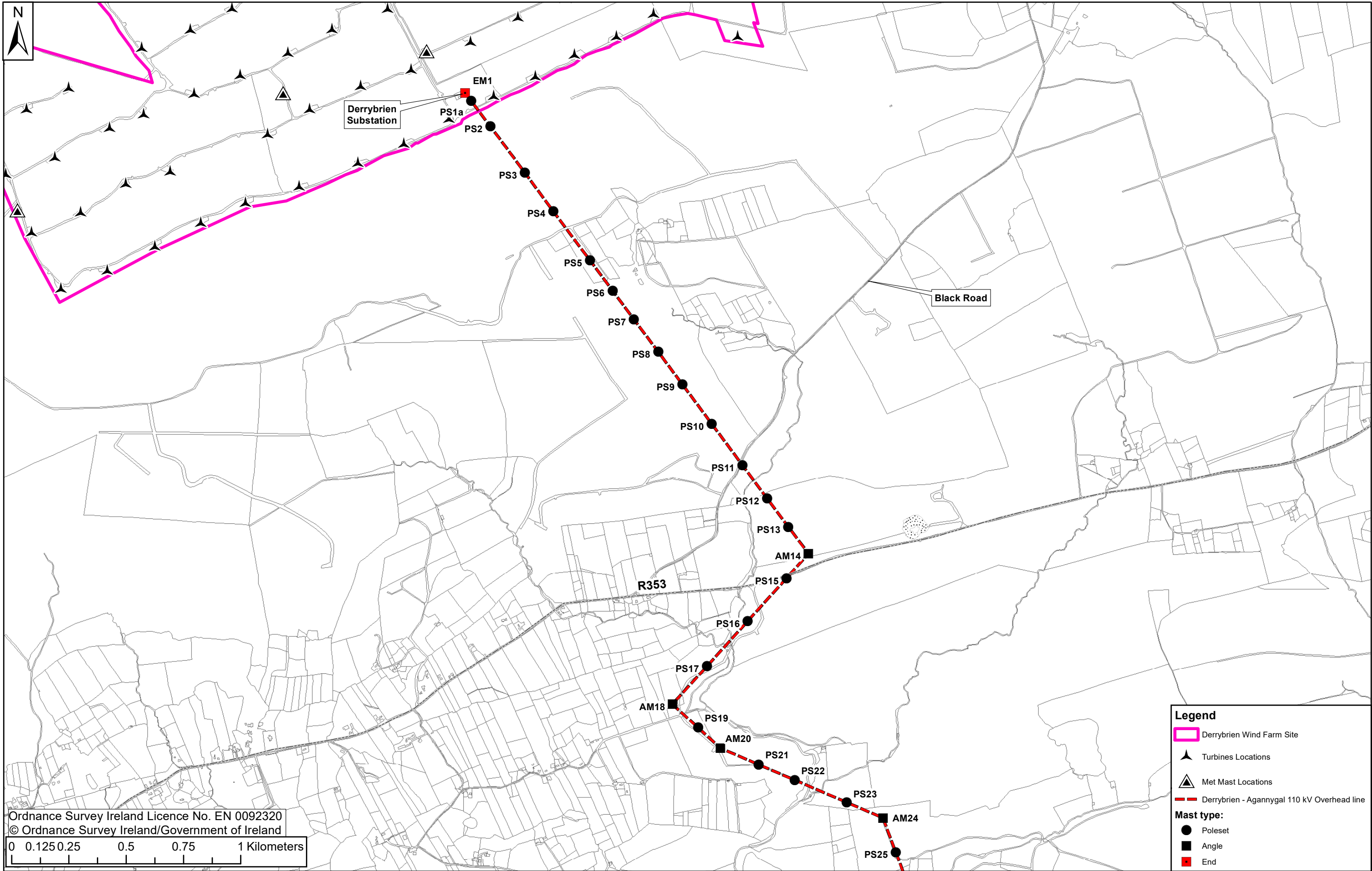
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0 0.125 0.25 0.5 0.75 1 Kilometers

Legend

- Derrybrien Wind Farm Site
- Turbines Locations
- Met Mast Locations
- Derrybrien - Agannygal 110 kV Overhead line

Mast type:

- Poleset
- Angle
- End

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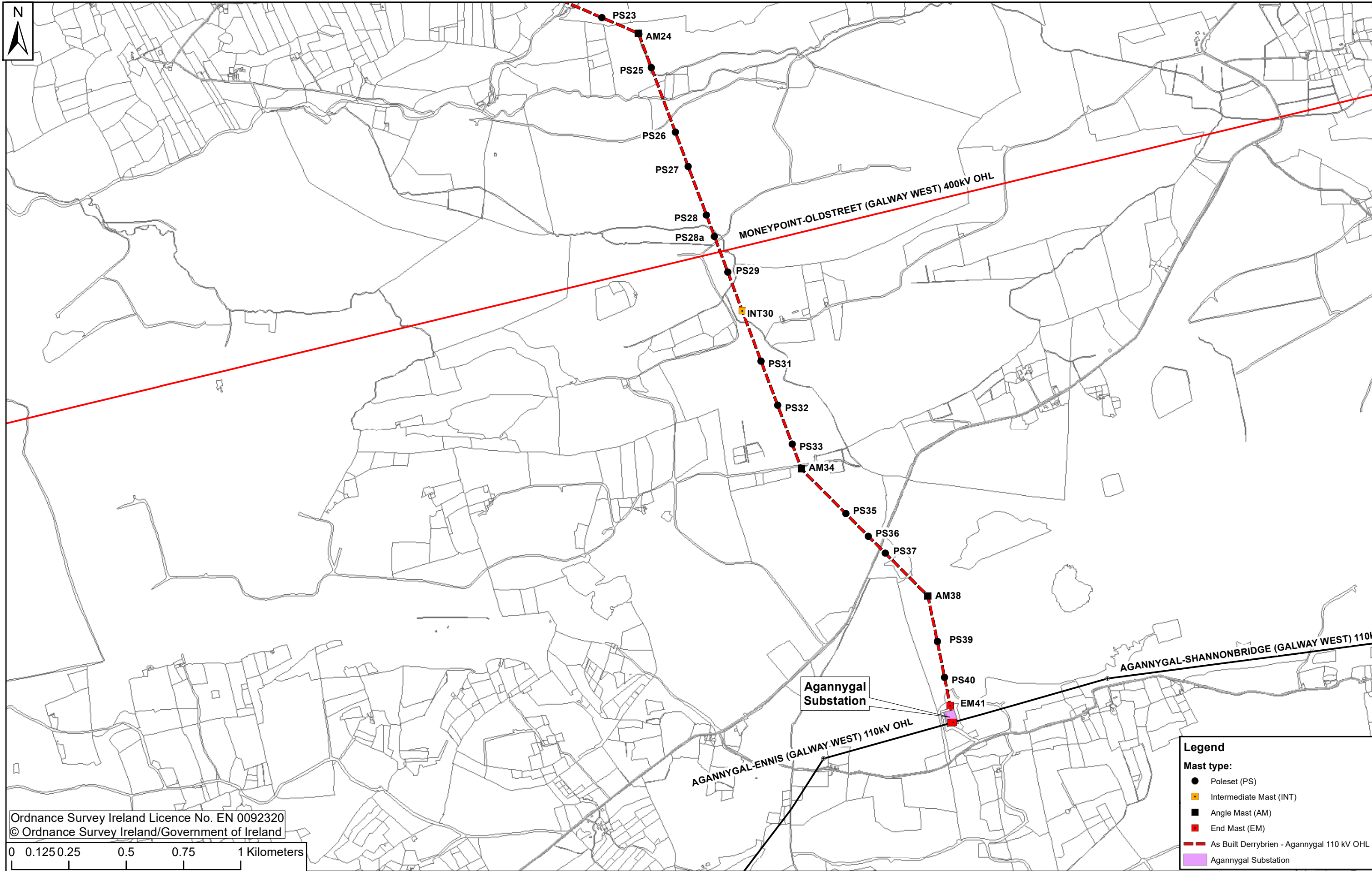
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**Figure 2.14 -
Derrybrien - Agannygal 110kV
Overhead Line Route
(Sheet 1 of 2)**

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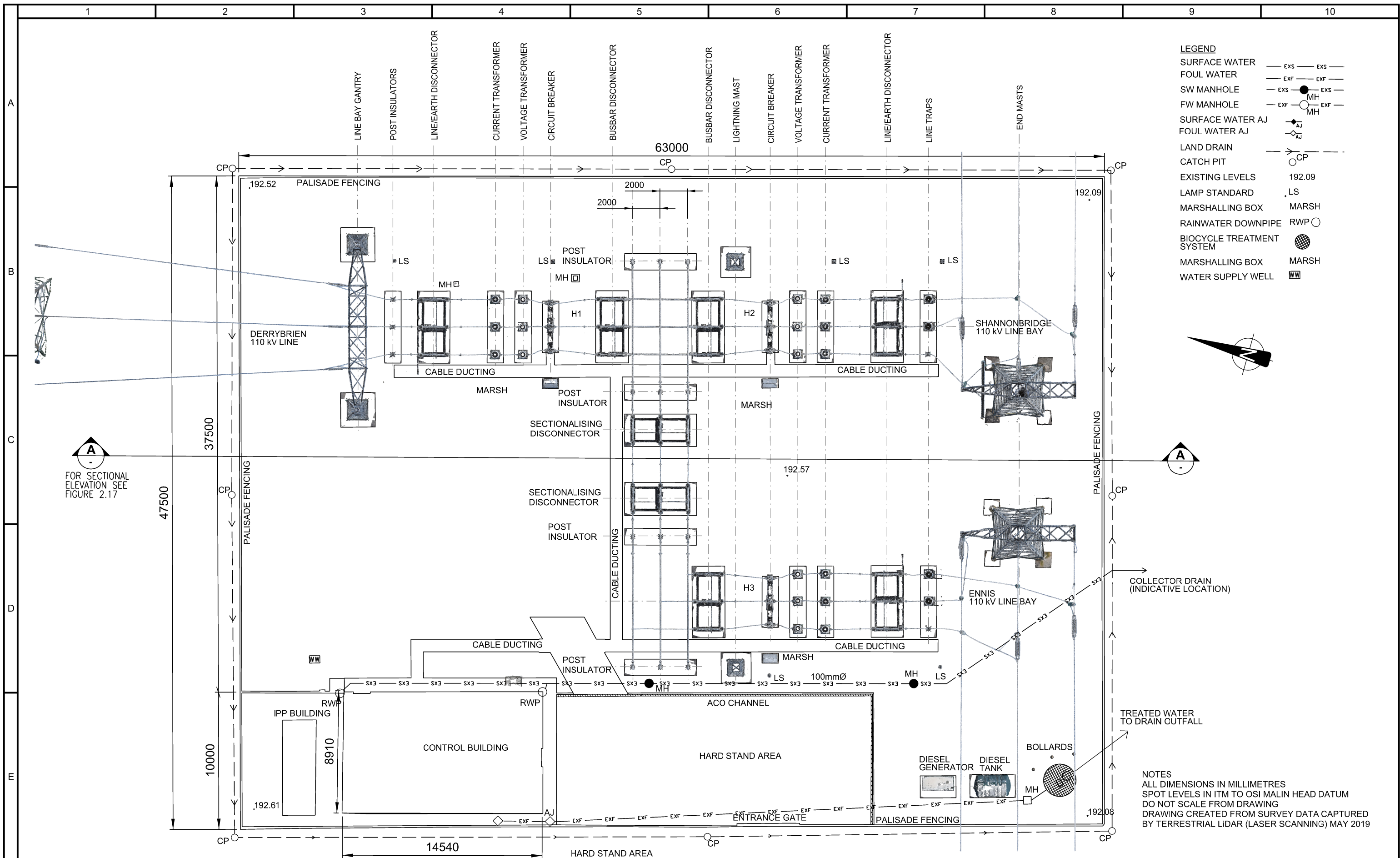
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- LEGEND**
- SURFACE WATER — EXS — EXS —
 - FOUL WATER — EXF — EXF —
 - SW MANHOLE — EXS — MH — EXS —
 - FW MANHOLE — EXF — MH — EXF —
 - SURFACE WATER AJ — AJ —
 - FOUL WATER AJ — AJ —
 - LAND DRAIN —> —
 - CATCH PIT — CP —
 - EXISTING LEVELS 192.09
 - LAMP STANDARD LS
 - MARSHALLING BOX MARSH
 - RAINWATER DOWNPIPE RWP
 - BIOCYCLE TREATMENT SYSTEM
 - MARSHALLING BOX MARSH
 - WATER SUPPLY WELL WW



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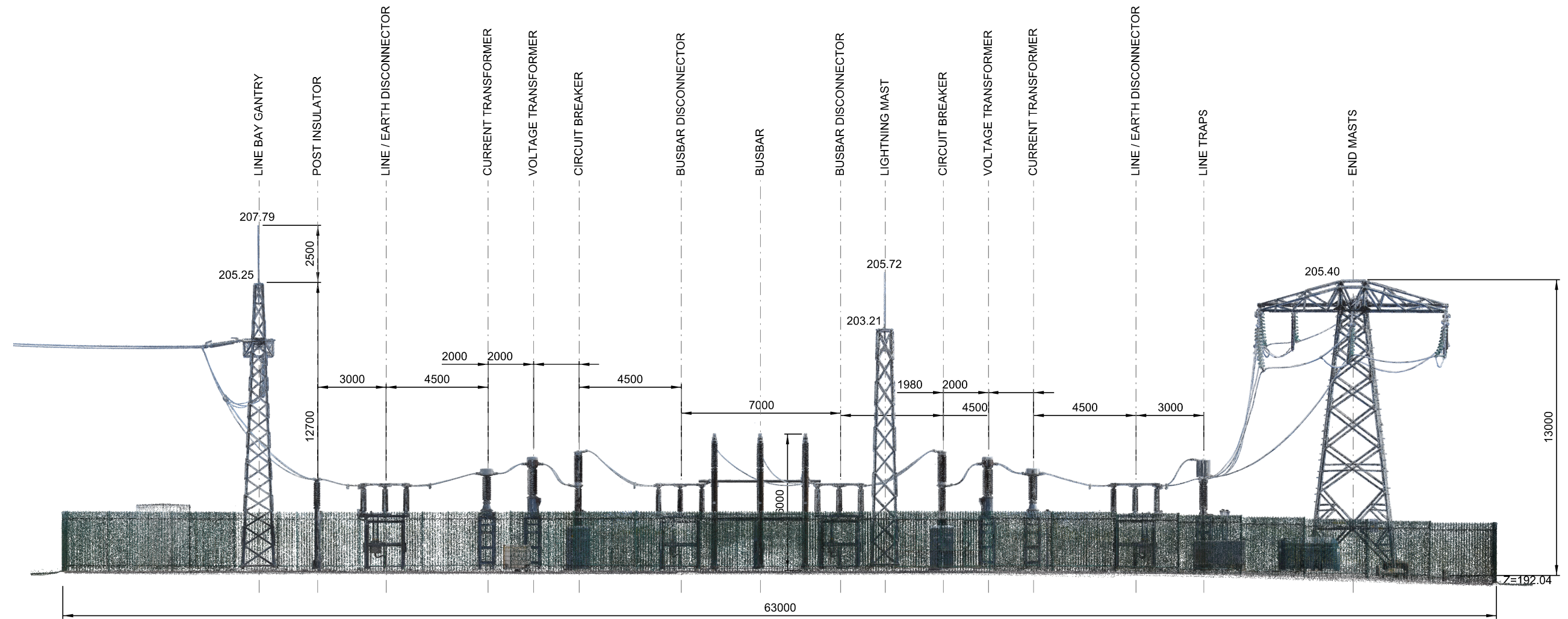
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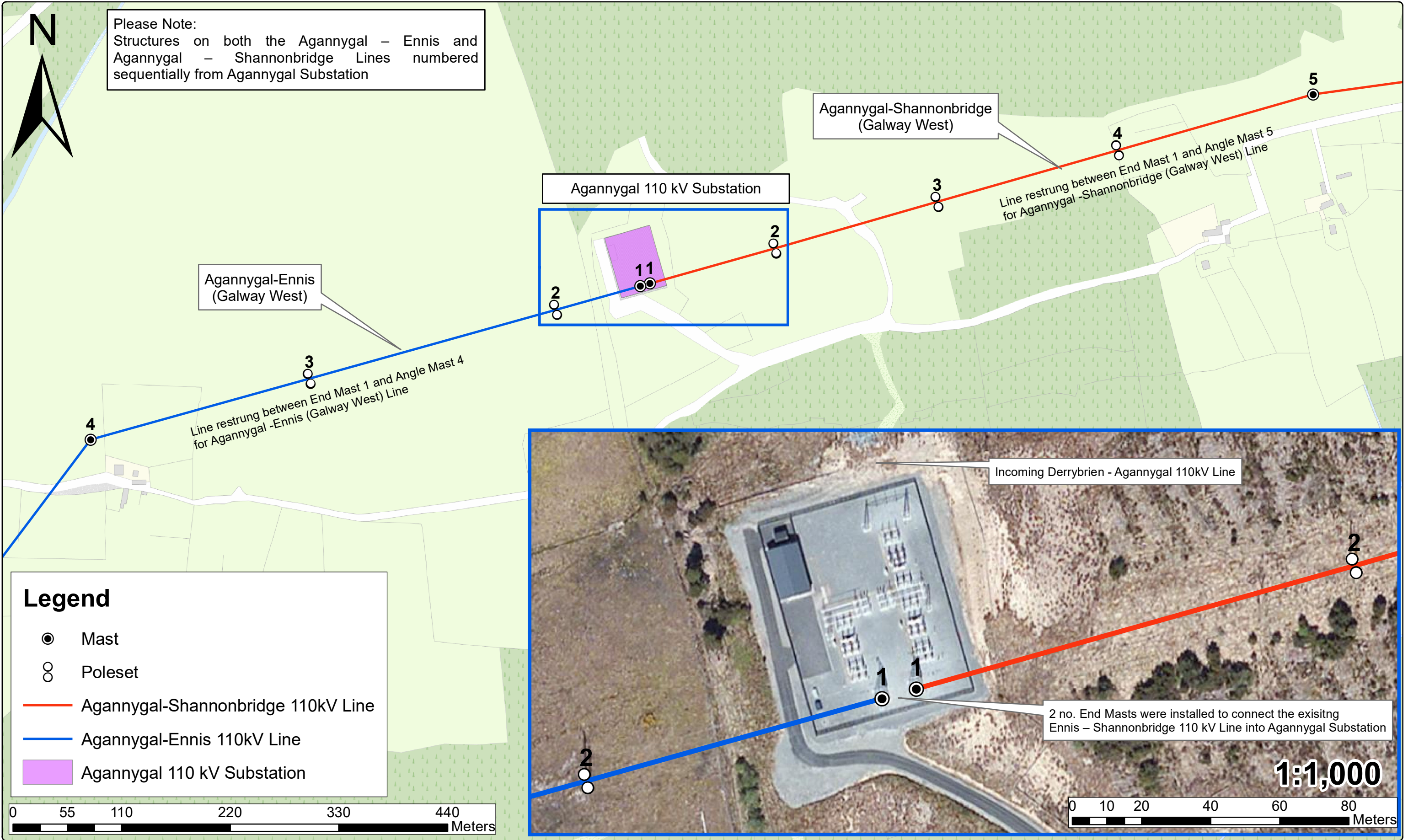
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Client	GORT WINDFARMS LTD.
Project	DERRYBRIEN WIND FARM PROJECT
Contract	

