Ballyloo Substation and Grid Connection

Site Access Report

October 2025

CIVIL AND STRUCTURAL
ENGINEERING ADVISORS LTD.

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County Carlow

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APPENDIX A: DRAWINGS

1 INTRODUCTION

Civil and Structural Engineering Advisors Ltd. is providing engineering consultancy services to Ballyloo Solar Farm Ltd. in relation to a proposed substation and grid connection at Ballyloo, Castletown, Graiguenaspiddoge, Kellistown East, Kellistown West, Kilballyhue, Knockbower, Leagh Or Ballybeg, Linkardstown and Moyle Big (townlands), County Carlow.

This is a Site Access Report for the proposed development.

The proposed development comprises of:

1. A 220kV Air Insulated Switchgear (AIS) or Gas Insulated Switchgear (GIS) electricity substation or a 110kV AIS electricity substation, including two control buildings, associated electrical structures and apparatus, lightning protection, telecom pole, perimeter security fencing, security lighting, water and drainage infrastructure, temporary construction compound to connect to and serve solar farms;

2. Associated grid connection between the proposed substation and the existing 110/220kV Kellis substation comprising 220kV or 110kV underground electricity cables (reflecting final substation option) of c.8.9 km or c. 8.65 km in length to be provided in an excavated trench including associated fibre cable and ducting, and all associated site development and reinstatement works. Two options are proposed after the first c.8.3 km of underground grid connection and for the final c.0.35 – 0.6 km of the underground cable grid connection route comprising (i) cabling in the L30535 public road, or (ii) cabling in private agricultural land;

3. Temporary construction and permanent operational access to the substation from the L3050, vehicular entrance and access track from this public road;

4. All ancillary site development, excavation, construction, landscaping and reinstatement works;

5. The development subject to this application forms part of grid connection and access arrangements which will facilitate the connection of the permitted Ballyloo Solar Farm (Carlow County Council Reference 24/60043 / An Coimisiún Pleanála Reference ABP-322347-25), permitted Park Solar Farm (Carlow County Council Reference 24/60205), and proposed Ballybannon Solar Farm (Carlow County Council Reference 25/60137) to the national electricity grid via the existing 110/220kV Kellis substation. A Natura Impact Statement (NIS) has been prepared in respect of the proposed development. The NIS includes consideration of the permitted Ballyloo and Park Solar Farms and the proposed Ballybannon Solar Farm which are located in County Carlow.

The purpose of this report is to consider the development from an access and transportation perspective. The report is presented in the following sections to allow a detailed engineering appraisal of the local road network in relation to proposed construction and operational traffic:

- The proposed development;
- The site and its context in the local road network;
- Existing and anticipated traffic;

- Delivery routes and *Swept Path Analysis*;
- Vertical and horizontal road geometry;
- Pavement and roadside drainage;
- Sightline appraisal at proposed entrances;
- Proposed mitigation measures.

2 THE PROPOSED DEVELOPMENT

2.1 APPLICATION CONTEXT

The purpose of the proposed development is to transport the electricity generated at the proposed Ballyloo, Park and Ballybannon Solar Farms to the national electricity grid via the existing 220/110kV Kellis substation. The planning status of those solar farms is set out below:

> An application for the Ballyloo Solar Farm was made to Carlow County Council on the 28th February 2024 (Council Reference: 24/60043). The Council issued a Notification of Decision to Refuse Permission on the 25th March 2025 and a First Party Appeal was submitted by to An Coimisiún Pleanála on the 22nd April 2024. Permission was granted by An Coimisiún Pleanála on the 5th September.
>
> An application for the Park Solar Farm was made to Carlow County Council on the 19th July 2024 (Council Reference: 24/60205). The Council issued a Notification of Decision to Grant Permission on the 24th April 2025.
>
> An application for the Ballybannon Solar Farm was made to Carlow County Council on the 22nd May 2025 (Council Reference: 25/60137). At the time of reporting, a decision on this application was still pending.

Early in the project development phase, it was identified that the proposed substation and grid connection may constitute 'strategic infrastructure development' having regard to the provisions of the Planning and Development (Strategic Infrastructure) Act 2006 and established case precedent on such matters. The Act provides that applications for permission/approval for specified private and public strategic infrastructure developments be made directly to An Coimisiún Pleanála. The applicant entered into pre-application consultations with An Coimisiún Pleanála on the 10th February 2025, with a meeting held on 31st March 2025. An Coimisiún confirmed their opinion that the proposed development meets the definition of 'strategic infrastructure development' as defined in the legislation by means of a formal notice dated 14th July 2025. The subject application is made pursuant to this determination.

In addition to the above pre-application consultation, the applicant also requested a meeting under section 182F of the Planning and Development Act 2000, as amended, to determine An Coimisiún Pleanála's opinion as to flexibility with regard to the proposed development. The applicant proposed design flexibility for the following development:

The substation will be either 110kV or 220kV voltage. The 110kV substation will use Air Insulated Switchgear (AIS) switchgear, whilst the 220kV substation might use AIS or Gas Insulated Switchgear (GIS) depending on the requirements of EirGrid.

The underground cable grid connection from the proposed substation to the existing 110/220kV Kellis substation will be at either 110kV or 220kV voltage.

The underground cable grid connection is located primarily in the public road network. However, there are two options proposed for its final entry into the existing 220/110kV Kellis substation.

a. Option A is to leave the L30535 local road and enter onto private lands where it will cross agricultural farmland into the existing 220/110kV Kellis substation.

b. Option B is to be situated within the L30535 local road which provides road access into the existing 220/110kV Kellis substation.

It should be noted that the options described above apply to both the 110kV and 220kV underground grid connection cables.

An Coimisiún confirmed that the above referred design flexibility can be facilitated by means of a formal notice dated 14th July 2025. It should be noted that the red line development application boundary is identical for the substation options and the grid connection options.

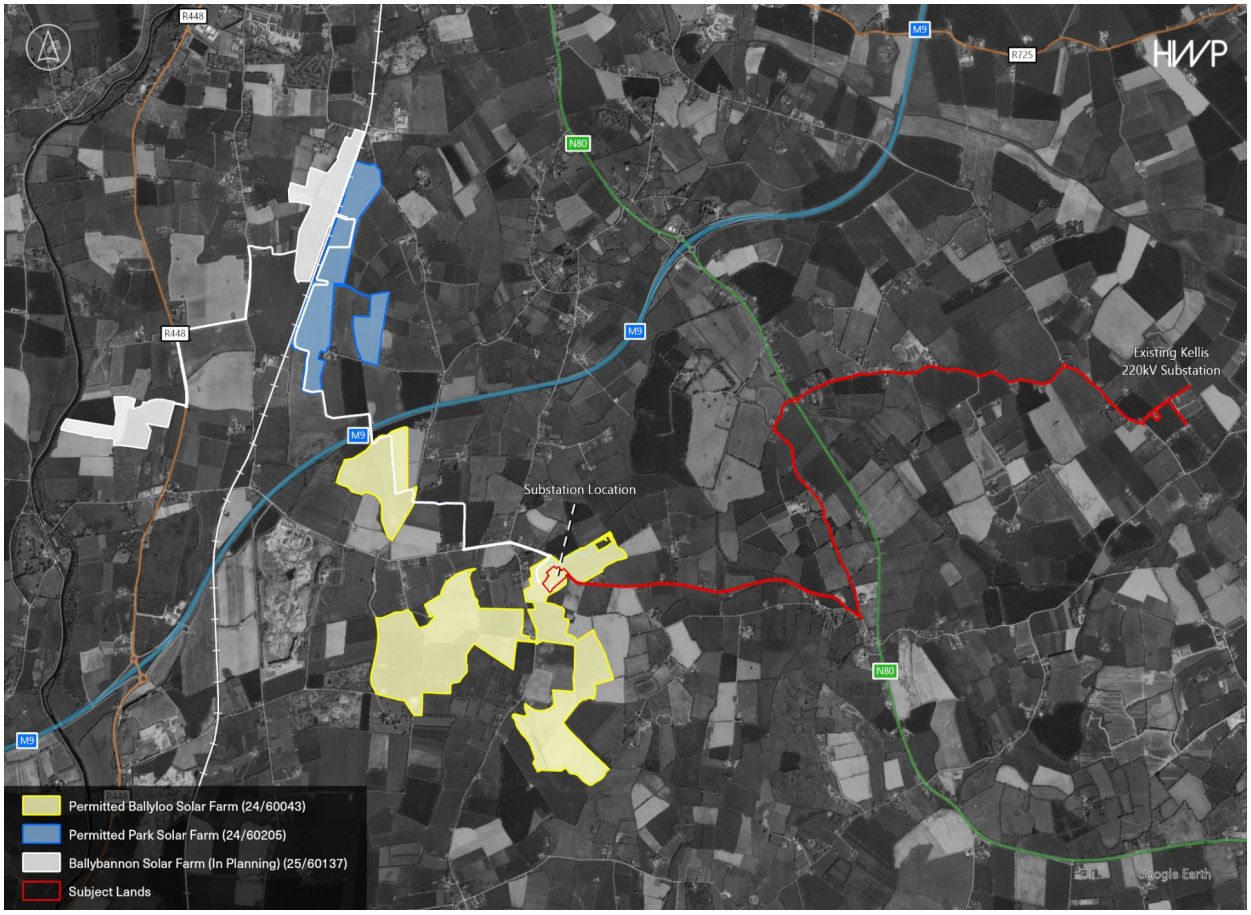


Figure 2.1: Site Context

2.2 PROPOSED DEVELOPMENT

General

The electricity produced from the Ballyloo, Park and Ballybannon Solar Farms will be transported into the proposed substation.

The proposed substation will be either an Air Insulated Switchgear (AIS) or Gas Insulated Switchgear (GIS) tail fed substation with the associated grid connection comprising underground cabling which will connect into the existing 220/110kV Kellis substation.

As set out in Section 1, the applicant proposes design flexibility for the following development. The proposed development comprises of:

6. A 220kV Air Insulated Switchgear (AIS) or Gas Insulated Switchgear (GIS) electricity substation or a 110kV AIS electricity substation, including two control buildings, associated electrical structures and apparatus, lightning protection, telecom pole, perimeter security fencing, security lighting, water and drainage infrastructure, temporary construction compound to connect to and serve solar farms;

7. Associated grid connection between the proposed substation and the existing 110/220kV Kellis substation comprising 220kV or 110kV underground electricity cables (reflecting final substation option) of c.8.9 km or c. 8.65 km in length to be provided in an excavated trench including associated fibre cable and ducting, and all associated site development and reinstatement works. Two options are proposed after the first c.8.3 km of underground grid connection and for the final c.0.35 – 0.6 km of the underground cable grid connection route comprising (i) cabling in the L30535 public road, or (ii) cabling in private agricultural land;

8. Temporary construction and permanent operational access to the substation from the L3050, vehicular entrance and access track from this public road;

9. All ancillary site development, excavation, construction, landscaping and reinstatement works;

10. The development subject to this application forms part of grid connection and access arrangements which will facilitate the connection of the permitted Ballyloo Solar Farm (Carlow County Council Reference 24/60043 / An Coimisiún Pleanála Reference ABP-322347-25), permitted Park Solar Farm (Carlow County Council Reference 24/60205), and proposed Ballybannon Solar Farm (Carlow County Council Reference 25/60137) to the national electricity grid via the existing 110/220kV Kellis substation. A Natura Impact Statement (NIS) has been prepared in respect of the proposed development. The NIS includes consideration of the permitted Ballyloo and Park Solar Farms and the proposed Ballybannon Solar Farm which are located in County Carlow.