Production Unit	CIVIL & ENVIRONMENTAL ENGINEERING
Drawing Title	FIGURE 2.17 AGANNYGAL 110 kV SUBSTATION SECTIONAL ELEVATION

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Client Ref. No.				No. OF SHTS -	SIZE A3
Drawing Number				SHEET	REV
QS-000280-01-D460-003-017-000					



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	Purpose of Issue - Preliminary unless indicated
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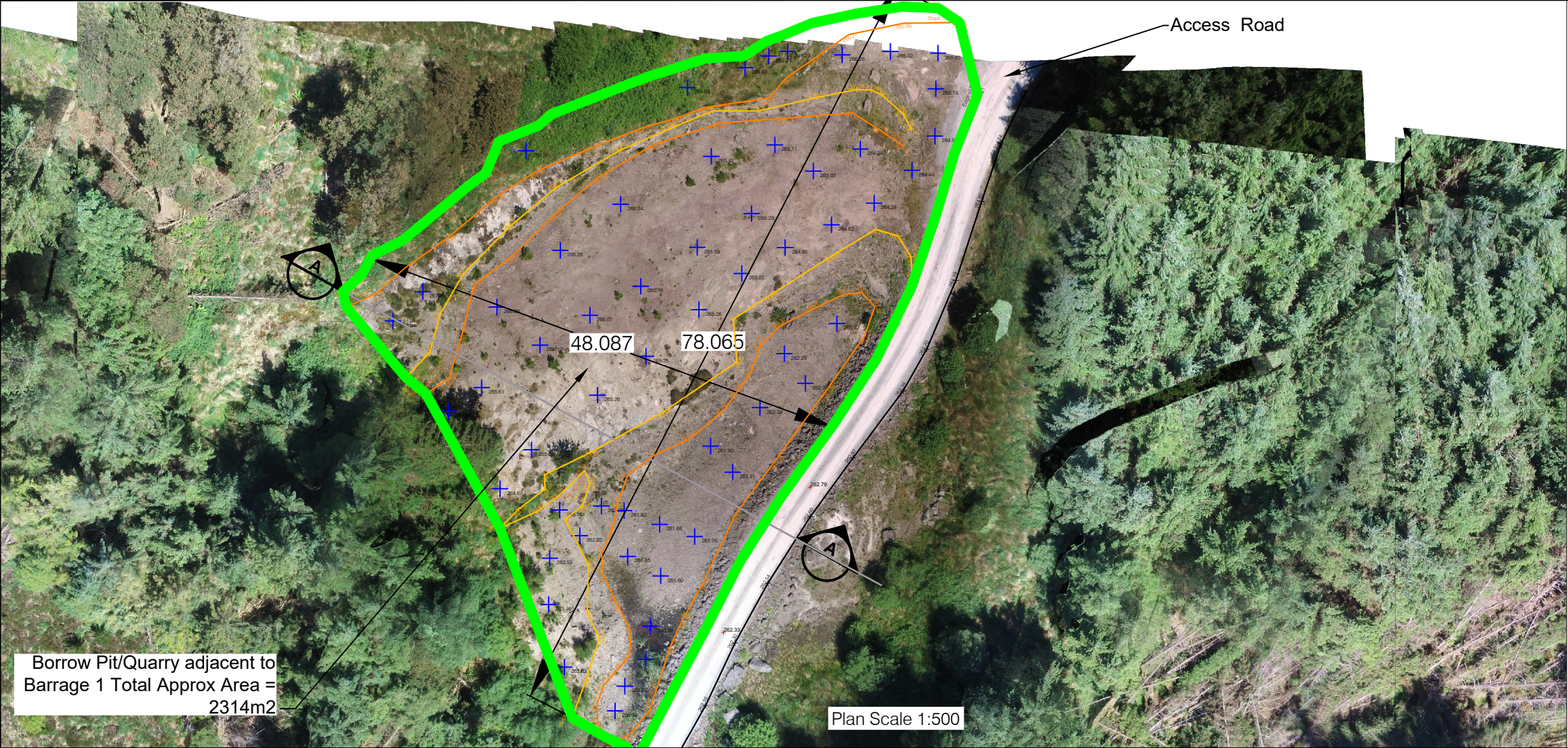
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PROJECT: Derrybrien Wind Farm Project
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PRODUCTION UNIT: High Voltage Engineering
DRAWING TITLE: Figure 2.18 Grid connection works undertaken to Ennis-Shannonbridge OHL span

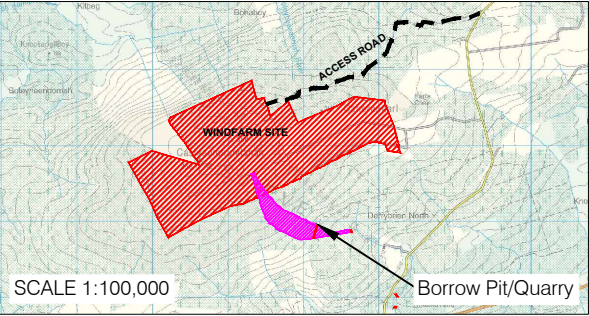
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CLIENT REF. -	NO. OF SHTS 1 of 1	SIZE A3	SCALE 1:3,500	
DRAWING NUMBER QS-000280-01-D460-003-018-000				



LEGEND

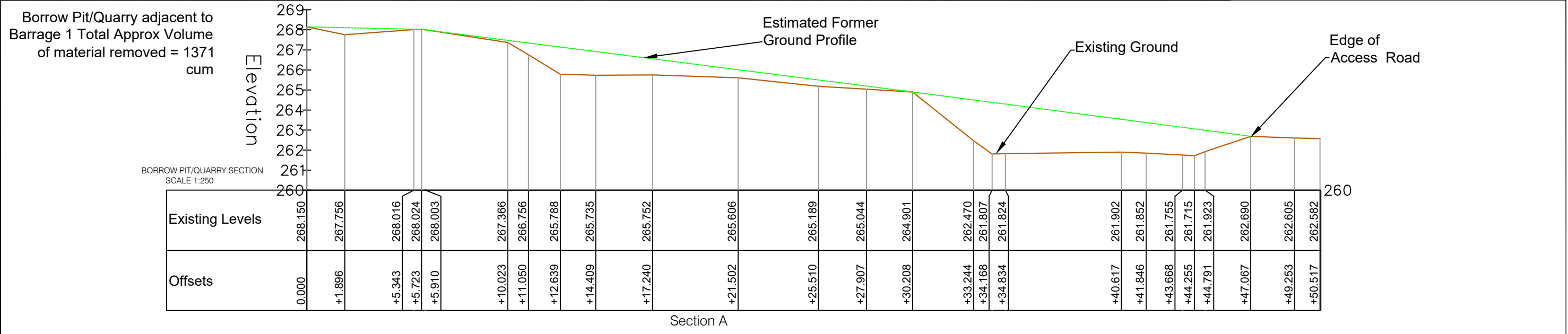
- Edge of Road
- Spotheight
- Section
- Extent of Borrow Pit/Quarry
- Top of Slope
- Bottom of Slope

KEY PLAN

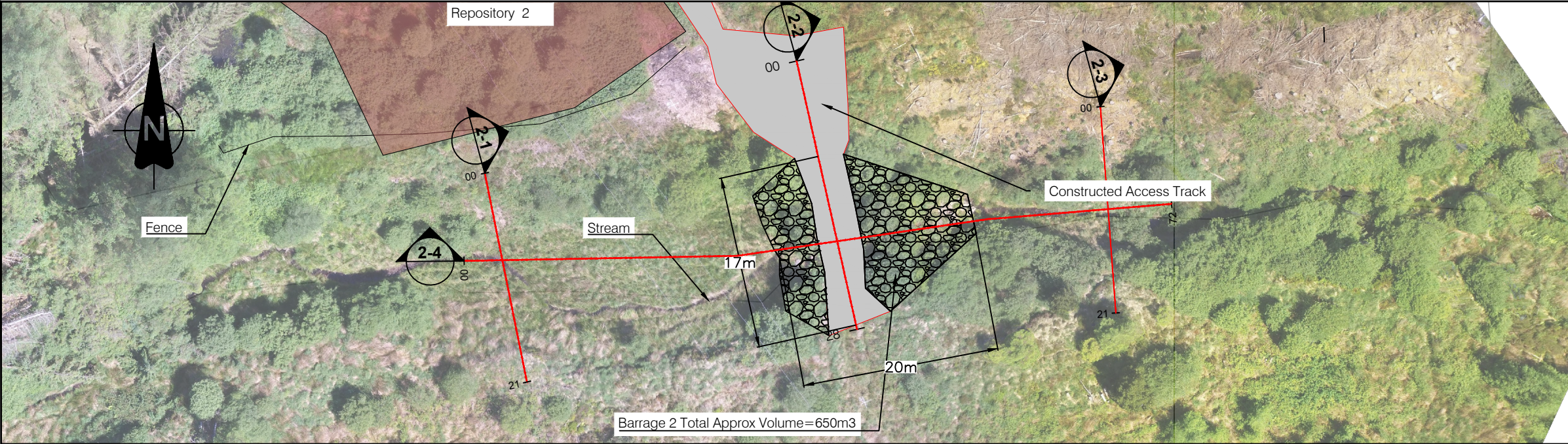


Note:
All levels in meters above ordnance datum Malin Head
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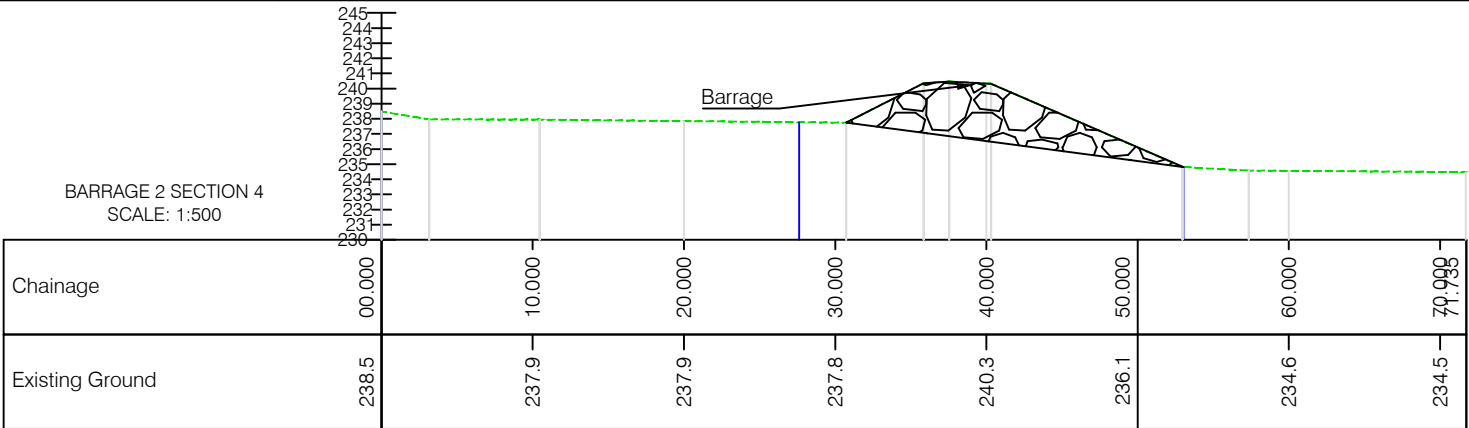
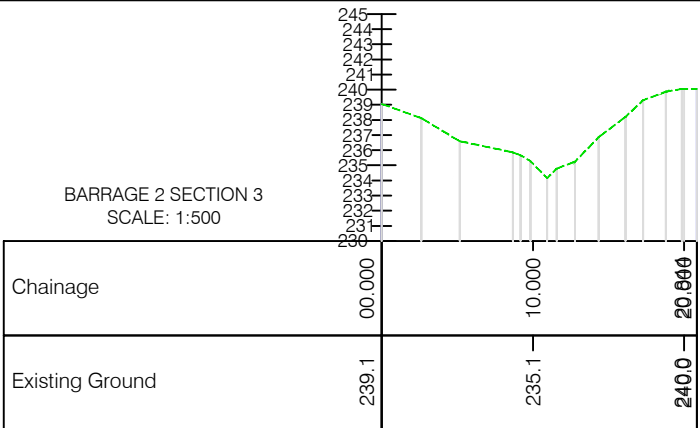
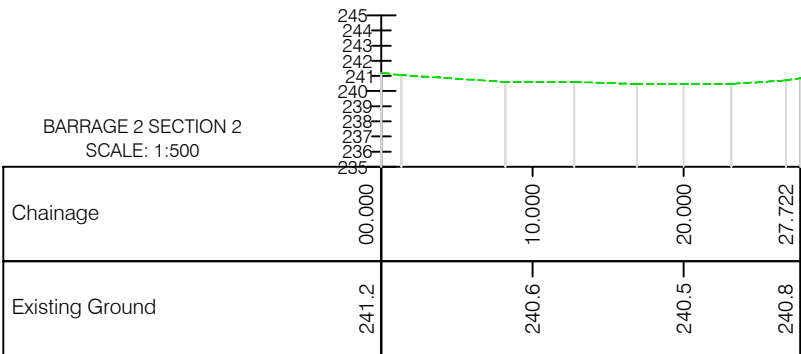
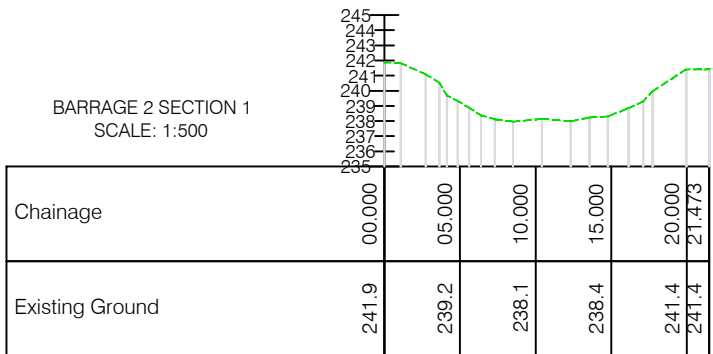
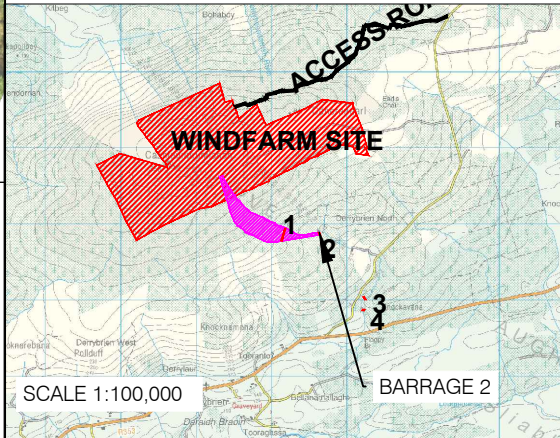


Client Gort Windfarms Ltd		Drawing title Figure 2.19 Borrow Pit/Quarry Adjacent to Barrage 1 Plan and Section		COPYRIGHT © ESB ALL RIGHTS RESERVED. NO PART OF THIS WORK MAY BE MODIFIED, REPRODUCED OR COPIED IN ANY FORM OR BY ANY MEANS GRAPHIC, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, TAPING OR USED FOR ANY PURPOSE OTHER THAN ITS DESIGNATED PURPOSE, WITHOUT THE WRITTEN PERMISSION OF ESB.	
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Contract				Verified A. Tuite	Approved R. O'Donovan
Purpose of issue - Preliminary unless indicated Client Approval <input type="checkbox"/> Planning <input checked="" type="checkbox"/> Tender <input type="checkbox"/> Construction <input type="checkbox"/> As-Built <input type="checkbox"/>				No. of sheets 1	Approval date 05.05.2020
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				Drawing number QS-000280-01-D460-003-019-000	



- LEGEND
- Stone Barrage
 - Constructed Access Track
 - Existing Ground

KEY PLAN



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Client Approval ☐ Planning ☒ Tender ☐ Construction ☐ As-Built ☐

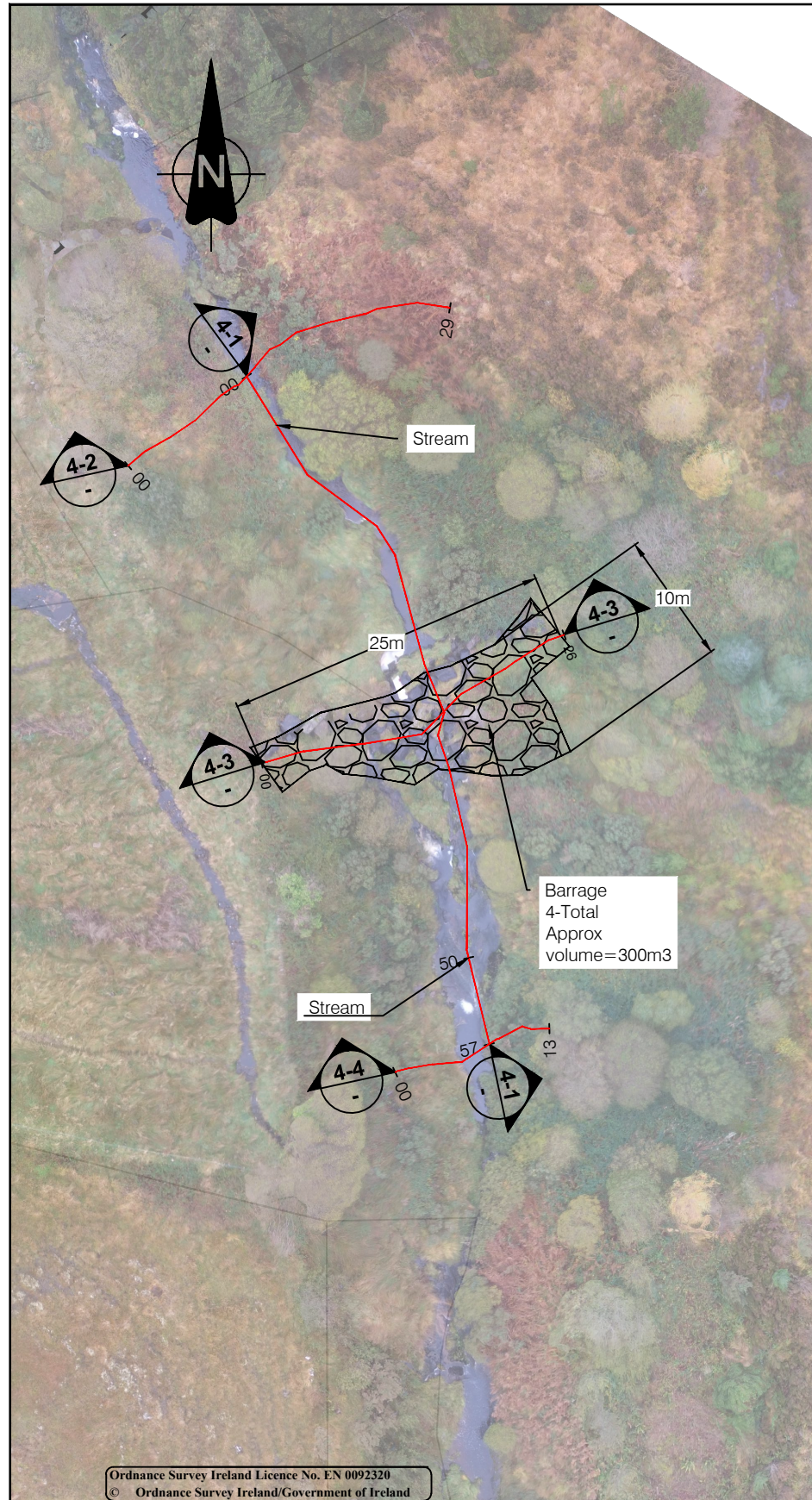


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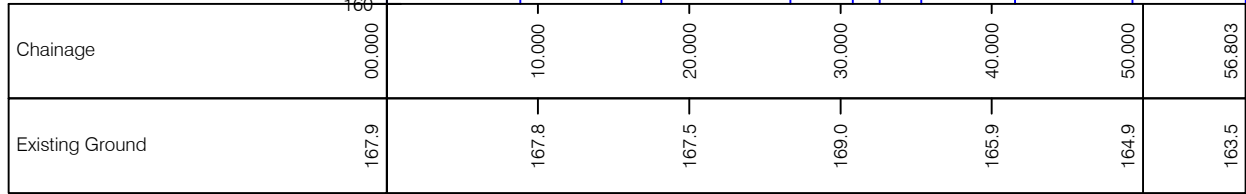
Client	Gort Windfarms Ltd
Project	Derrybrien Wind Farm Project
Contract	