The operational lifetime of the solar farms is assumed to be 40 years. However, following the decommissioning of the solar farm, it is envisaged that the substation (and underground cable grid connection) will remain in situ as a valuable functioning and operational part of the electricity transmission network managed by the Transmission Systems Operator, EirGrid.

2.2.1 Substation

110kV AIS Substation

The substation will be based on EirGrid design specifications. The 110kV AIS substation will consist of both EirGrid and Independent Power Producer (IPP) including IPP Control Room buildings, HV electrical equipment and associated infrastructure including palisade fences and concrete post and rail fences. The installation of HV electrical equipment will include a Transformer (TRAFO) with associated equipment along with:

Cable Sealing End (CSE);

Surge Arrestor (SA);

Earth Disconnect (DT);

Current /Voltage Transformer (CT/VT);

House Transformer (HT);

Circuit Breaker (CB);

Lightning Mast (LM);

Diesel Generator;

Security Fencing and Cameras;

Drainage, access etc.

Earthworks will be undertaken so the compound is level, with a finish compound level of 100.72m.

The 110kV AIS substation layout is indicated in Figure 2.2.

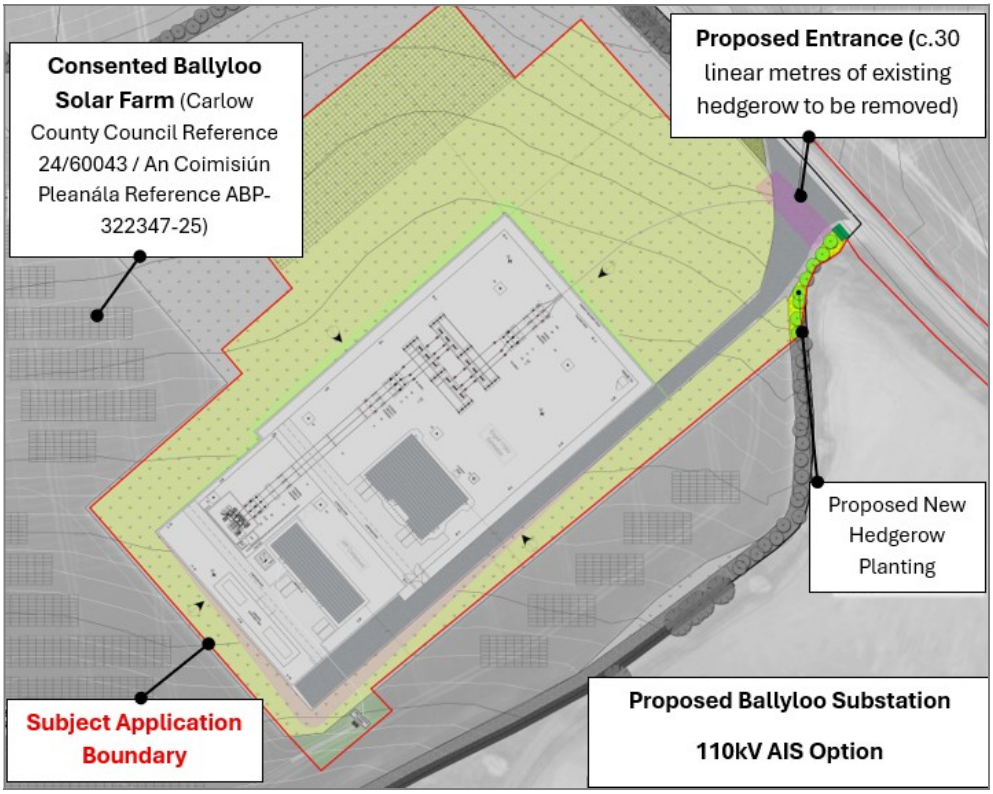


Figure 2.2: Proposed 110kV AIS Substation Option

220kV AIS Substation

The 220kV AIS substation will comprise the same infrastructure and equipment as the 110kV AIS substation option. The key difference is that the clearance distances required between individual components becomes greater at 220kV and therefore it has a larger footprint.

The 220kV AIS substation layout is indicated in Figure 2.3.

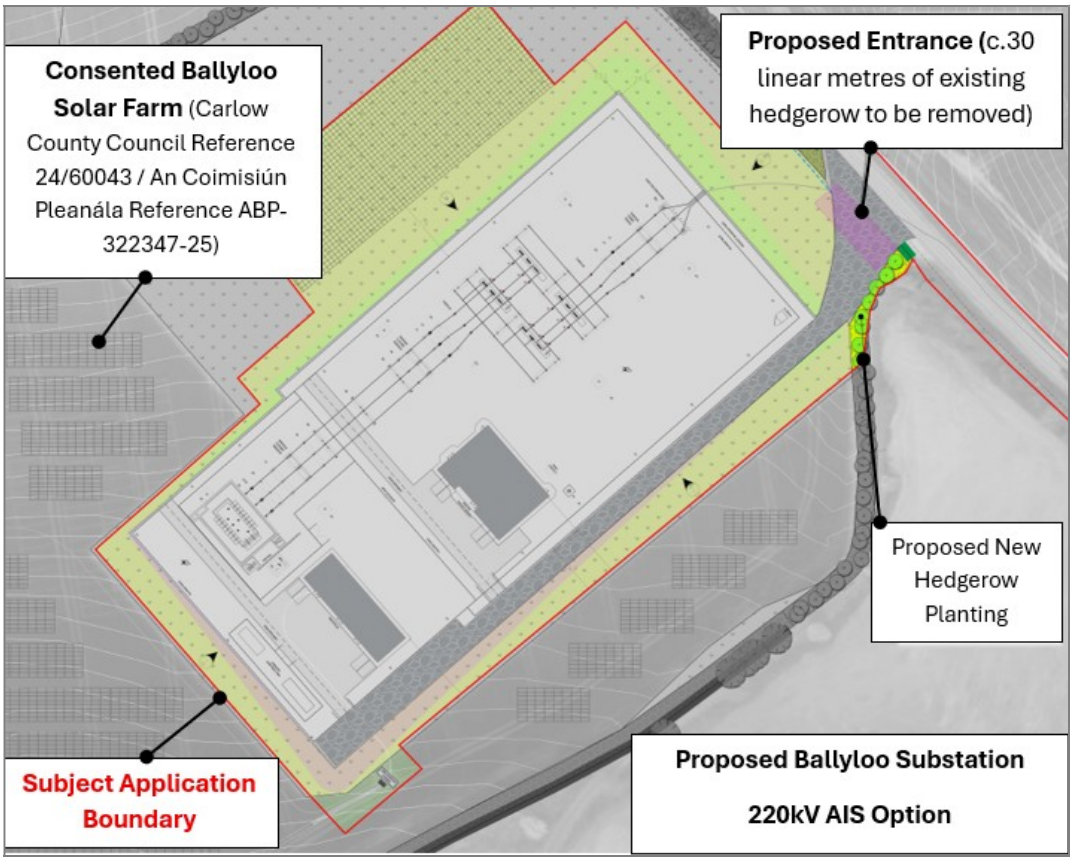


Figure 2.3: Proposed 220kV AIS Substation Option

220kV GIS Substation

The substation will be based on EirGrid design specifications. The substation compound will consist of a two storey GIS substation building, IPP Control Room building, High Voltage (HV) electrical equipment and associated infrastructure including palisade fences and concrete post and rail fences. The installation of HV electrical equipment will include a transformer with associated equipment along with:

Lightning Masts (LM);

Back-Up Diesel Generator;

Harmonic filters if required by EirGrid;

Capacitor Bank if required by EirGrid;

Fire/Blast Wall;

Telecoms Pole.

The 220kV GIS substation layout is indicated in Figure 2.4.

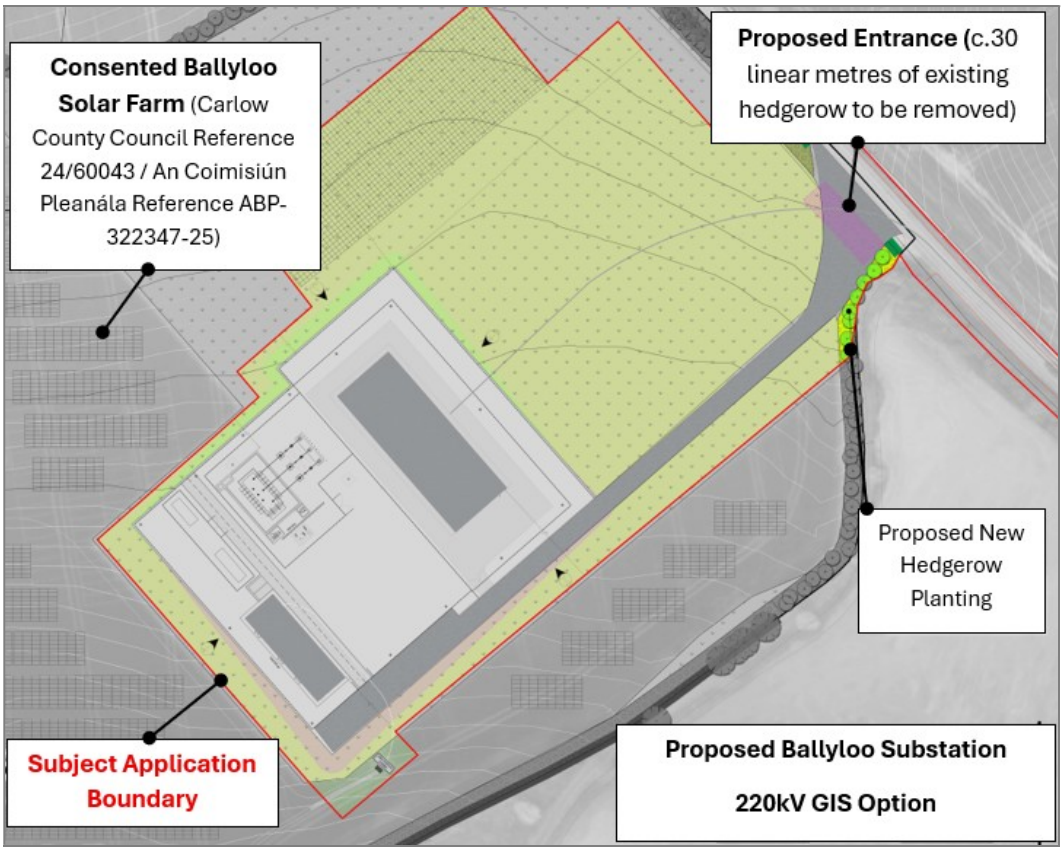


Figure 2.4: Proposed 220kV GIS Substation Option

2.2.2 Substation Access

It should be noted that the red line development application boundary is identical for all substation options.

Construction access to the substation will be provided by private lands, with a new entrance from the public road L3050. c.30 linear metres of existing hedgerow will be removed to facilitate the entrance. The entrance will be suitably splayed and has been subject to sight line and autotrack analysis, with the latter including modelling of abnormal load delivery for the transformer. The entrance will include a linear drain to ensure there is no potential for runoff to the public road.

A compacted access track will extend from the entrance to the substation compound. The track will include a geotextile base and filter membrane and 200 mm of Clause 804 sub-base. There will be sections of temporary track alongside the permanent track to facilitate delivery of the transformer within the site. The autotrack analysis has demonstrated that delivery of the substation transformer can be safely accommodated.