Drawing title	Figure 2.21 Barrage 2 Plan and Sections
Production unit	Civil & Environmental Engineering

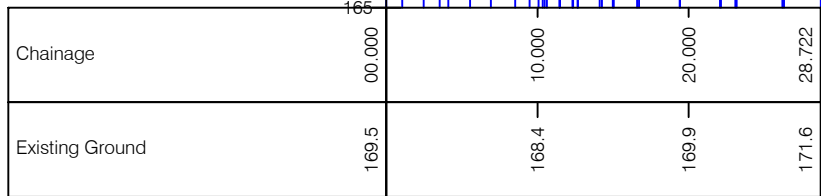
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Client ref.		No. of sheets	Size	Scale
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Drawing number				SHEET REV
QS-000280-01-D460-003-021-000				



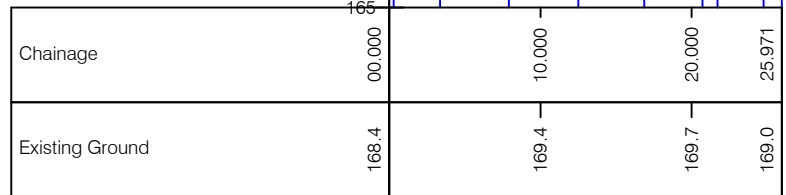
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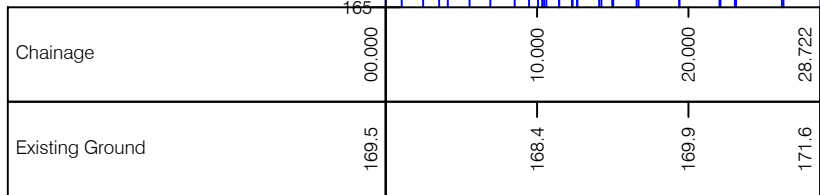
BARRAGE 4 SECTION 2
SCALE: 1:200



BARRAGE 4 SECTION 3
SCALE: 1:200



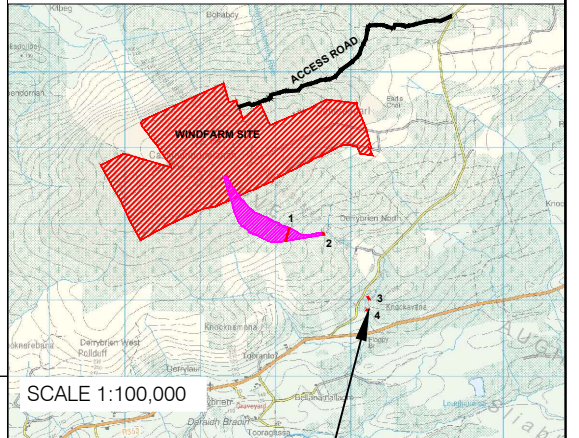
BARRAGE 4 SECTION 2
SCALE: 1:200



LEGEND

- Stone Barrage
- Existing Ground

KEY PLAN



Note:
All levels in meters above ordnance datum Malin Head
Coordinates are given in Irish Transverse Mercator coordinate system
Topographical survey undertaken on week commencing 16/09/2019
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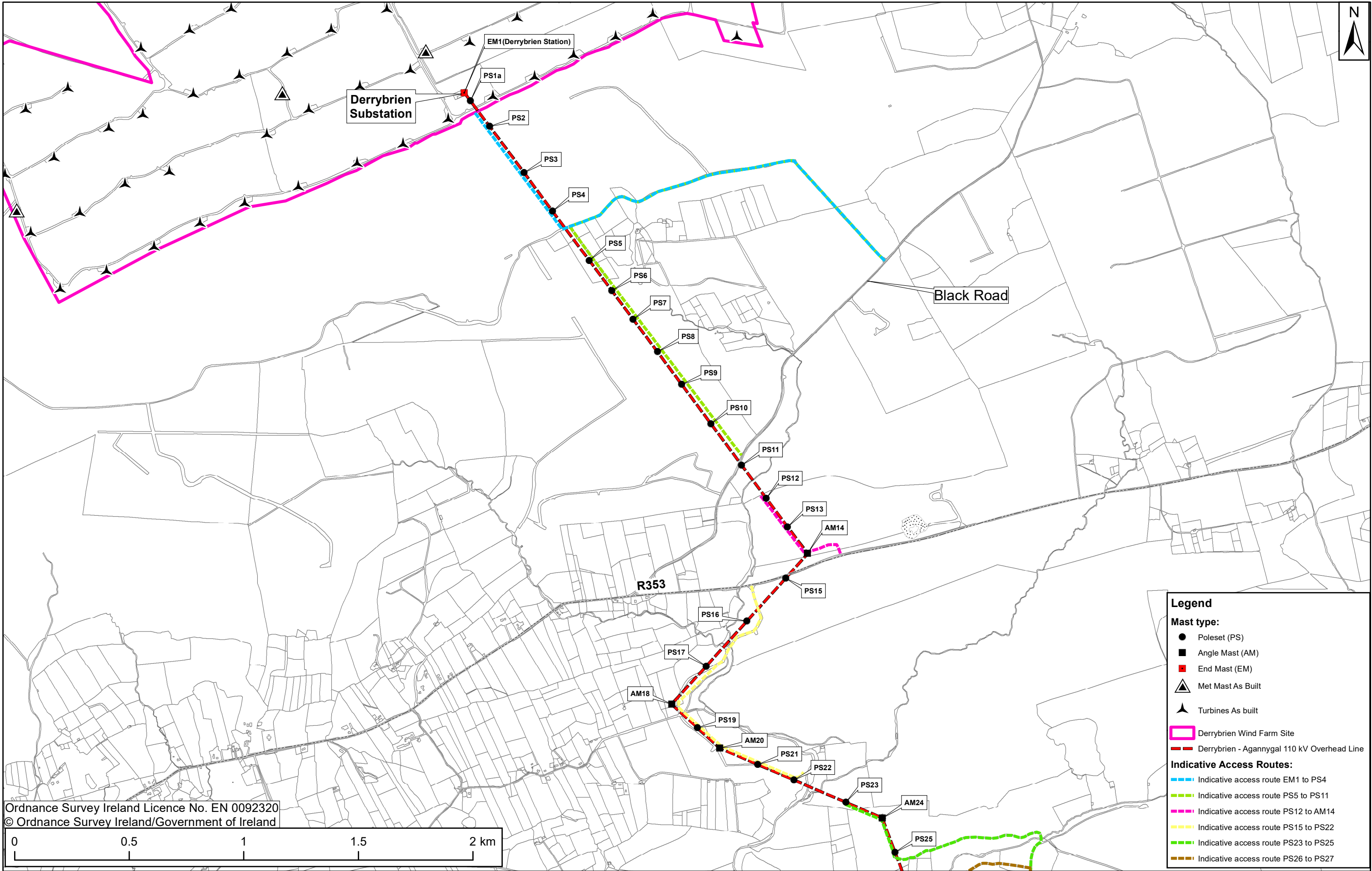


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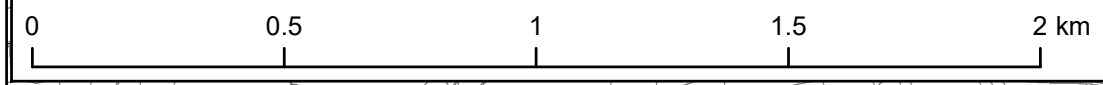
Client	Gort Windfarms Ltd
Project	Derrybrien Wind Farm Project
Contract	

Drawing title	Figure 2.25 Barrage 4 Plan and Sections
Production unit	Civil & Environmental Engineering

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Drawing number				SHEET REV
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Legend

Mast type:

- Poleset (PS)
- Angle Mast (AM)
- End Mast (EM)
- ▲ Met Mast As Built
- ▲ Turbines As built

Indicative Access Routes:

- Indicative access route EM1 to PS4
- Indicative access route PS5 to PS11
- Indicative access route PS12 to AM14
- Indicative access route PS15 to PS22
- Indicative access route PS23 to PS25
- Indicative access route PS26 to PS27

REV	DATE	PURPOSE OF ISSUE - PRELIMINARY UNLESS INDICATED	DRN	PROD	VER	APP
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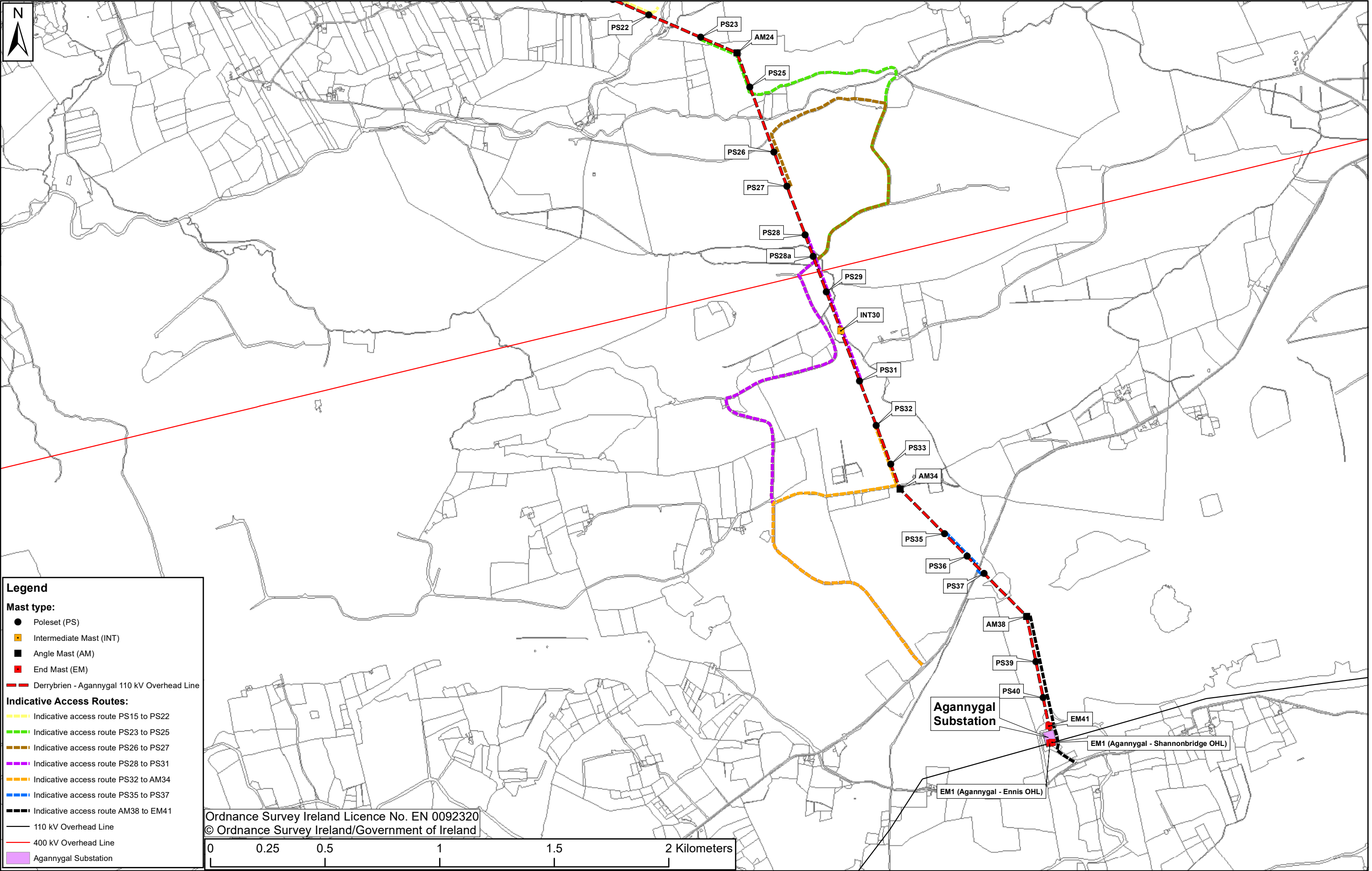


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PROJECT:	Derrybrien Wind Farm Project
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PRODUCTION UNIT:	Civil & Environmental Engineering
DRAWING TITLE:	Figure 2.27 - Derrybrien - Agannygal OHL - Indicative Decommissioning Access Routes (Sheet 1 of 2)

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DRAWING NUMBER			SCALE	
QS-000280-01-D460-003-027-000			1:15,000	



Legend

Mast type:

- Poleset (PS)
- Intermediate Mast (INT)
- Angle Mast (AM)
- End Mast (EM)

Indicative Access Routes:

- Indicative access route PS15 to PS22
- Indicative access route PS23 to PS25
- Indicative access route PS26 to PS27
- Indicative access route PS28 to PS31
- Indicative access route PS32 to AM34
- Indicative access route PS35 to PS37
- Indicative access route AM38 to EM41

— 110 kV Overhead Line

— 400 kV Overhead Line

■ Agannnygal Substation

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REV	DATE	REVISION DESCRIPTION	DRN	PROD	VER	APP
PURPOSE OF ISSUE - PRELIMINARY UNLESS INDICATED						
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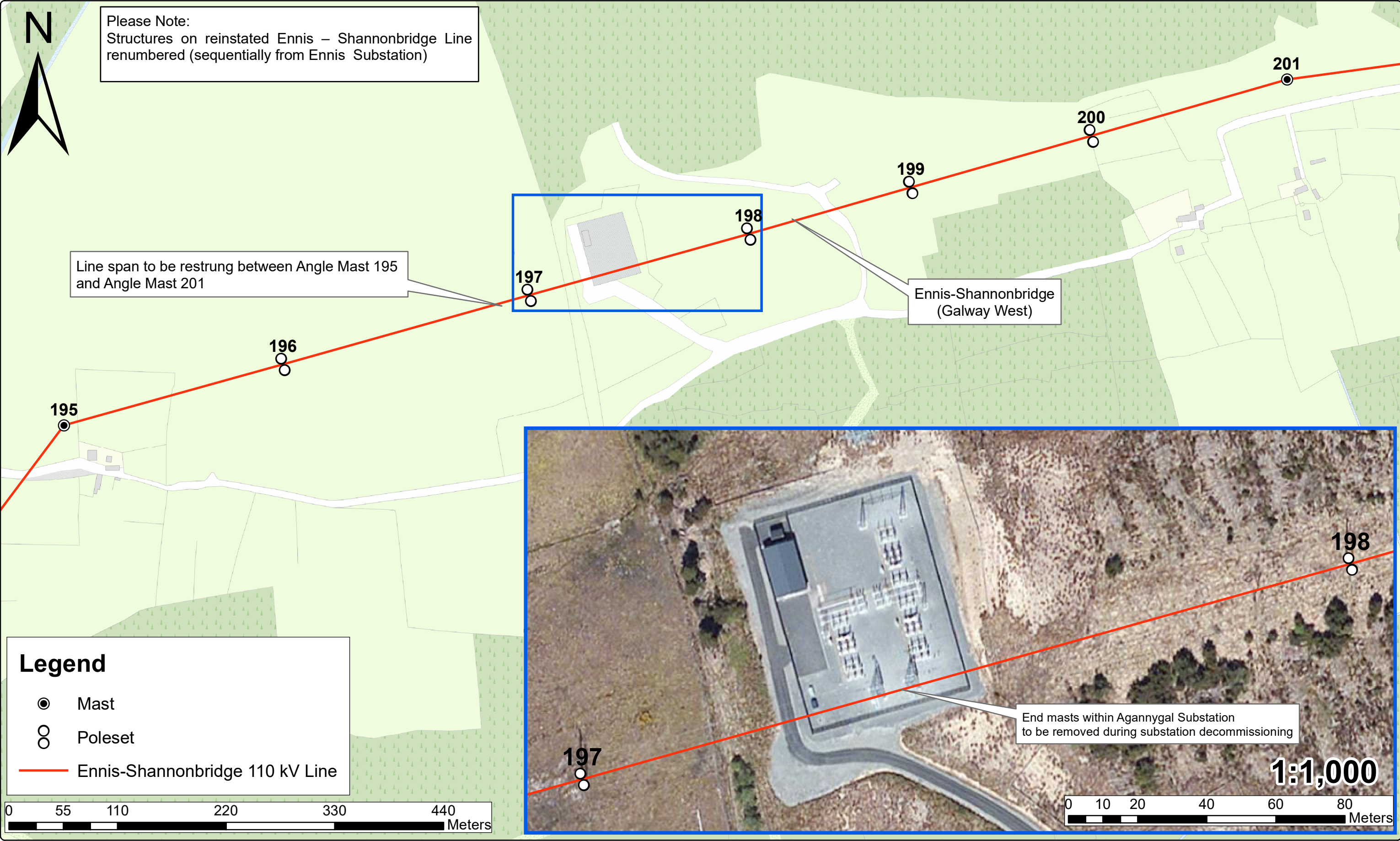
PRODUCTION UNIT: **Civil & Environmental Engineering**

DRAWING TITLE: **Figure 2.28 -
Derrybrien - Agannnygal OHL -
Indicative Decommissioning Access Routes
(Sheet 2 of 2)**

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Rev	Revision Description
	Purpose of Issue - Preliminary unless indicated
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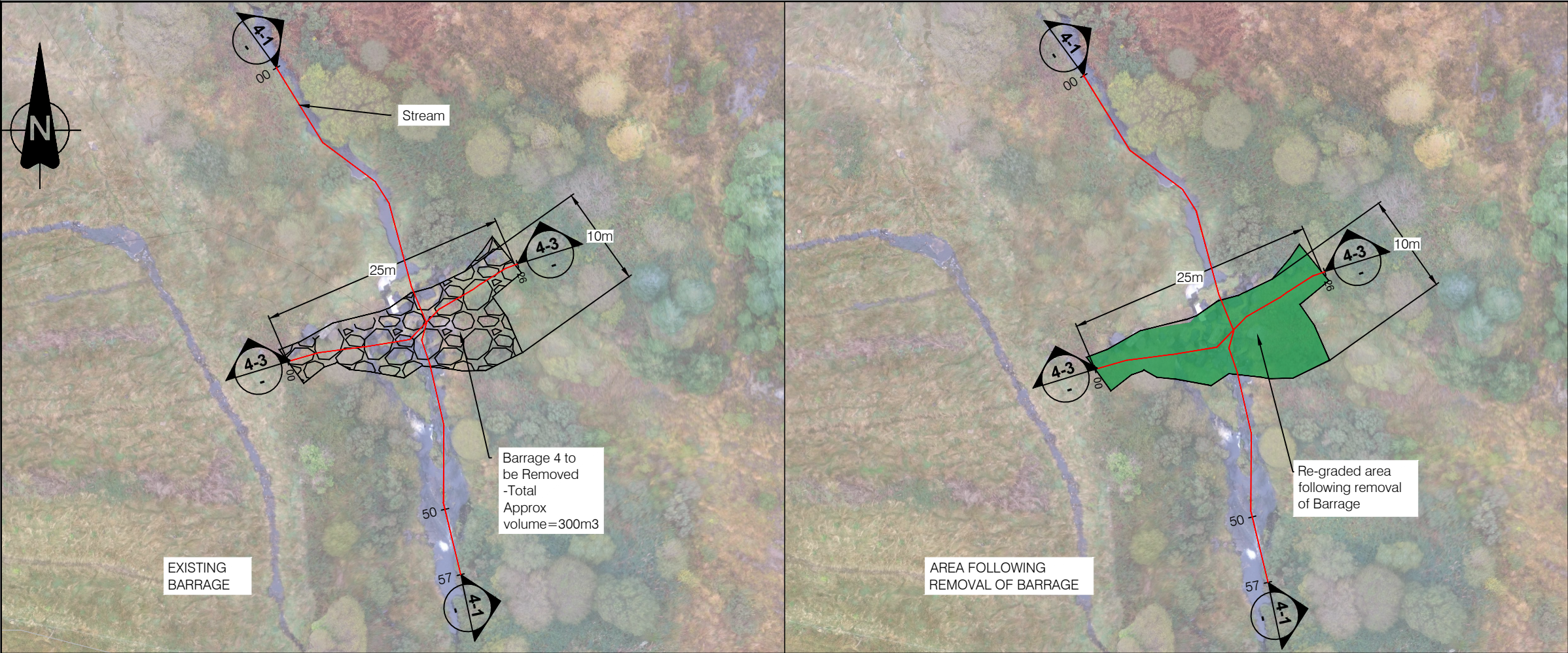


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PRODUCTION UNIT: High Voltage Engineering
DRAWING TITLE: Figure 2.29 Decommissioning Phase: Ennis - Shannonbridge OHL span reinstatement

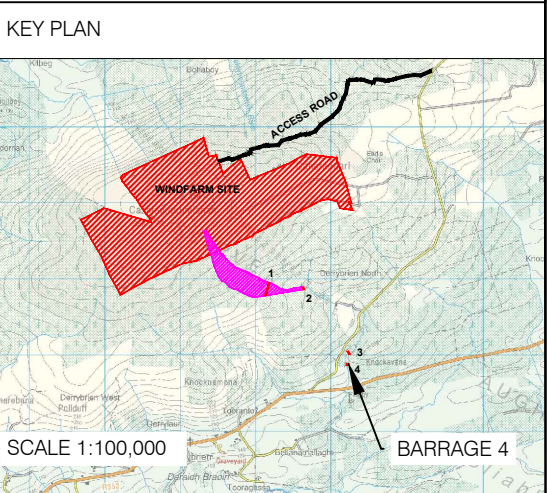
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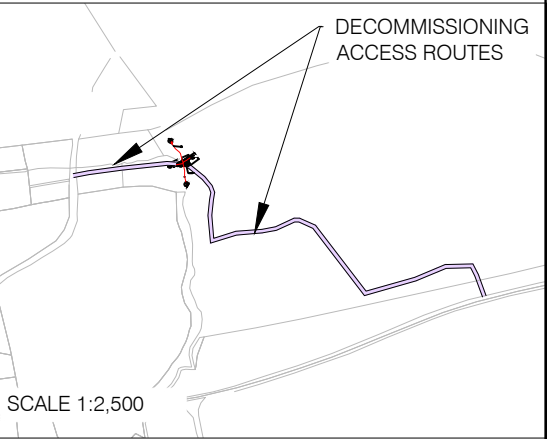
LEGEND

Stone Barrage

Re-graded Barrage area

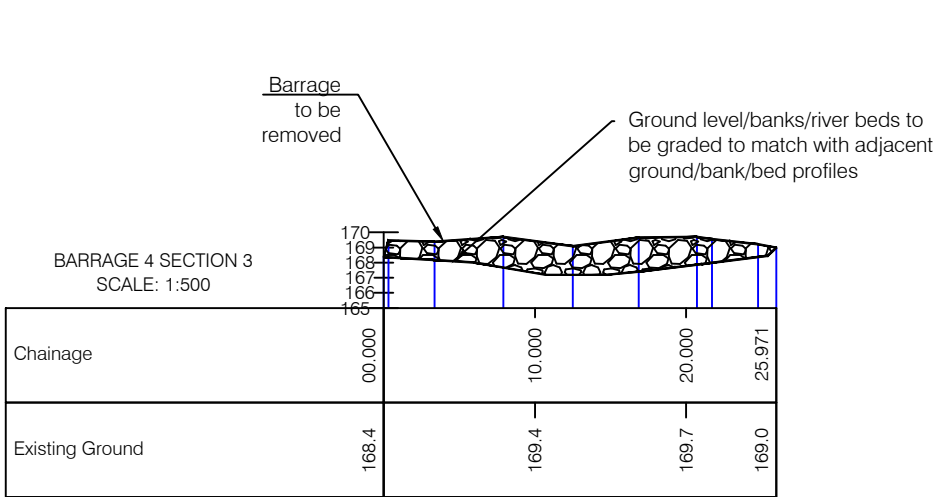
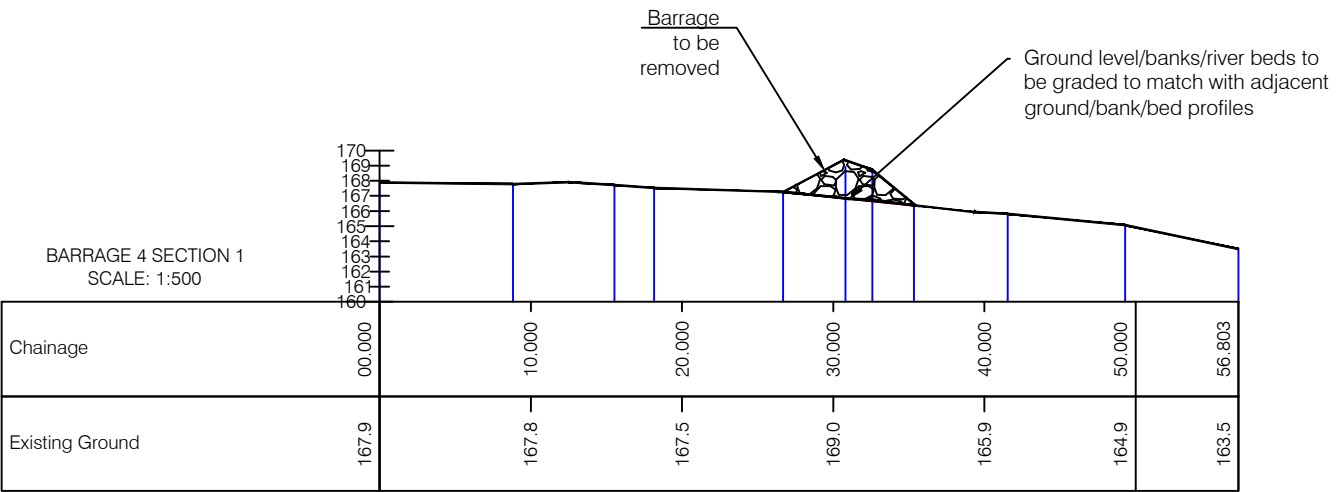


DECOMMISSIONING ACCESS ROUTE-BARRAGE 4



Decommissioning Plan For Barrage:

1. Reference chapter 2 for details of removal works plan



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Client
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Project
Derrybrien Wind Farm Project

Contract

Drawing title
**Figure 2.31
Decommissioning-Removal of Barrage 4**

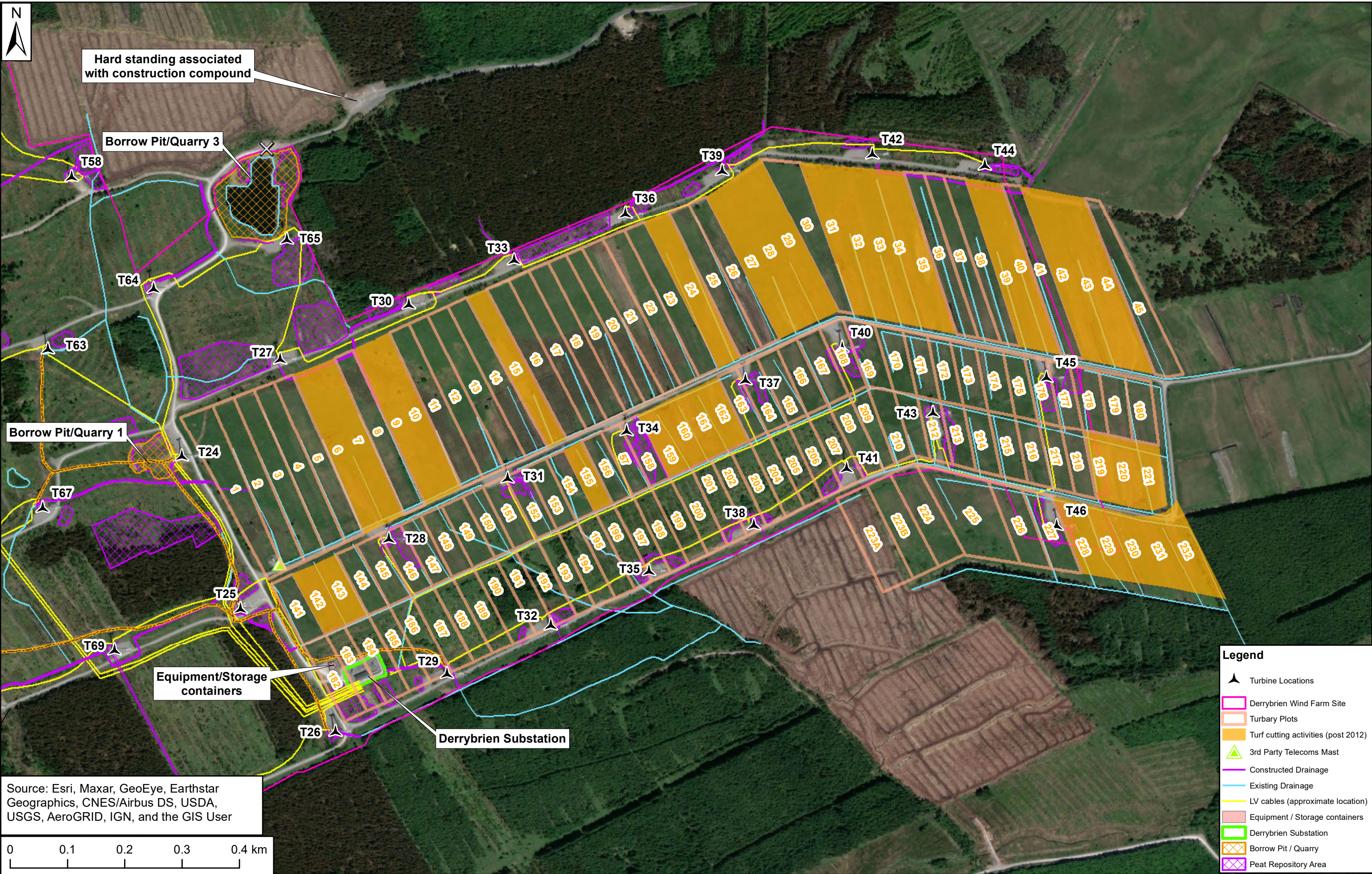
Production unit
Civil & Environmental Engineering

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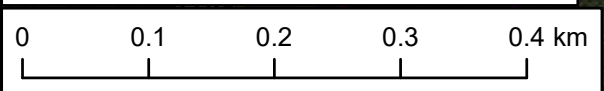
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LMcM	LMcM	M.Brides	P.Kavanagh	07.05.2020
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Drawing number
QS-000280-01-D460-003-031-000

SHEET REV



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User



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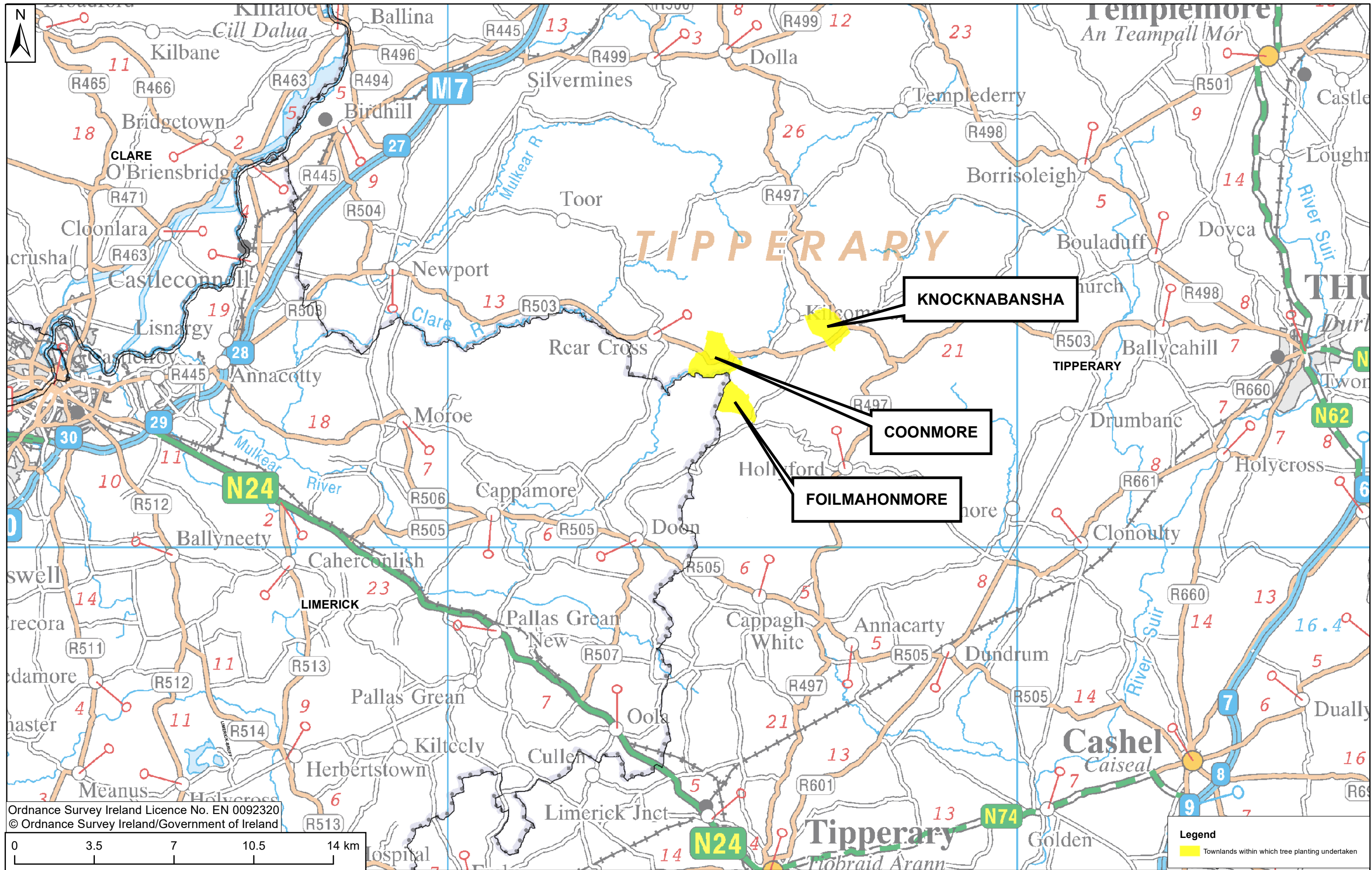
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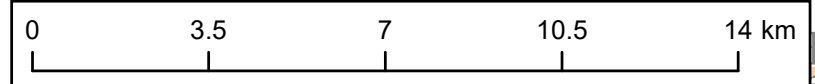
CLIENT:	Gort Windfarms Ltd
PROJECT:	Derrybrien Wind Farm Project
CONTRACT:	

PRODUCTION UNIT:	Civil & Environmental Engineering
DRAWING TITLE:	Figure 2.33 - Indicative location of turf cutting activities (post 2012)

DRAWN E.O'Shea					PRODUCED E.O'Shea		VERIFIED P.Kavanagh		APPROVED J.McLoughlin		APPROVAL DATE 04/08/2020	
CLIENT REF. 00-00					NO. OF SHEETS 00-00		SIZE A3		SCALE 1:6,000		DRAWING NUMBER QS-000280-01-D460-003-033-000	