2.2.3 Temporary Construction Compound

As outlined in the submitted site layout plans, it is proposed to provide a temporary construction compound, accessed from the entrance from the L3050. The temporary compound will include the following facilities at a minimum:

Adequate canteen space to allow for all workers during the peak period;

Office space with lighting, heating and internet facilities;

Toilets and adequate welfare facilities for construction staff in accordance with the relevant statutory Health & Welfare guidelines;

Parking space for both light and heavy vehicles;

Designated skips and temporary storage areas.

2.2.4 Surface Water Drainage and Water Services

110kV & 220kV AIS Substations

It should be noted that the surface water drainage proposals are similar for both the 110kV and 220kV AIS substation options described in this report.

Surface water drainage for the substation compound have been designed to mimic the natural drainage patterns of the site and thereby be in accordance with the Best Management Practices (BMPs) of Sustainable Drainage Systems (SuDS).

This is achieved when the following parameters are considered:

The compound construction is formed with permeable stone thus mimicking a soakaway scenario. ESB compound stone is single sized for the first 150mm for safety purposes. It then changes to a graded 6F2 material. The area of this permeable surface is circa 8,315m2 for the 110kV AIS substation option and 13,600m2 for the 220kV AIS substation option.

The main areas to be drained includes the roofs and the compound road. These equate to approximately 1,592m² for the 110kV AIS substation option and 2,023m2 for the 220kV AIS substation option. These areas are modest in themselves and in comparison to the overall compound area. The compound road will be drained via series of road gullies.

Assuming even the most basic of infiltration rates down through the permeable compound stone, the existing greenfield situation is easily maintained.

The surface water generated in the hardstanding areas and in the bunded areas within the substation compound will discharge to soakaway via Class 1 Full Retention Oil Separators. The electrical transformer in the substation is oil filled equipment and, as such, is protected with impermeable bunds. Surface water generated in this bund will be pumped out by an oil sensitive pump ensuring that only non-contaminated water enters the site drainage network.

220kV GIS Substation

Surface water drainage for the substation compound have been designed to mimic the natural drainage patterns of the site and thereby be in accordance with the Best Management Practices (BMPs) of Sustainable Drainage Systems (SuDS).

This is achieved when the following parameters are considered:

The compound construction is formed with permeable stone thus mimicking a soakaway scenario. ESB compound stone is single sized for the first 150mm for safety purposes. It then changes to a graded 6F2 material. The area of this permeable surface is circa 7,660m2 for the GIS substation.

The main areas to be drained includes the roofs and the compound road. These equate to approximately 2,746m². The compound road will be drained via series of road gullies.

The surface water generated in the hardstanding areas and in the bunded areas within the substation compound will discharge to soakaway via Class 1 Full Retention Oil Separators. The electrical transformer in the substation is oil filled equipment and, as such, is protected with impermeable bunds. Surface water generated in this bund will be pumped out by an oil sensitive pump ensuring that only non-contaminated water enters the site drainage network.

2.2.5 Substation Foul Water Drainage

It should be noted that the foul water drainage proposals are the same for all AIS and GIS substation options described in this report.

There are no existing foul sewer water drains on or near the proposed substation site.

The foul drainage proposal must cater for the wastewater generated in the welfare facilities of the proposed substation. These welfare facilities include a toilet and wash hand basin both the EirGrid and IPP control buildings. The station will be unmanned in normal operation so demand for facilities which generate foul flows will be low.

Foul holding tanks are normally used in EirGrid and ESB substations. The foul holding tanks will have a capacity of 5m3 which is a multiple of the foul water generated over three months of normal operation of the station. The foul holding tank will also be inspected by a suitably qualified and indemnified person at these intervals and records of inspections will be held on site for inspection by the local authority.

2.2.6 Substation Water Supply

It is proposed to provide the required potable water demand of the station (all options) with a bored well on site. The potable water demand within the site will be low as the proposed station is to be unmanned. To avoid issues like stagnation in the water supply line and problems resulting from this, there will be a continual water demand of 24 litres per week from automatically flushing WCs within the station.

2.2.7 Grid Connection

The substation will connect to the existing 220/110 kV Kellis substation via a proposed 110kV or 220 kV underground grid connection cable.

The overall length of the grid connection is approximately 8.9km at its longest . The route is shown in Figure 2.5. All works will be carried out in accordance with international best practice and full compliance with health and safety requirements.

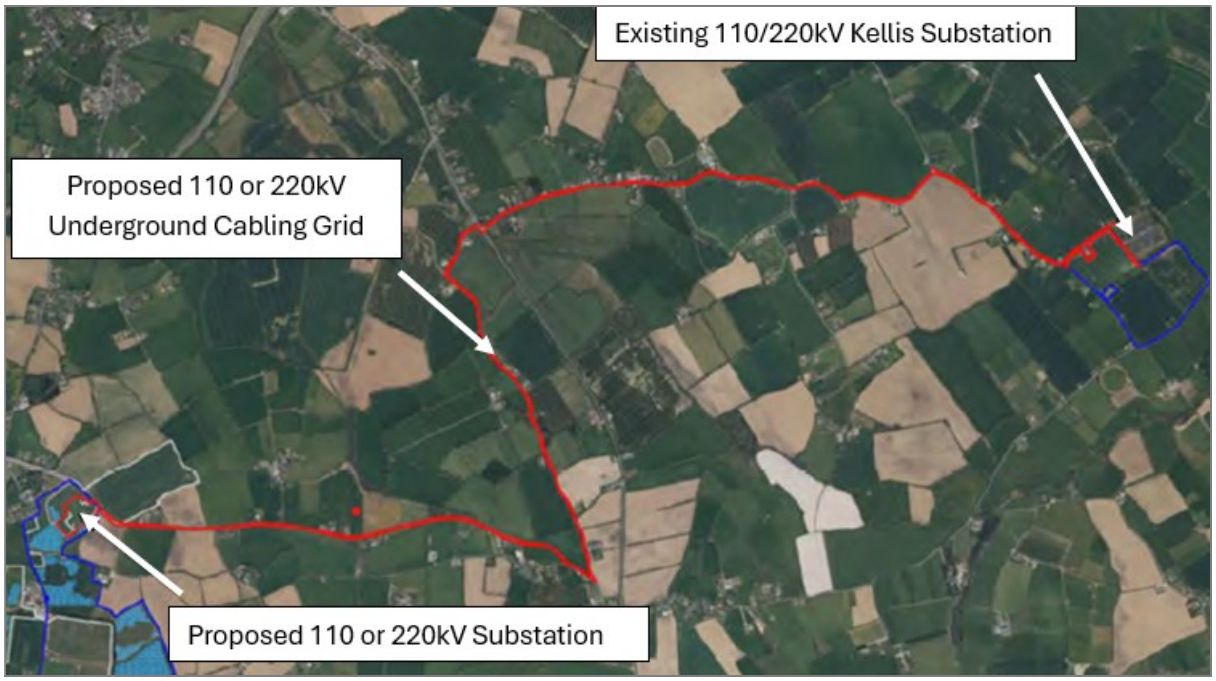


Figure 2.5: Underground Cabling Grid Connection Overview

It should be noted that the red line development application boundary is identical for both the 110kV and 220kV grid connection cable options. The route travels east from the proposed substation on the L3050 before turning north onto the L30504. It then crosses the N80 at Castletown Cross Roads and continues east on the L7148 before turning south onto the L3053. The cable would then turn east onto the L30535 which is the main road access to the existing 220/110kV Kellis substation. There are two options proposed for the final c.0.35-0.6km section accessing the substation. One option (Option A) is within privately owned agricultural lands and the other option (Option B) is via the L30535 local road. Both options are indicated in Figure 2.6. In the case of Option A, c. 1m of hedgerow will be temporarily removed for the purposes of laying the cable into the substation lands. This will be reinstated.

Planning permission is being sought from An Coimisiún Pleanála for a proposed grid connection between the proposed Ballyloo Substation and Kellis 110/220kV Substation, and underground cable run of up to c.8.9km metres which terminates at the boundary of the Kellis 110/220kV substation. As set out in the submitted plans and technical reports, it will be necessary to install a new line bay in the Kellis 220kV substation. This will require an additional short distance of underground cabling into the substation. The connecting line bay will consist of concrete bases, steelwork and electrical equipment similar to the already installed equipment within the station. This additional infrastructure will be subject to a future consenting process and is included for information in this planning application so that a robust assessment can be made of the entire application.

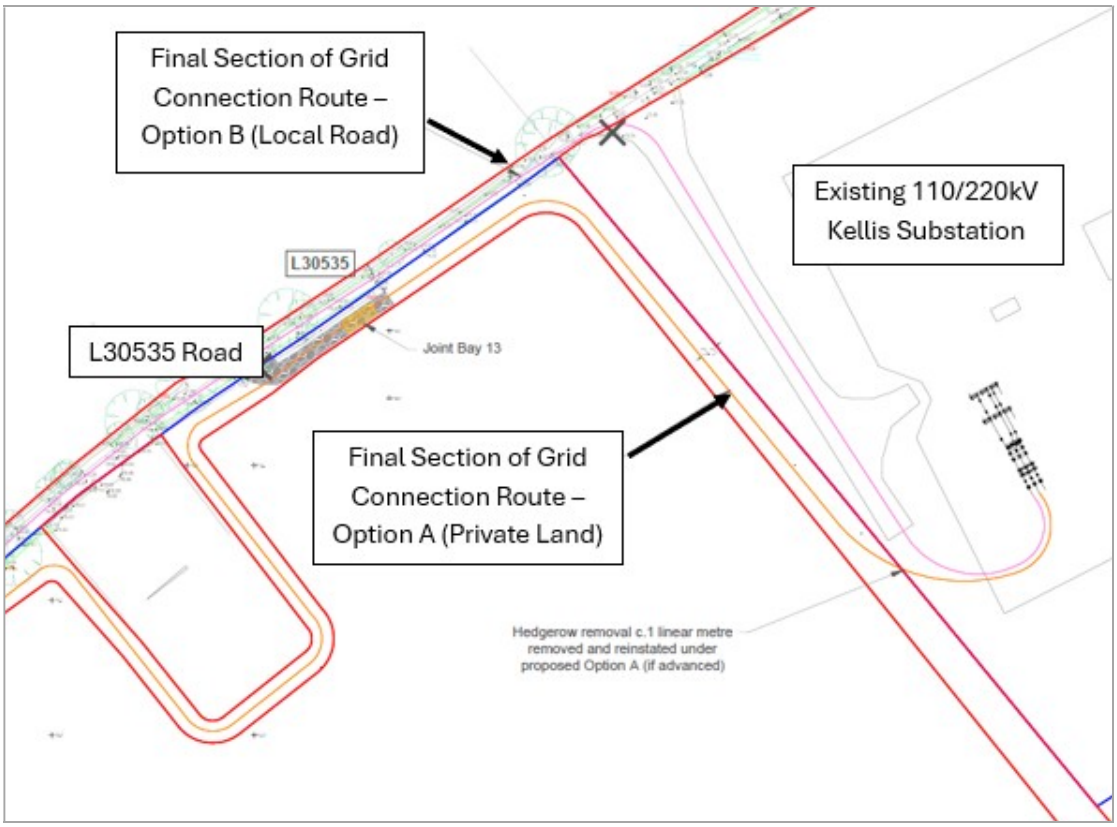


Figure 2.6: Final Underground Cabling Options on Public Road / Private Lands

2.2.8 Site Reprofiling

The subject site is relatively flat in nature but analysis of topographic data confirms that cutting and filling of the existing terrain will be required to establish a level platform for the substation compound.