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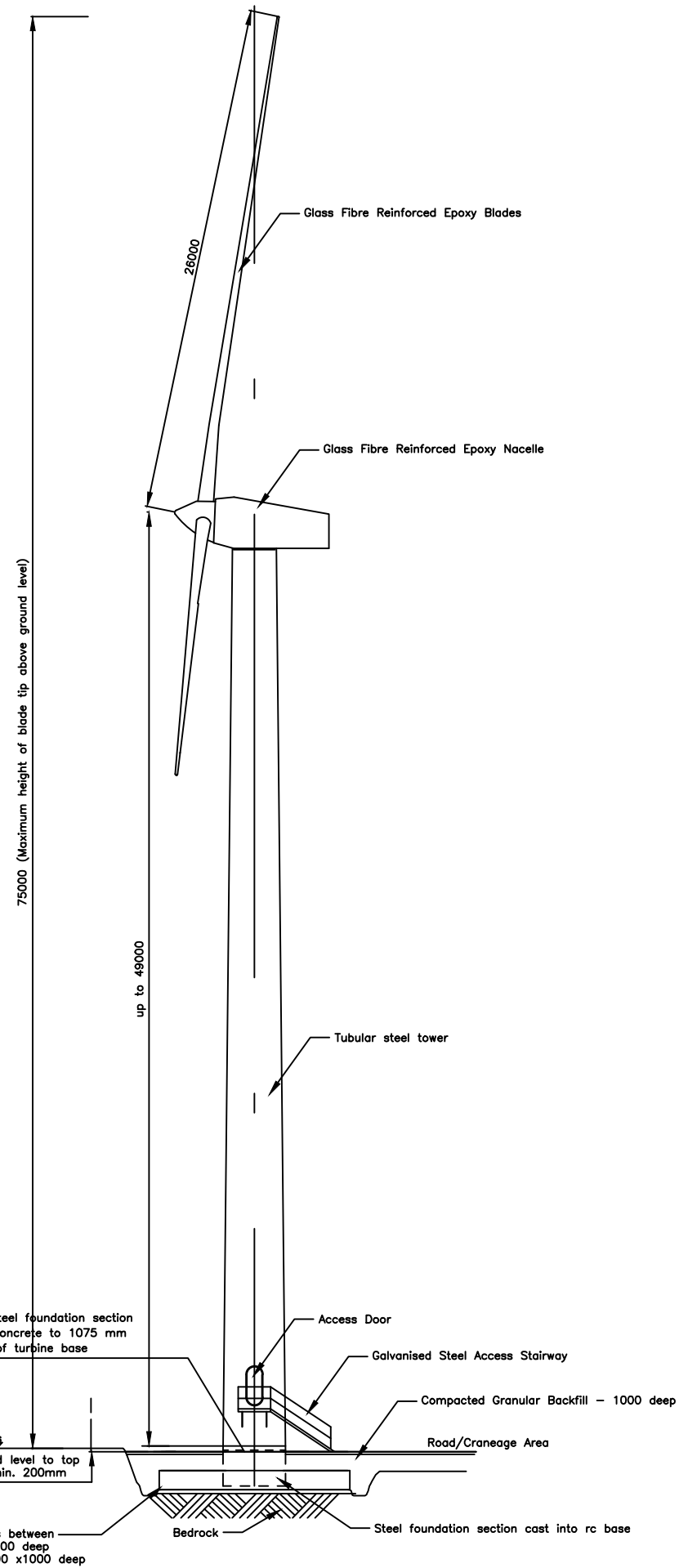


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PRODUCTION UNIT:	Civil & Environmental Engineering
DRAWING TITLE:	Figure 2.35 - Location of tree planting in lieu of forestry felled for Project - County Tipperary

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	00-00	00-00	A3	1:150,000
DRAWING NUMBER QS-000280-01-D460-003-035-000				



Technical drawing of a wind turbine showing dimensions and components. The drawing includes the following labels and dimensions:

- Dimensions:**
 - 2600 (Height of the nacelle and blades)
 - up to 49000 (Total height of the tower)
 - 52000 (Total height of the tower and nacelle)
- Components:**
 - Glass Fibre Reinforced Epoxy Blades
 - Tubular steel tower
 - Galvanised Steel Access Stairway by turbine supplier.
 - Compacted Granular Backfill
 - Existing GL. varies (Ground Level)
 - Bedrock

NOTES:

1. All dimensions are in millimetres - figured dimensions to be taken in preference to scaled dimensions.

0	04.08.20	Issued for substitute consent	E.O.S	E.O.S	P.K	J.Med	
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PURPOSE OF ISSUE - PRELIMINARY UNLESS INDICATED

CLIENT APPROVAL ☐ PLANNING ☒ TENDER ☐ CONSTRUCTION ☐ AS-BUILT ☐

CLIENT **Gort Wind Farms Ltd**

PROJECT	Derrybrien Wind Farm Project
---------	------------------------------

CONTRACT

DRAWING TITLE

Standard Wind Turbine Details
for 49m turbines on
Derybrien Wind Farm Site

PRODUCTION UNIT Civil & Environmental Engineering



**Engineering and Major Projects,
One Dublin Airport Central, Dublin Airport,
Cloughran, Co. Dublin, K67 XF72, Ireland.**

Tel: +353 (0)1 703 8000 Web: www.ees.ie

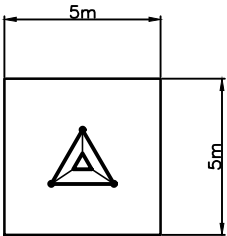
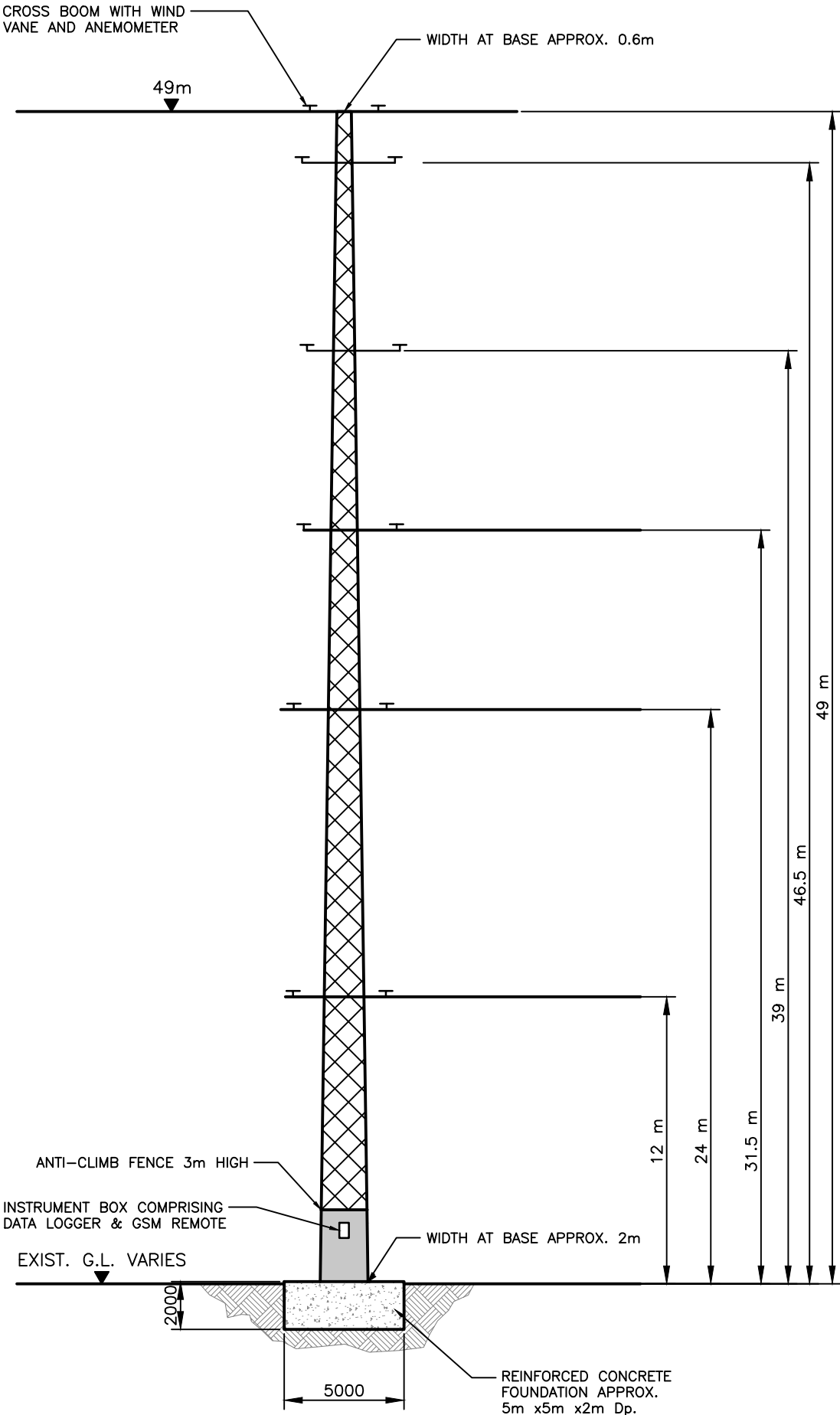
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DRAWN E.O'Shea	PRODUCED E.O'Shea	VERIFIED P.Kavanagh	APPROVED J.McLoughlin	APPROVAL DATE 08.07.2020
CLIENT REF		NO. OF SHTS 1	SIZE A1	SCALE N.T.S

DRAWING NUMBER	SHEET	REV
QS-000280-01-D460-003-036-000		


NOTES:

1. All dimensions are in millimetres - figured dimensions to be taken in preference to scaled dimensions.



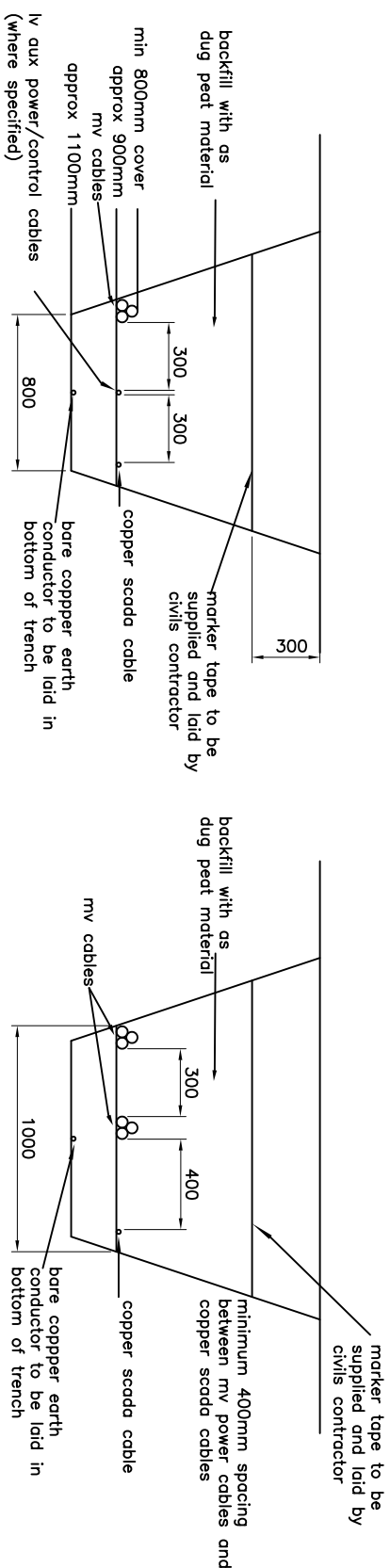
PLAN VIEW
SCALE 1:200

ELEVATION OF MET MASTS 1 & 2
Scale 1:150

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PURPOSE OF ISSUE - PRELIMINARY UNLESS INDICATED						
CLIENT APPROVAL	<input type="checkbox"/> PLANNING	<input checked="" type="checkbox"/> TENDER	<input type="checkbox"/> CONSTRUCTION	<input type="checkbox"/> AS-BUILT		
CLIENT Gort Wind Farms Ltd						
PROJECT Derrybrien Wind Farm Project						
CONTRACT						
DRAWING TITLE Met Masts1 & 2 Details						
PRODUCTION UNIT Civil & Environmental Engineering						
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CLIENT REF		NO. OF SHITS 1	SIZE A1	SCALE NTS		
DRAWING NUMBER QS-000280-01-D460-003-037-000						SHEET REV

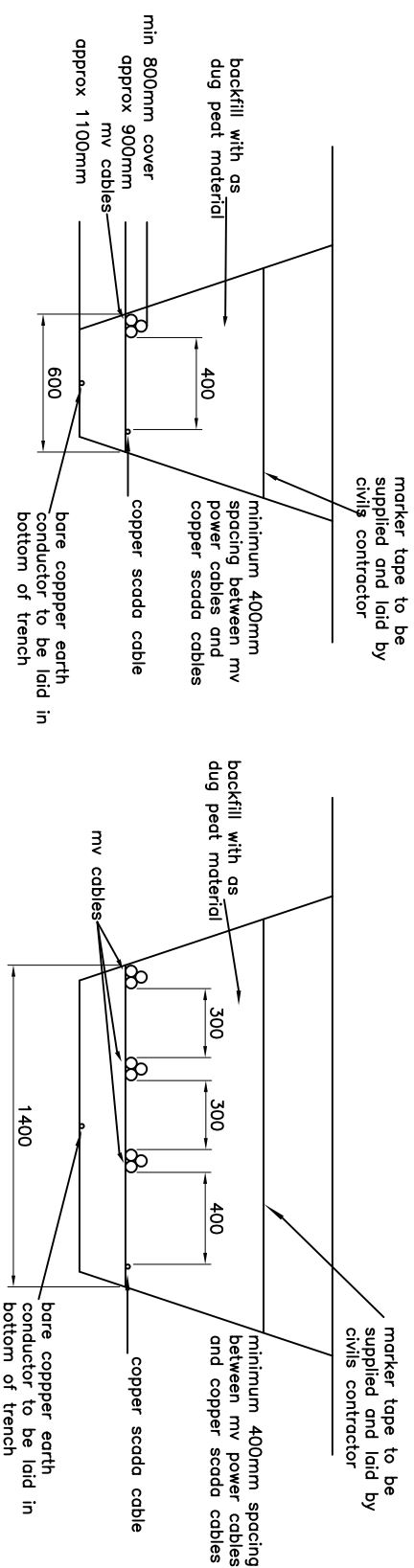
Notes :-

1. All dimensions are in millimeters – figured dimensions to be taken in preference to scaled dimensions.



Type A

single mv cable and aux
lv cables in trench

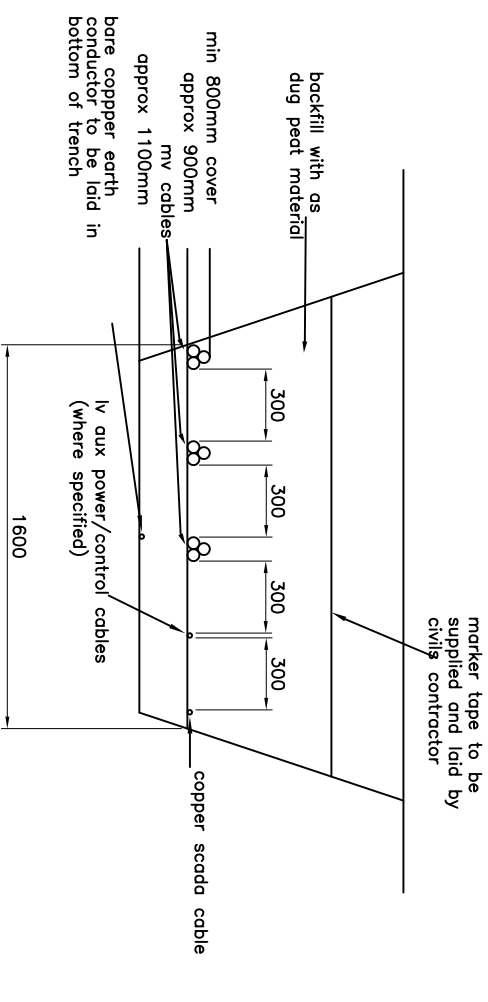


Type B

2 m/cables in trench

Type C

single mv cable in trench

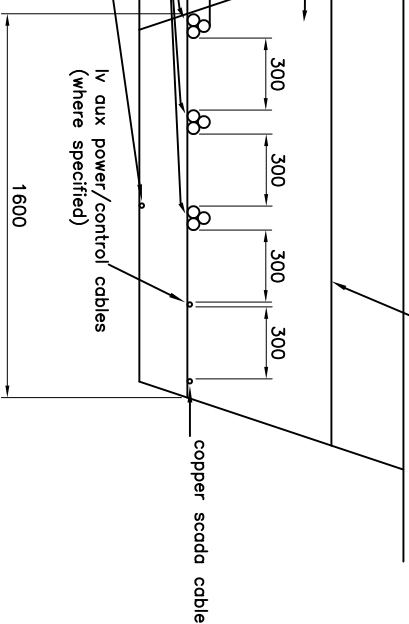


Type D

3 my cables in trench

Type E

3 mv cables and aux
lv cables in trench



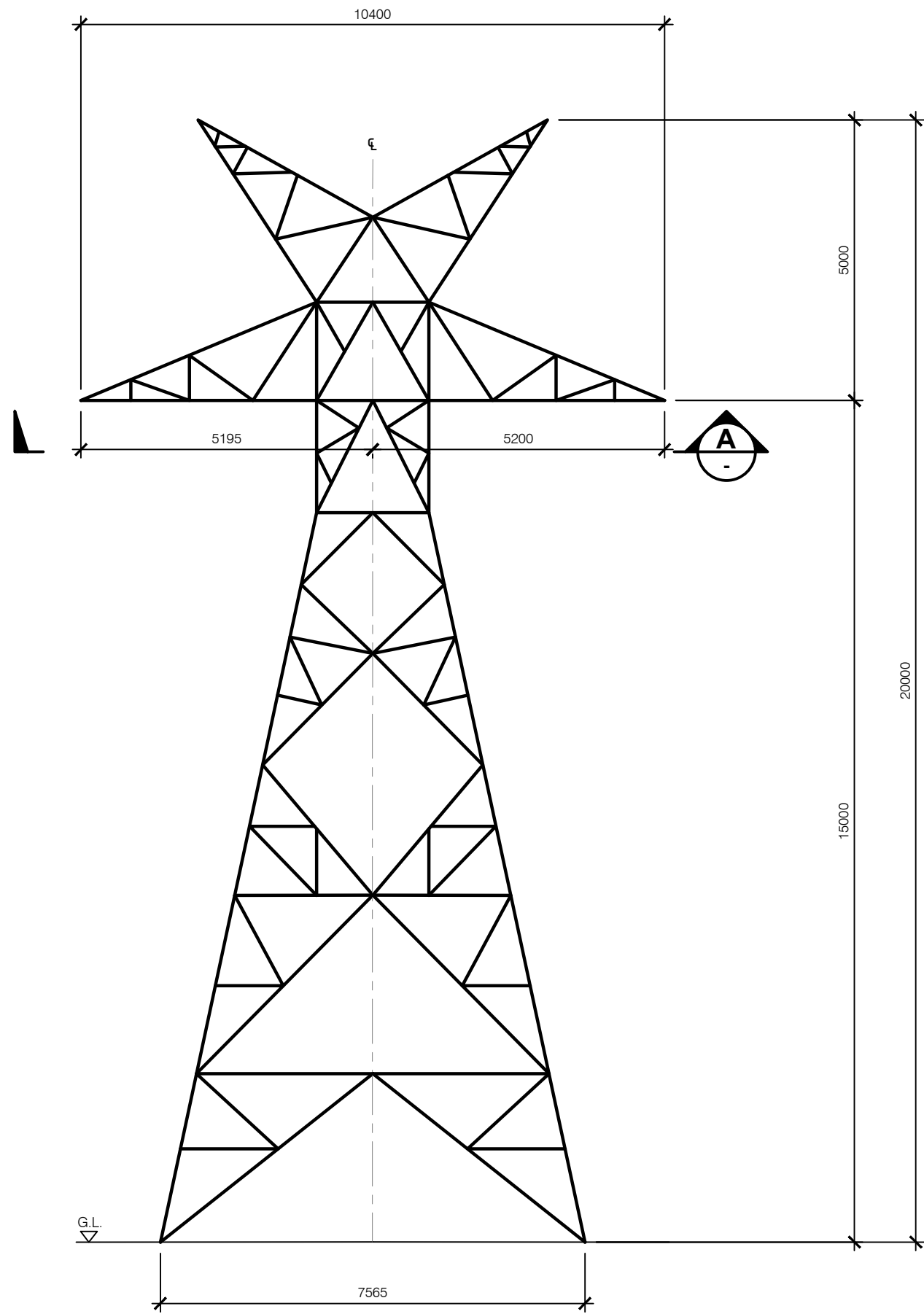
Cable Trench Details

Scale 1:25

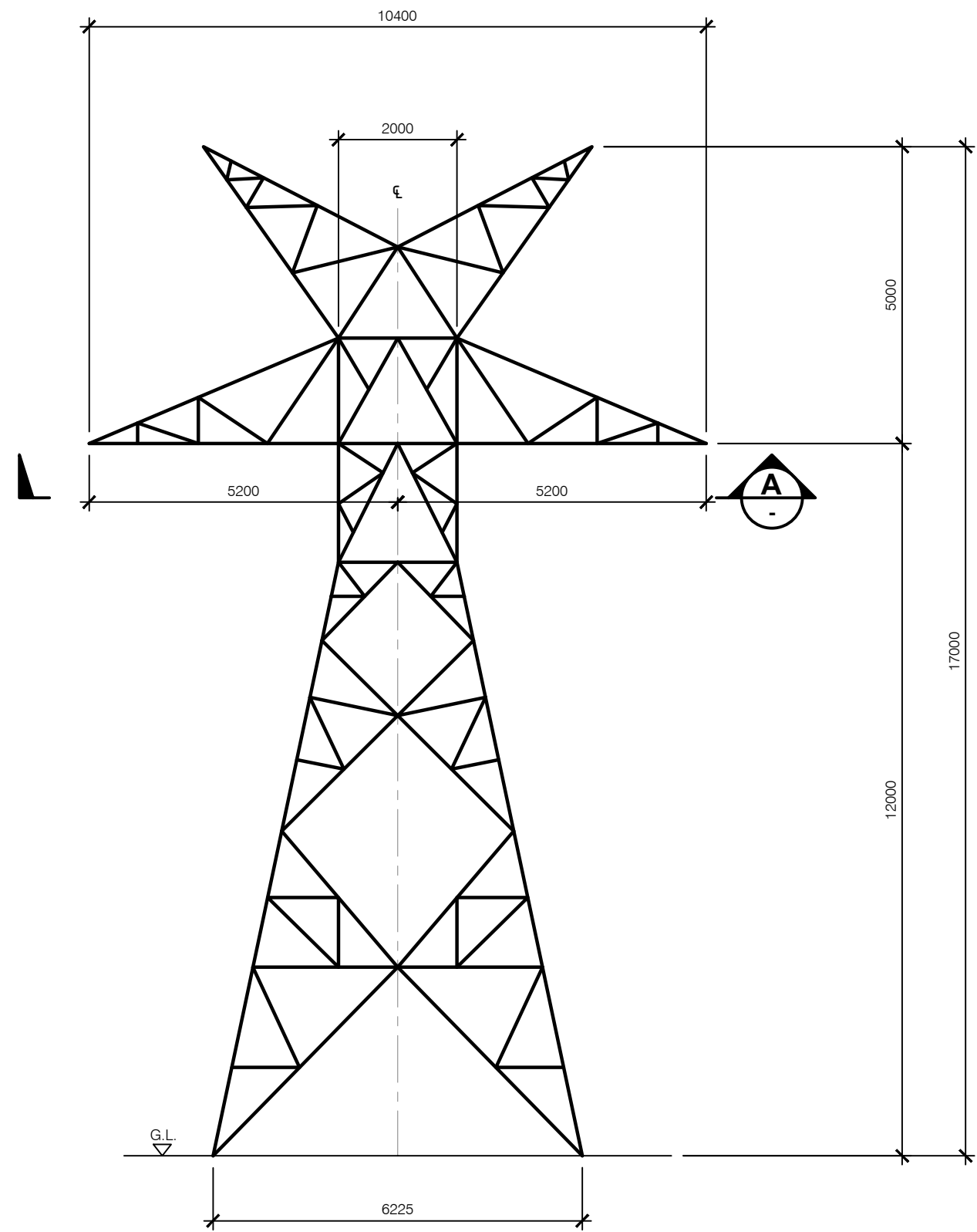
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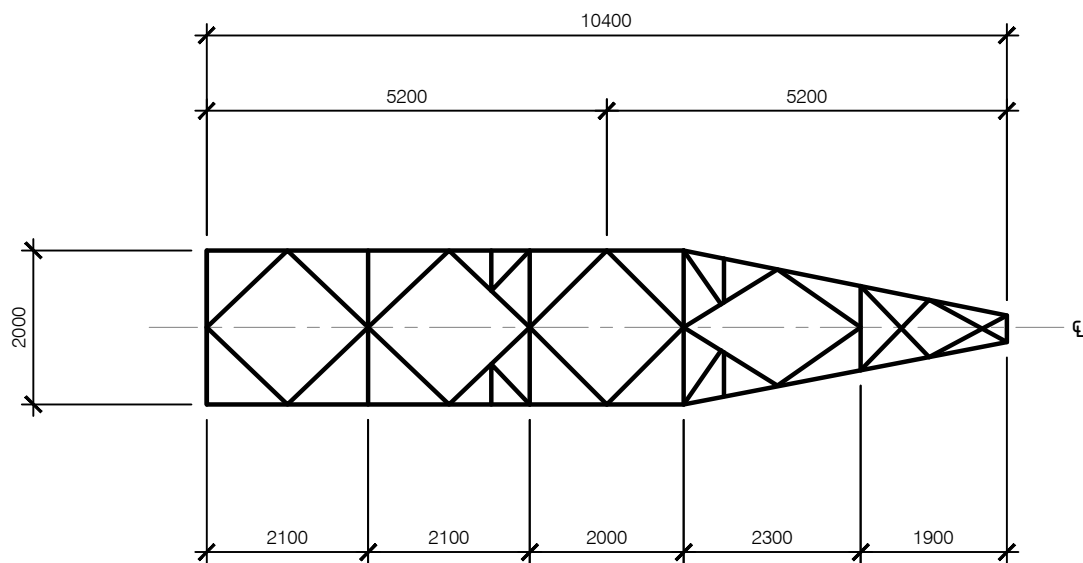
1. ALL DIMENSIONS IN mm.



TYPICAL ELEVATION TYPE 15m
SCALE 1:100



TYPICAL ELEVATION TYPE 12m
SCALE 1:100



SECTION A-A
SCALE 1:100

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REV	DATE	REVISION DESCRIPTION					DRN	PROD	VER APP

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PURPOSE OF ISSUE - PRELIMINARY UNLESS INDICATED
CLIENT APPROVAL ☐ PLANNING ☒ TENDER ☐ CONSTRUCTION ☐ AS-BUILT ☐

CLIENT Gort Windfarms Ltd.

PROJECT Derrybrien Wind Farm Project

CONTRACT

DRAWING TITLE
Outline Drawing Tower Type 61
Single Circuit 110kV Angle Tower typical tower type 10 - 90 Degree

PRODUCTION UNIT CIVIL & ENVIRONMENTAL ENGINEERING



Engineering and Major Projects,
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DRAWN S. Bolton	PRODUCED S. Bolton	VERIFIED P.Kavanagh	APPROVED J.McLoughlin	APPROVAL DATE 05.08.2020
CLIENT REF		NO. OF SHTS 1	SIZE A1	SCALE N.T.S

DRAWING NUMBER QS-000280-01-D460-003-039-000
SHEET REV

1. ALL DIMENSIONS IN mm.

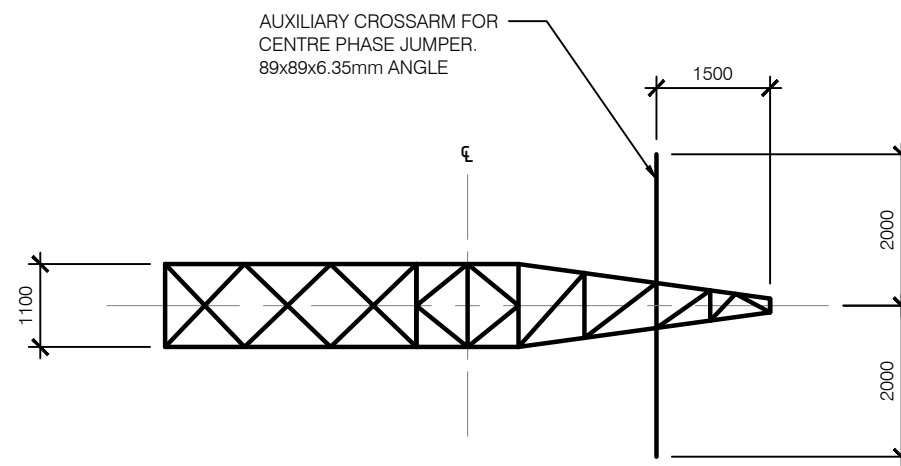
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1. All dimensions in mm.

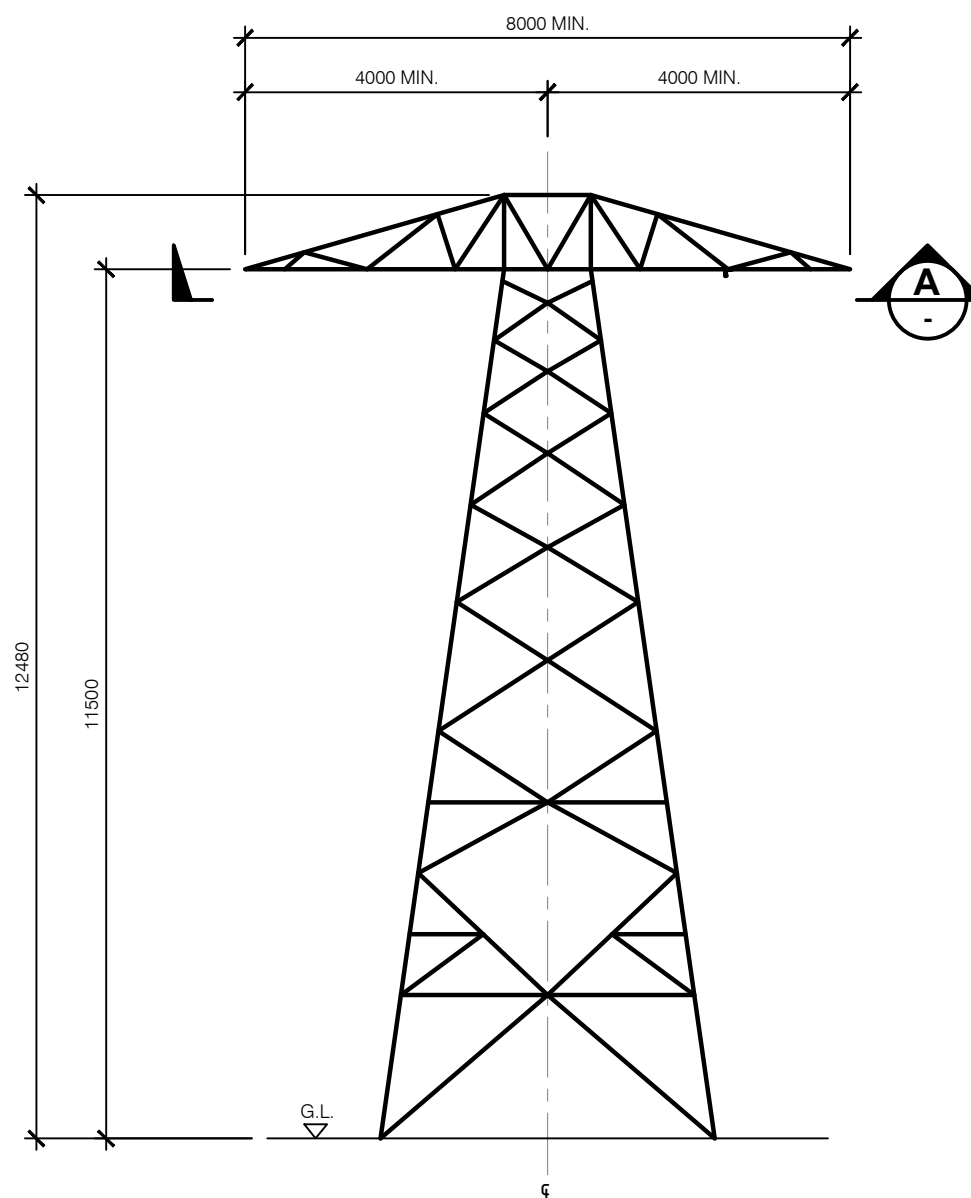
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1. ALL DIMENSIONS IN mm.

1. ALL DIMENSIONS IN mm.



A



TYPICAL ELEVATION
SCALE 1:100



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Rev.	Date	Revision description					Dm.	Prod.	Ver.

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Drawn S. Bolton	Produced S. Bolton	Verified P.Kavanagh	Approved J.McLoughlin	Approval date 05.08.2020
Client ref.		No. of sheets 1	Size A3	Scale As Shown

Drawing title

Outline Drawing Tower Type 38

Client **Gort Windfarms Ltd.**

Project	Derrybrien Wind Farm Project
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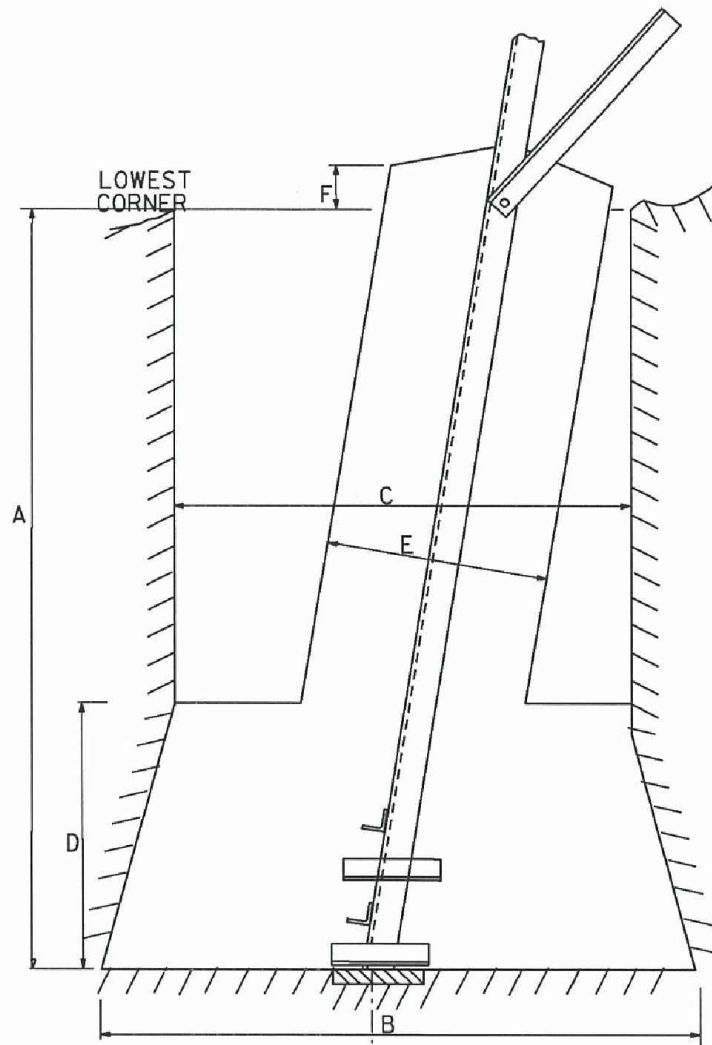
Contract	Production unit	Drawing Number	SHEET	REV
	Civil & Environmental Engineering	QS-000280-01-D460-003-042-000		

TABLE A

DIMENSIONS	A	B	C	D	E	F
VALUE (mm)	3000	1500	1300	1500	800	100

11.5m
OZ = 4683
OB = 3784
OC = 5602

13.5m
OZ = 5185
OB = 4266
OC = 6104



MAX. UPLIFT/ LEG = 54121kgs = 530.93kN
MAX. COMP/ LEG = 60076kgs = 589.35kN
MAX. TRANV. SHEAR/ LEG = 4,642kgs = 45.54kN
MAX. LONG SHEAR/ LEG = 4,126kgs = 40.48kN
VOLUME OF CONCRETE/ LEG = 8.8m³
(EXCLUDING BLINDING)

CONCRETE TO BE IN ACCORDANCE WITH SPECIFICATION
No. PG404-S27 (LATEST REV.) UNLESS OTHERWISE STATED
AND SHOULD HAVE A MINIMUM CEMENT CONTENT OF 300KGS/METRE

Notes:

1. Dig all four holes to the dimensions shown in Table A.
2. With a dumpy level, check the relative levels of the bottom of the holes. Check these levels with the relative levelsheets supplied by ESB Ltd. and excavate as necessary to get the same relative levels.
3. Use the marking out pegs to find the exact centre of the hole and set in there a concrete slab at least 300x300x75mm - again check relative levels.
4. Preassemble the back and front of the base and put on temporary tie members as shown on the relevant drawing.
5. Undercut the banks as shown
6. Lower the two parts of the base into the holes and onto the concrete slabs. Bolt the two parts together and put in temporary tie members at the sides.
7. Adjust the mast so that the diagonal distances ON A HORIZONTAL PLANE are equal. If different leg extensions are in use readings should be taken down from the first horizontal member and suitable marks placed on the legs at eye level - this will then define a more accessible horizontal plane.
8. When the diagonals are equal, level the mast using shims under the legs. The readings should be taken again from the first main horizontal member.
9. Repeat 7 and 8 until satisfactory - the difference between the highest and lowest legs should not exceed 3mm and the difference in diagonals should not exceed 10mm and the face difference should not exceed 5mm.
10. Fill the bottom of the hole with concrete as shown. (Note: Every care must be taken to prevent soil falling into the concrete and if any does it must be removed. The leg of the mast must be cleaned to ensure a good bond between the concrete and steel)
11. Place the specified former for the neck and fill the former with concrete. Use a mixture of sand and cement to finish of the necks. The formers should be left on for at least 24 hours.
12. In soft wet ground, where undercutting is not feasible, but sides will stand on vertical face, refer to drawing for Type C foundation.
13. Very bad holes, with general collapse of banks, very strong water inflow or peat should be referred to ESB Ltd.