110kV and 220kV AIS Substations

For the 110kV substation option, the amount of cut to be transported off site is expected to be ca. 3,443m3. Similarly, the necessary amounts of fill material will be transported onto site. This is expected to be ca. 3,838m3. For the 220kV substation option, the amount of cut to be transported off site is expected to be ca. 7,229m3. Similarly, the necessary amounts of fill material will be transported onto site. This is expected to be ca. 7,868m3.

220kV GIS Substation

The amount of cut to be transported off site is expected to be ca. 3,495m3. Similarly, the necessary amounts of fill material will be transported onto site. This is expected to be ca. 3,472m3.

In all cases, any surplus soil will be disposed of offsite by means of an Article 27 declaration (European Communities (Waste Directive) Regulations 2011 (S.I. No. 126 of 2011)) from the EPA or by means of transfer to an appropriate and licensed waste disposal facility.

2.2.9 Site Restoration and Landscaping

This will involve the reinstatement of all other excavated materials and associated landscaping works. It will include the replacement of topsoil in disturbed ground areas such as access tracks and the removal of the construction compound and other temporary work areas. The proposed development provides for the removal c.30 linear metres of hedgerow at the substation site entrance and c.1 linear metre removed and reinstated under proposed Option A (if advanced) where the cable alignment passes through a field boundary near the Kellis 220kV sub. There is some 32 linear meters of new hedgerow proposed and 15 linear meters of bolstered hedgerow within the project red-line boundary. The application is accompanied by 3 no. landscape mitigation plans by Macro Works, reflecting the three substation options that may be implemented.

2.2.10 Other Planned Works

It is intended that the proposed substation and grid connection will service the permitted Ballyloo and Park Solar Farms, as well as the proposed Ballybannon Solar Farm which is under consideration by Carlow County Council.

Carlow County Council Reference 24/60043 / An Coimisiún Pleanála Reference ABP-322347-25

An application for the Ballyloo Solar Farm was made to Carlow County Council on the 28th February 2024. The solar farm application design as submitted to Carlow County Council comprised of the following:

> *A 10 Year Planning Permission for a solar farm with a total area of circa 192 hectares in the townlands of Ballybar Upper, Ballyloo, Ballyryan, Garryhundon, and Linkardstown, in County Carlow. The solar farm will consist of solar panels on ground mounted frames, 30 no. single storey electrical inverter/transformer stations, 4 no. single storey spare parts containers, 4 no. Ring Main Units, 8 no. weather stations, underground electrical ducting and cabling within the development site, private lands and within the L3051, L3052 and L3050 public roads to connect solar farm field parcels, security fencing, CCTV, access tracks, 2 no. stream deck crossings and 1 no. horizontal directional drill, temporary construction compounds, landscaping and all associated ancillary development and drainage works. Construction and operational access will be via 4 no. entrances from the L3051, L3052 and L3050. The operational lifespan of the solar farm will be 40 years and planning permission is requested for this duration. A Natura Impact Statement (NIS) has been prepared and will be submitted to the Planning Authority with the application.*

The scheme was revised at Request for Further Information stage to include, inter alia, a reduction in the paneled area including omission of c.11.6 ha easternmost field (Parcel 4) of the project. The Council issued a Notification of Decision to Refuse Permission on the 25th March 2025 and a First Party Appeal was submitted by to An Coimisiún Pleanála on the 22nd April 2024. Permission was granted by An Coimisiún Pleanála on the 5th September.

Carlow County Council Reference 24/60205

An application for the Park Solar Farm was made to Carlow County Council on the 19th July 2024. The solar farm application design as submitted to Carlow County Council comprised of the following:

> *A 10 Year Planning Permission for a solar farm with a total area of circa 73 hectares. The solar farm will consist of solar panels on ground mounted frames, 11 no. single storey electrical inverter/transformer stations, 3 no. single storey spare parts containers, 2 no. Ring Main Units, 3 no. weather stations, underground electrical ducting and cabling within the development site, private lands and within the L1010, L3051, L3052 and L3050 public roads to connect solar farm field parcels, security fencing, CCTV, access tracks, 3 no. watercourse/drain deck crossings and 2 no. horizontal directional drill crossings (under M9 motorway and L3050), temporary construction compounds, landscaping and all associated*

ancillary development and drainage works. Construction and operational access will be via 2 no. entrances from the L1022 and L1010. Sections of the proposed underground electrical cabling will traverse the solar farm proposed under Carlow County Council Reference 24/60043, but will not alter infrastructure proposed under that application. The operational lifespan of the solar farm will be 40 years and planning permission is requested for this duration. A Natura Impact Statement (NIS) has been prepared and will be submitted to the Planning Authority with the application.

The Council issued a Notification of Decision to Grant Permission on the 24th April 2025. The applied conditions provided for the removal of Parcel 1 from the permitted solar farm.

Carlow County Council Reference 25/60137

An application for the Ballybannon Solar Farm was made to Carlow County Council on the 22nd May 2025 for the following development:

A 10 Year Planning Permission for a solar farm with a total area of circa 57 hectares in the townlands of Ballybannon, Ballybar Lower, Ballybar Upper, Ballycarney, Ballyloo, Cloghna, Linkardstown and Park in County Carlow. The solar farm will consist of solar panels on ground mounted frames, 8 no. single storey electrical inverter/transformer stations, 2 no. single storey spare parts containers, 1 no. Ring Main Unit, 3 no. weather stations, underground electrical ducting and cabling within the development site, private lands and within the L4038, L8185, R448, L3051, L3052 and L3050 public roads to connect solar farm field parcels, security fencing, CCTV, access tracks, 5 no. watercourse/drain deck crossings and 2 no. horizontal directional drill crossings (under M9 motorway and the Dublin - Waterford railway), temporary construction compounds, landscaping and all associated ancillary development and drainage works. Construction and operational access will be via 2 no. existing entrances from the R448 and L1010. Sections of the proposed underground electrical cabling will traverse the solar farms proposed under Carlow County Council References 24/60043 and 24/60205, but will not alter infrastructure proposed under these applications. The operational lifespan of the solar farm will be 40 years and planning permission is requested for this duration. A Natura Impact Statement (NIS) has been prepared and will be submitted to the Planning Authority with the application.