ASSOCIATED DRAWINGS:

TOWER PEGGING -
TOWER DETAILS -
FORMER -
TEMPORARY STIFFENERS -

FOUNDATION TYPES :

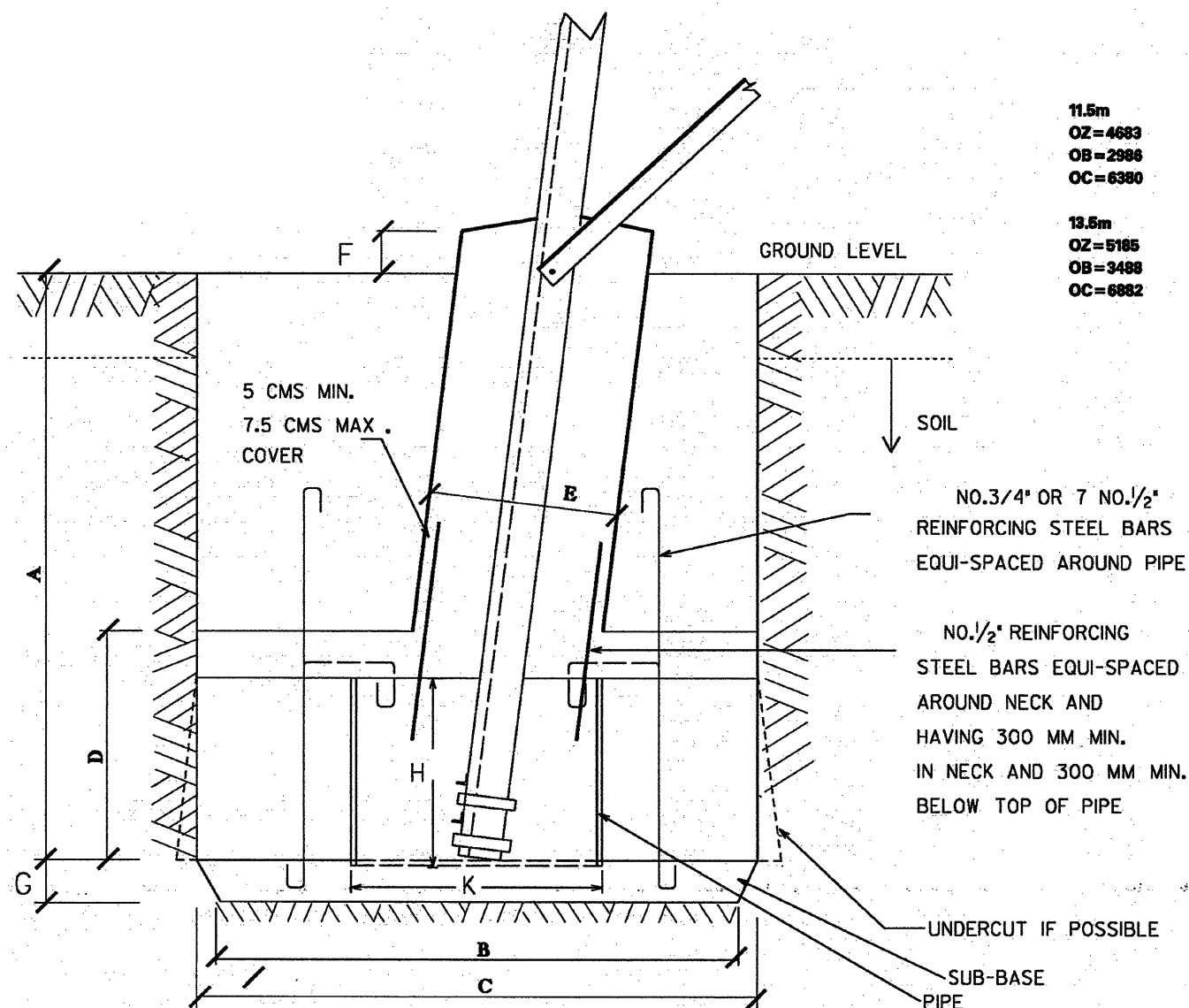
A (ROCK) - DRG.No.
B (NORMAL) - THIS DRG.
C (PIPED) - DRG.No.
D (SHUTTERED) - DRG.No.

0	25.08.20	ISSUED FOR SUBSTITUTE CONSENT	SB	SB	PK	JMcL
Rev	Date	Revision description	Drn	Prod	Ver	App
Purpose of issue - Preliminary unless indicated						
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Client Gort Windfarms Ltd.	Drawing title Foundation details for Type 60 new 90 steel tower Foundation type 'B'	COPYRIGHT © ESB ALL RIGHTS RESERVED. NO PART OF THIS WORK MAY BE MODIFIED, REPRODUCED OR COPIED IN ANY FORM OR BY ANY MEANS GRAPHIC, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, TAPING OR USED FOR ANY PURPOSE OTHER THAN ITS DESIGNATED PURPOSE, WITHOUT THE WRITTEN PERMISSION OF ESB.			
Project Derrybrien Wind Farm Project	Production unit Civil & Environmental Engineering	Drawn S. Bolton	Produced S. Bolton	Verified P. Kavanagh	Approved J. McLoughlin
Contract		Client ref.	No. of sheets 1	Size A3	Approval date 05.08.2020
				Scale N.T.S	
		Drawing number QS-000280-01-D460-003-043-000		SHEET 1	REV



DIMENSION	A	B	C	D	E	F	G	H	K
METERS	3.0	2.2	2.4	1.5	0.8	0.1	0.1-0.2	0.9min	1.2min

MAX UPLIFT/LEG= 54121 KGs = 530.93 KN

MAX COMPRESSION LEG= 60076 KGs = 589.35 KN

TRANSVERSE SHEAR/LEG= 4,842 KGs = 45.54 KN

LONGITUDINAL SHEAR/LEG= 4126 KGs = 40.48 KN

VOLUME OF CONCRETE/LEG(min)= 17.04M³

ASSOCIATED DRAWINGS

Tower Pegging -
Tower Details -
Former.....
Temporary Stiffeners.....
Type A Foundation (Rock) - Consult ESB
Type B Foundation (Normal) -
Type D Foundation (Wet Clay) - Consult ESB
Type C Foundation (Piped) - This Drawing

PLACING OF TYPE C FOUNDATIONS

There are a large number of sites where the bearing capacity of the soil is excellent in the undisturbed state but because of the presence of high ground or surface water, it has been found that the sides of the excavation undergo gradual collapse if the holes are left open for the lengthy period necessary to set up the tower and that undercutting is not possible or desirable. It has been found that the use of precast concrete pipes is very useful in such situations and allows the undisturbed strength of the soil in uplift to be developed.

Similarly when a foundation is being cast in dry undisturbed soil but where the stability of the excavation sides is doubtful it may be advisable to widen the excavation to the dimensions of the Type C foundation. In this case the sub-base may be omitted and depending on the stability of the excavation sides, the pipe may also be omitted. This situation also allows the reusable steel internal former to be used if available. The technique to be used is as follows :-

STAGE 1:

It is usually obvious from surface conditions when sites requiring the use of concrete pipes can be expected (e.g. wet rushy ground or surface water at or near the site). Concrete pipes and reinforcing steel should be purchased and made available before excavation begins. The minimum pipe size, for practical reasons, should be 4 feet (1.2 meters) diameter and 3 feet (0.9 meters) deep.

The holes should be excavated, one at a time, to the width (C) indicated and dug to the depth (A) indicated. Where there is considerable water inflow the holes should then be excavated 0.1-0.2 meters deeper than normal and this extra excavation filled with concrete to form a sub-base. The amount of water in the hole should be minimised by continuous pumping. Where control of the water/cement ratio is available, a drier mix could be used in this sub-base concrete. The most usual situation where a Type C foundation would be used is fissured glacial till with slow water inflow but where lumps of soil keep falling from the sides of the excavation. Where Type C is used in dry ground for safety reasons, the sub-base may be omitted and a decision on the necessity for a pipe made on purely safety grounds. The use of safety netting is recommended for doubtful cases.

STAGE 2 :

Where a pipe is required it should be placed in the correct position using the mast pegs, set approximately 0.1 meters into the sub-base, reinforcing steel placed as shown and concrete poured and vibrated immediately between the pipe and the undisturbed bank. Large lumps of soil should be removed before the concrete is placed and the concrete should be brought up to the level of the top of the pipe.

This procedure should be repeated for the other three holes until all are in a stable condition. The mast base should then be set up and levelled according to the normal procedure, the pipes cleaned internally and the reinforcing steel bent downwards into the pipe. The remainder of the base blocks should then be concreted to the dimensions shown. If the base block has inadvertently become wider than indicated on the drawing, the thickness of the block should be increased by 50% of the increased width. The reinforcing steel should also have adequate concrete cover (50mm minimum).

The neck should be formed and concreted as for a normal foundation. If there is any delay in pouring the necks, reinforcing steel should be used to ensure that the horizontal shear forces are transferred into the main block. This reinforcing steel should be placed around the periphery of the neck while maintaining the required depth of cover. Every care should be taken when placing the neck, to ensure a good bond between the block and the neck by removing the water and wire brushing the surface of the block of concrete in contact with the neck.

Very bad holes, with general collapse of the banks, very strong water inflow or peat will require a special design and should be referred to ESB.

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Purpose of issue - Preliminary unless indicated						
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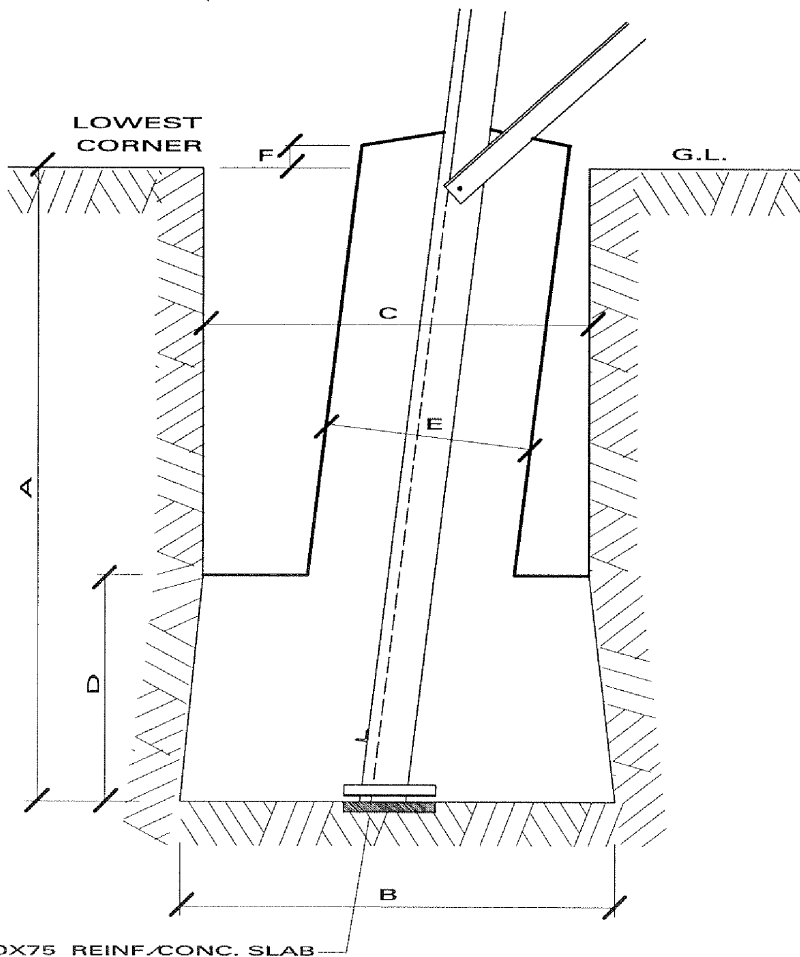
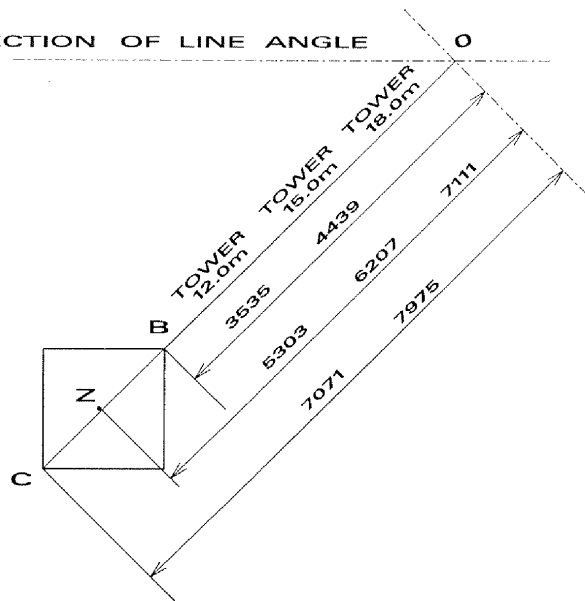
Client	Gort Windfarms Ltd.
Project	Derrybrien Wind Farm Project
Contract	

Drawing title	Foundation details for Type 60 new 90 steel tower Foundation type 'C'
Production unit	Civil & Environmental Engineering

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S. Bolton	S. Bolton	P. Kavanagh	J. McLoughlin	05.08.2020
Client ref.	No. of sheets	Size	Scale	
	1	A3	N.T.S	
Drawing number				SHEET REV
QS-000280-01-D460-003-044-000				

PEGGING

DIRECTION OF LINE ANGLE



TOWER 12.0m	TOWER 15.0m	TOWER 18.0m
OZ = 5303	OZ = 6207	OZ = 7111

MAX. UPLIFT /LEG = 96,639 kgs.

MAX.COMPRESSION /LEG = 113,472 kgs.

SHEAR /LEG = 4347 kgs. TRANSV./3762 kgs. LONGITUD.

TABLE A

A	B	C	D	E	F	VOL. CONC / LEG
3.0	2.7	2.5	1.5	1.0	0.1	11.745

NOTES :

MAST PEGGING

INCL

TOWER ERECTION

ABB 21135A

CONCRETE TO BE IN ACCORDANCE WITH
E.S.B.I. SPECIFICATION NO. PG406-S27
UNLESS OTHERWISE STATED AND SHOULD
HAVE A MINIMUM CEMENT CONTENT OF
300 KGS/METRE³

TEMPORARY STIFFENER DETAILS

	12m	15m	18m	
HOLES CC (mm)	3180	3830	4477	

INSTRUCTIONS

- EXCAVATE ALL FOUR HOLES TO THE DIMENSIONS SHOWN IN TABLE A.
- WITH A DUMPY LEVEL, CHECK THE RELATIVE LEVELS OF THE BOTTOMS OF THE HOLES AND ENSURE THAT THE SHALLOWEST HOLE IS AT DEPTH 'A' AS SHOWN IN THE TABLE.
- USE THE MARKING OUT PEGS TO LOCATE THE EXACT CENTRE OF THE HOLE AND CONSTRUCT A REINF./CONC. SLAB AT LEAST 300 X 300 X 75mm - AGAIN CHECK RELATIVE LEVELS.
- PRE-ASSEMBLE THE BACK AND FRONT OF THE BASE AND BOLT ON TEMPORARY TIE MEMBERS AS SHOWN ON THE RELEVANT DRAWING.
- UNDERCUT THE BANKS AS SHOWN.
- LOWER THE TWO PARTS OF THE BASE [SEE 4.] INTO THE HOLES AND ONTO THE CONCRETE SLABS. BOLT THE TWO PARTS TOGETHER AND FIX TEMPORARY TIE MEMBERS AT THE SIDES.
- ADJUST THE MAST SO THAT THE DIAGONAL DISTANCES ON A HORIZONTAL PLANE ARE EQUAL. IF DIFFERENT LEG EXTENSIONS ARE IN USE READINGS SHOULD BE TAKEN DOWN FROM THE FIRST HORIZONTAL MEMBER AND SUITABLE MARKS PLACED ON THE LEGS AT EYE LEVEL - THIS WILL THEN DEFINE A MORE ACCESSIBLE HORIZONTAL PLANE.
- WHEN THE DIAGONALS ARE EQUAL, LEVEL THE MAST USING SHIMS UNDER THE LEGS. THE READINGS SHOULD BE TAKEN AGAIN FROM THE FIRST MAIN HORIZONTAL MEMBER.
- REPEAT 7 AND 8 UNTIL SATISFACTORY - THE DIFFERENCE BETWEEN THE HIGHEST AND LOWEST LEGS SHOULD NOT EXCEED 3mm AND THE DIFFERENCE IN DIAGONALS SHOULD NOT EXCEED 10mm AND FACE DIFFERENCE SHOULD NOT EXCEED 5mm.
- FILL THE BOTTOM OF THE HOLE WITH CONCRETE AS SHOWN. (NOTE: EVERY CARE MUST BE TAKEN TO PREVENT SOIL FALLING INTO THE CONCRETE AND IF ANY DOES FALL IN IT MUST BE REMOVED). THE LEG OF THE MAST MUST BE CLEANED TO ENSURE A GOOD BOND BETWEEN CONCRETE AND STEEL. THE CONCRETE SHOULD BE WELL VIBRATED INTO THE SIDES OF THE BANK.
- PLACE THE SPECIFIED FORMER FOR THE NECK AND FILL THE FORMER WITH CONCRETE. USE A MIXTURE OF SAND AND CEMENT TO FINISH OFF THE NECK. THE FORMER SHOULD BE LEFT IN SITU FOR AT LEAST 24 HOURS.
- IN SOFT WET GROUND, WHERE UNDERCUTTING IS NOT FEASIBLE, REFER TO DRAWING NO. TC12295 FOR TYPE C FOUNDATION.
- IN VERY UNSTABLE GROUND CONDITIONS, I.E. WITH GENERAL COLLAPSE OF BANKS, VERY STRONG WATER INFLOW, OR DEEP PEAT, PLEASE REFER TO ELECTRICAL POWER SYSTEMS, ESB.

Rev	Date	Revision description	Drm	Prod	Ver.	App
0	25.08.20	ISSUED FOR SUBSTITUTE CONSENT	SB	SB	PK	JMcL
Purpose of issue - Preliminary unless indicated						
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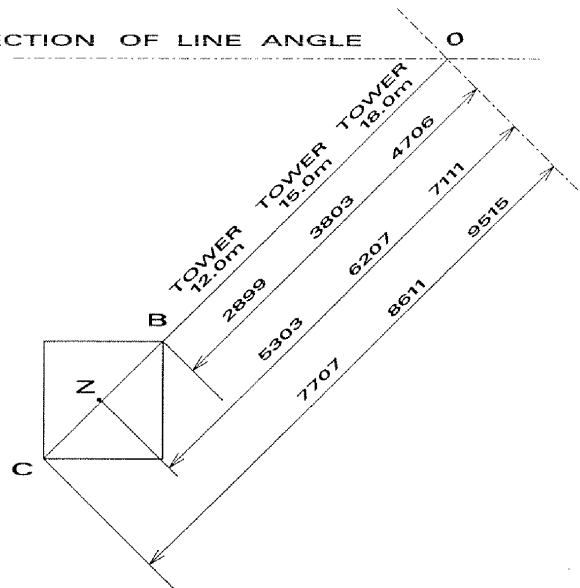
Client	Gort Windfarms Ltd.
Project	Derrybrien Wind Farm Project
Contract	

Drawing title	Foundation details for Type 61 steel tower Foundation type 'B'
Production unit	Civil & Environmental Engineering

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Drawn	Produced	Verified	Approved	Approval date
S. Bolton	S. Bolton	P.Kavanagh	J.McLoughlin	05.08.2020
Client ref.		No. of sheets	Size	Scale
		1	A3	N.T.S.
Drawing number				SHEET REV
QS-000280-01-D460-003-045-000				

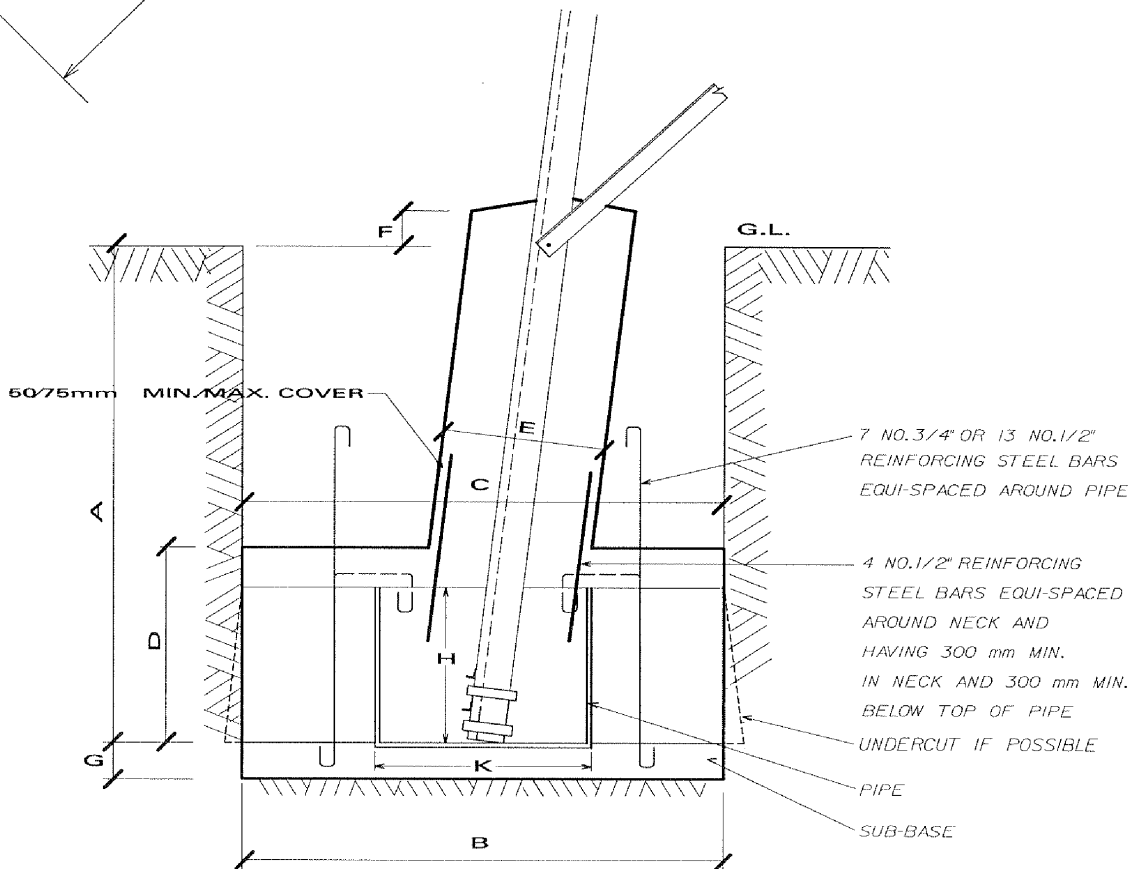
PEGGING

DIRECTION OF LINE ANGLE



TOWER 12.0m	TOWER 15.0m	TOWER 18.0m
OZ = 5303	OZ = 6207	OZ = 7111

TEMPORARY STIFFENER DETAILS				
HOLES C/C (mm)	12m	15m	18m	
	3180	3830	4477	



A	B*	C	D	E	F	G	H	K	VOL. CONC. /LEG
3.0	3.4	3.4	2.0	1.0	0.1	0.1	0.9	1.2	24cu/m

* UNDERCUT ALSO IF POSSIBLE

PLACING OF PIPED FOUNDATIONS (TYPE C) IN CLAY SOILS.

THERE ARE A LARGE NUMBER OF SITES WHERE THE BEARING CAPACITY OF THE SOIL IS EXCELLENT IN THE UNDISTURBED STATE BUT BECAUSE OF THE PRESENCE OF GROUND OR SURFACE WATER, IT HAS BEEN FOUND THAT THE SIDES OF THE EXCAVATION UNDERGO GRADUAL COLLAPSE IF THE HOLES ARE LEFT OPEN FOR THE LENGTHY PERIOD NECESSARY TO SET UP THE TOWER AND THAT UNDERCUTTING IS NOT POSSIBLE. IT HAS BEEN FOUND THAT THE USE OF PRE-CAST CONCRETE PIPES IS VERY USEFUL IN SUCH SITUATIONS AND ALLOWS THE UNDISTURBED STRENGTH OF THE SOIL IN UPLIFT TO BE DEVELOPED. THE TECHNIQUE TO BE USED IS AS FOLLOWS :

STAGE 1

IT IS USUALLY OBVIOUS FROM GROUND CONDITIONS WHEN SITES REQUIRING THE USE OF CONCRETE PIPES CAN BE EXPECTED, E.G. WET RUSHY GROUND OR SURFACE WATER AT OR NEAR THE SITE. CONCRETE PIPES AND REINFORCING STEEL SHOULD BE PURCHASED AND BE QUICKLY AVAILABLE. THE MINIMUM PIPE SIZE FFOR PRACTICAL REASONS SHOULD BE 4 FEET (1.2M) DIA. AND 3 FEET (0.9M) DEEP.

THE HOLES SHOULD BE OPENED ONE AT A TIME TO THE FULL UNDERCUT WIDTH AND DUG 0.1M DEEPER THAN NORMAL TO THE DIMENSIONS SHOWN IN TABLE A. THE EXTRA 0.2M SHOULD THEN BE FILLED WITH A RICH CONCRETE MIX (5 PARTS AGGREGATE TO 1PART CEMENT, BY WD). THE AMOUNT OF WATER TO BE ADDED TO THE MIX WILL DEPEND ON THE WATER INFLOW - IN CASES OF SEVERE INFLOW THE MIX COULD ALMOST DRY WITH THE REMAINING WATER COMING FROM THE GROUND WATER, WHICH SHOULD BE MINIMISED BY CONTINUOUS PUMPING. IN THE CASE OF FISSURED CLAY, WHICH IS USUALLY CHARACTERISED BY A SLOW WATER INFLOW BUT WITH LUMPS OF SOIL DROPPING FROM THE SIDES OF THE EXCAVATION, THE NORMAL AMOUNT OF WATER SHOULD BE ADDED TO THE CONCRETE. REINFORCING STEEL SHOULD BE PLACED IN THE SUB-BASE AS INDICATED ON THE DRAWING. THE NUMBERS OF THESE WILL DEPEND ON THE UPLIFT (SEE ACROSS). THESE BARS SHOULD BE SENT AS SHOWN ACROSS. THE SUB-BASE CONCRETE SHOULD THEN BE COMPACTED BY VIBRATION UNLESS CONTINUING COLLAPSE OF THE BANKS INDICATE THAT PIPES WILL BE REQUIRED.

STAGE 2

IF THE BANKS CONTINUE TO COLLAPSE OR SHOWN SIGNS OF COLLAPSE (SUCH AS FISSURES IN THE CLAY), THE HOLE SHOULD BE CLEANED OUT AND WIDENED TO ALLOW FOR THE PLACING OF THE PIPE AND TO IMPROVE THE BEARING CAPACITY AND UPLIFT CAPACITY OF THE FOUNDATION. AS A GUIDE TO THE MINIMUM SIZE OF FOUNDATION, THE BEARING CAPACITY SHOULD BE REDUCED TO 1TON PER SQ.FT. (10.937 KGS/M SQ.) (SEE MAXIMUM COMPRESSION PER LEG ACROSS). THE PIPE SHOULD THEN BE PLACED IN THE CORRECT POSITION USING THE MAST PEGS AND SET APPROXIMATELY 0.1M INTO THE SUB-BASE, REINFORCING STEEL PLACED AND NORMAL CONCRETE POURED AND VIBRATED IMMEDIATELY BETWEEN THE PIPE AND THE UNDISTURBED BANK. LARGE LUMPS OF SOIL SHOULD BE REMOVED JUST BEFORE THE CONCRETE IS PLACED. THE CONCRETE SHOULD BE BROUGHT UP TO THE LEVEL OF THE TOP OF THE PIPE.

THIS PROCEDURE SHOULD BE REPEATED FOR THE OTHER THREE HOLES UNTIL ALL ARE IN A STABLE CONDITION. THE MAST BASE SHOULD THEN BE SET-UP AND LEVELLED ACCORDING TO THE NORMAL PROCEDURE, THE PIPES CLEANED INTERNALLY AND THE REINFORCING STEEL BENT DOWNWARDS INTO PIPE. THE REMAINDER OF THE BASE BLOCK SHOULD THEN BE CONCRETED INCREASING THE BLOCK THICKNESS BY THE USUAL RULE (HALF THE INCREASED BASE WIDTH) AND ENSURING THAT REINFORCING STEEL HAS AN ADEQUATE COVER OF CONCRETE, I.E. 2 INCHES OR 50MM. THE NORMAL NECK SHOULD THEN BE POURED AND FINISHED AS FOR NORMAL FOUNDATION. IF THERE IS ANY DELAY IN POURING THE NECKS REINFORCING STEEL SHOULD BE USED TO ENSURE THAT THE NECK AND BLOCK ACT AS A MONOLITHIC UNIT TO ENSURE THAT THE HORIZONTAL SHEAR FORCES ARE TRANSFERRED INTO THE MAIN BLOCK. THIS REINFORCING STEEL SHOULD BE EQUALLY PLACED AROUND THE PERIPHERY OF THE NECK BUT MAINTAINING THE REQUIRED DEPTH OF COVER, I.E. 2 INCHES OR 50MM. EVERY CARE SHOULD BE TAKEN WHEN PLACING THE NECK TO ENSURE A GOOD BOND BETWEEN THE BLOCK AND THE NECK BY REMOVING THE WATER AND WIRE BRUSHING THE SURFACE OF THE BLOCK CONCRETE IN CONTACT WITH THE NECK. IF THE SIDES OF THE EXCAVATION ARE GENERALLY UNSTABLE, SHEET PILING SHUTTERING SHOULD BE USED AND A TYPE D FOUNDATION INSTALLED. ESBI SHOULD BE CONSULTED IN ADVANCE IF FOUNDATION TYPES OTHER THAN B OR C ARE USED. COMPLETE DETAILS OF ALL FOUNDATIONS USED SHOULD BE RECORDED AND FORWARDED TO ESBI AT WEEKLY INTERVALS.

NOTES

- CONCRETE TO BE IN ACCORDANCE WITH E.S.B.I. SPECIFICATION NO. PG404-S27 UNLESS OTHERWISE SPECIFIED AND SHOULD HAVE A MINIMUM CEMENT CONTENT OF 300KG/M SQ.
- SEE ALSO CDL.IIFOR SHORING REQUIREMENTS WHEN EXCAVATING FOUNDATIONS.
- THIS FOUNDATION CAN ALSO BE USED FOR LOOSE, DRY, GRANULAR MATERIAL IN UNDISTURBED STATE.

OTHER RELEVANT DRAWINGS

TOWER PEGGING	INCL.
TOWER DETAILS	NO. TC0000
FORMER	
TEMPORARY STIFFENERS	12.0m TOWER : 3180 15.0m TOWER : 3830 18.0m TOWER : 4477
TYPE B FOUNDATION (NORMAL)	NO. TC15733

MAX. UPLIFT / LEG = 96,639 kgs.

MAX.COMPRESSION / LEG = 113,472 kgs.

SHEAR / LEG = 4347 kgs. TRANSV./ 3762 kgs. LONGITUD.

Rev	Date	Revision description	Dwn	Prod	Ver	App
0	25.08.20	ISSUED FOR SUBSTITUTE CONSENT	SB	SB	PK	JMcL
Purpose of issue - Preliminary unless indicated						
Client Approval <input type="checkbox"/> Planning <input checked="" type="checkbox"/> Tender <input type="checkbox"/> Construction <input type="checkbox"/> As-Built <input type="checkbox"/>						



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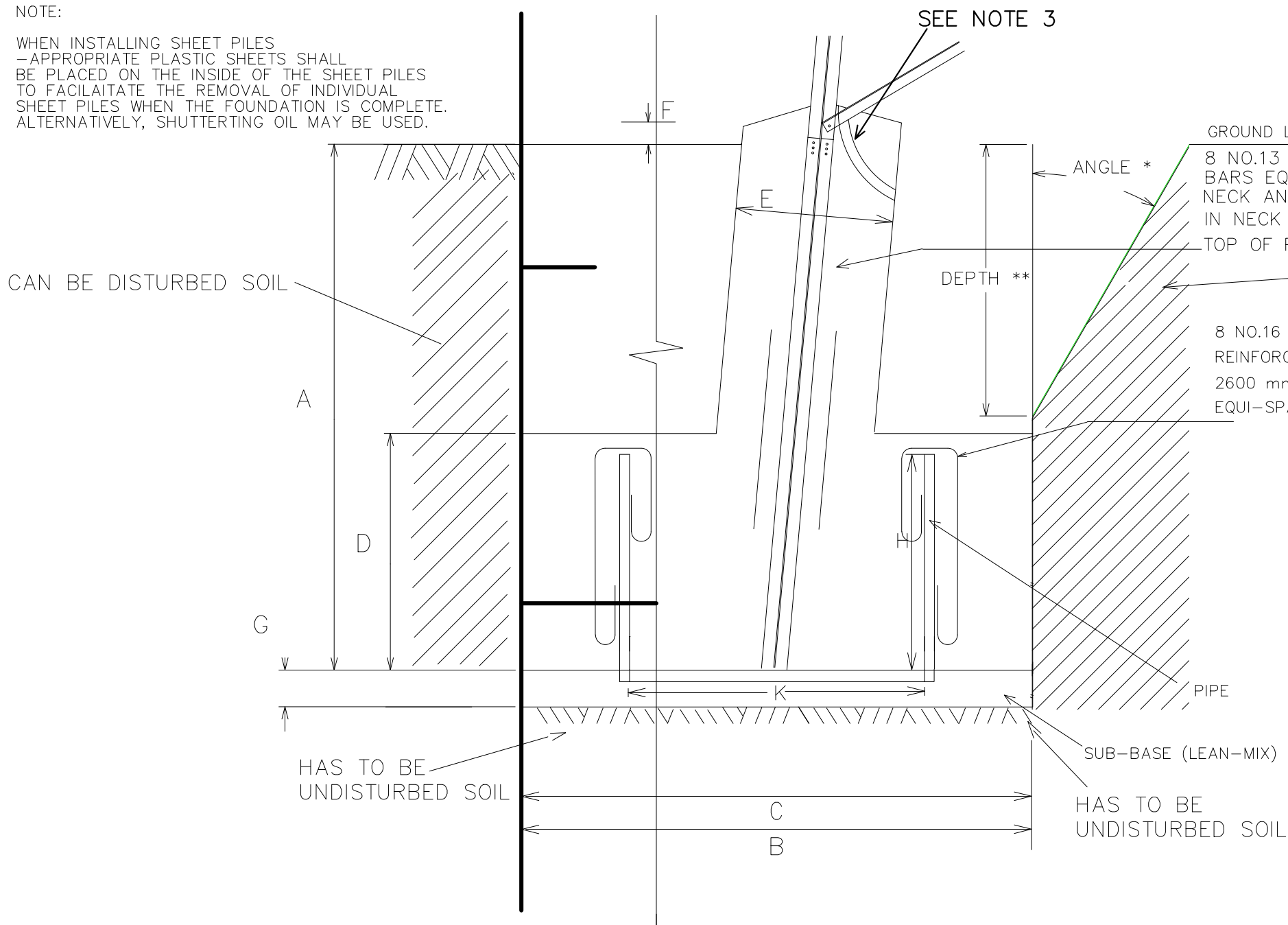
Client Gort Windfarms Ltd.
Project Derrybrien Wind Farm Project
Contract

Drawing title Foundation details for Type 61 steel tower Foundation type 'C'
Production unit Civil & Environmental Engineering

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Drawn S. Bolton	Produced S. Bolton	Verified P. Kavanagh	Approved J. McLoughlin	Approval date 05.08.2020
Client ref.		No. of sheets 1	Size A3	Scale N.T.S
Drawing number QS-000280-01-D460-003-046-000				SHEET REV

CONSTRUCTION METHOD 1:
SHUTTERING

NOTE:
WHEN INSTALLING SHEET PILES
-APPROPRIATE PLASTIC SHEETS SHALL
BE PLACED ON THE INSIDE OF THE SHEET PILES
TO FACILITATE THE REMOVAL OF INDIVIDUAL
SHEET PILES WHEN THE FOUNDATION IS COMPLETE.
ALTERNATIVELY, SHUTTERING OIL MAY BE USED.



CONSTRUCTION METHOD 2:
BATTERED SIDES

* ANGLE AS APPROPRIATE
** DEPTH AS APPROPRIATE

NOTE:
-ASSUME FOUNDATION IS CAST AGAINST DISTURBED SOIL
TYPE CD FOUNDATION - THIS FOUNDATION DESIGN IS GENERALLY
USED IN VERY POOR WET GROUND CONDITIONS.THE DESIGN HAS
BEEN CREATED TO ALLOW EITHER OF THE FOLLOWING
CONSTRUCTION TECHNIQUES:

- 1) USE OF SHUTTERING:
SIDES OF EXCAVATION SHUTTERED TO PREVENT COLLAPSE
OF THE SIDES OF THE EXCAVATION,THIS ALSO CONTROLS VOLUME
OF CONCRETE POURED
- 2) BATTER BACK SIDES OF EXCAVATION:
THE SIDES OF THE EXCAVATION CAN BE BATTERED BACK AS
APPROPRIATE THIS MAY HELP PREVENT COLLAPSE OF THE SIDES
OF THE EXCAVATION
- 3) 50mm HDPE PIPE [FOR FIBRE OPTIC CABLE LINK TO
SUBSTATION]: THE PIPE IS REQUIRED IN ONE APPROPRIATE LEG
FOUNDATION AT END MAST POSITIONS ONLY.MINIMUM BENDING
RADIUS OF PIPE = 500mm.MINIMUM DISTANCE FROM STUB IN
CONCRETE NECK = 100mm. MINIMUM DEPTH BELOW GL EXITING
NECK = 200mm.PIPE SHOULD BE SEALED TO PREVENT WATER
BUILD UP.

Concrete to be in accordance with ESB specification No. PG 404 - S27(Latest Revision)

DIMENSION	A	B	C	D	E	F	G	H	K
METRES	3.00	4.1	4.1	1.60	0.80	0.10	0.10	1.0 min	1.2 min

MAX UPLIFT/LEG= 121,291kgs = 1,189.86kN
MAX COMPRESSION LEG= 133,286kgs = 1,307.54kN
TRANSVERSE SHEAR/LEG= 9,117kgs = 89.44kN
LONGITUDINAL SHEAR/LEG= 6,870kgs = 67.39kN
VOLUME OF CONCRETE/LEG(min)= 27.86m (excluding sub-base)
3

0	25.08.20	ISSUED FOR SUBSTITUTE CONSENT	SB	SB	PK	JMcL
Rev	Date	Revision description	Drm	Prod	Ver	App
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division of ESB.

Client	Gort Windfarms Ltd.
Project	Derrybrien Wind Farm Project
Contract	

Drawing title	Foundation details for Type 149E steel tower Foundation type 'D'
Production unit	Civil & Environmental Engineering

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