At the time of reporting, a decision on this application was still pending.

3 THE SITE AND CONTEXT

3.1 SITE LOCATION

The site is located at Ballyloo, Castletown, Graiguenaspiddoge, Kellistown East, Kellistown West, Kilballyhue, Knockbower, Leagh Or Ballybeg, Linkardstown and Moyle Big (townlands), County Carlow at Latitude 52.77679 N and Longitude 6.89744 W (substation). The site is approximately 7km south of Carlow. Figures 3.1 and 3.2 shows the location of the site. Figure 3.3 shows the proposed site entrance and local road network.



Figure 3.1: Location of Site (© OSI).



Figure 3.2: Location of Site – 7km South of Carlow

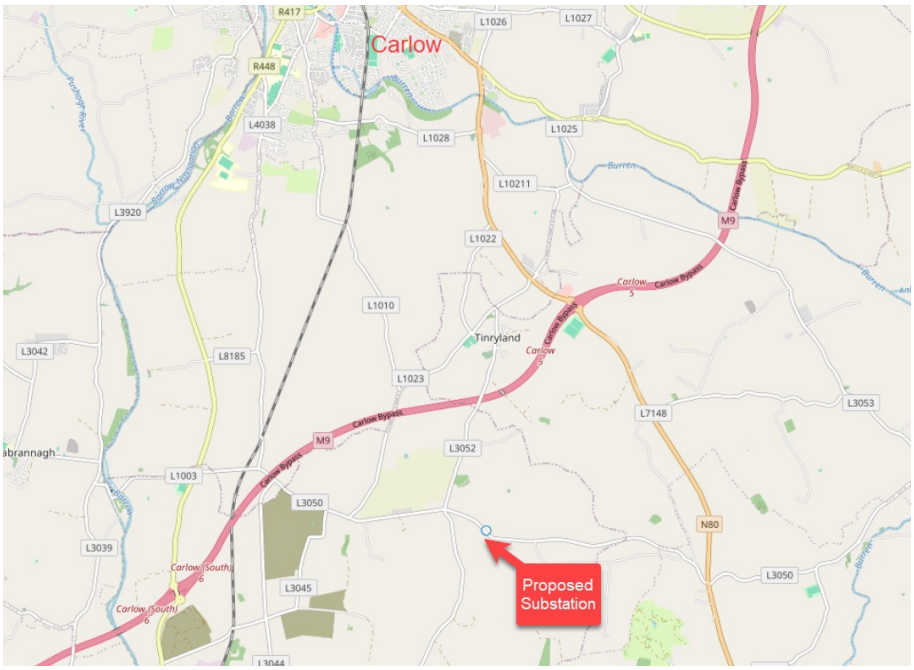


Figure 3.3: Local Road Network and Proposed Site Entrance L-3050

3.2 ROAD NETWORK IN THE VICINITY OF THE SITE

The site of the proposed substation is well served by the national and local road network. The site is located South of the M9 (Kildare – Waterford) motorway and west of the N80 (Tullamore – Enniscorthy) National Secondary Road. It is currently accessed by local road L-3050 connecting to the N80 and the L-3045 connecting to the M9 via the R-488 Regional Road. It is proposed to access the substation via the L-3050 (Entrance 1). An image of the proposed entrance to the substation is shown in Figure 3.4.

The road geometry, pavement condition and drainage of the local roads are considered in Sections 6 and 7 of this report.



Figure 3.4: Proposed Location of Site Entrance 1 (L-3050)

3.3 TOPOGRAPHY AND LAND USE

The site is generally located between the Burren River Valley to the East and the Barrrow River Valley to the West on topography characterised by gentle gradients. There are no significant inclines nor other topographical features impacting on the current road geometry which is free of steep gradients and hairpin bends. Entrance 1 is at an elevation of 101mOD. The site and its surrounds are predominantly in agricultural use.

4 TRAFFIC

4.1 ANTICIPATED TRAFFIC

It is anticipated that the substation will be constructed in conjunction with the permitted Ballyloo Solar Farm and the total construction period is expected to be c.24 months. A detailed breakdown of the principal construction phase activities and their associated construction vehicle trips is provided in Table 4.1 overleaf.

Over the 24 month period, the average number of return trips is 58 per week with a daily average of 10. The peak number of return trips to the site is 113 per week with a daily average of 21. This peak activity is associated with the delivery and installation of solar farm panels in Months 17 and 18. Vehicle numbers reduce substantially in the final months of the programme. Measures to mitigate the temporary construction traffic on the local road network is described in Section 9.

On completion of the works and commissioning of the solar farm, it will be an unmanned facility which will be remotely monitored. Operational and maintenance activities in relation to the solar farm and substation will generate occasional vehicle trips, estimated at 2 – 4 van or tractor/trailer type vehicles per month.

4.2 TRAFFIC ASSOCIATED WITH EXISTING LAND USE

The land parcels forming the proposed solar farm site currently comprise of working farms. The estimated existing traffic associated with agricultural activity at the site is detailed in Table 4.2. This information was derived from several farm traffic surveys undertaken for recent solar farm projects. The table shows return trips to the farms over a 52-week period. The total number of return trips in this period amounts to 552 per annum, or 46 per month (averaged over the 12 month period). Once construction of the substation commences, vehicle trips associated with this agricultural activity will cease. After a temporary increase in traffic numbers during the construction phase, the absence of agricultural vehicles from the local road network will result in a reduction of traffic on the network. The monthly average return trips are expected to drop from the current 46 return trips to a maximum of 4 trips per month during the solar farm's operational phase.

Activity	Vehicle Type	Approximate No. of Trips
Silage making	Tractors/trailers, loading shovels, harvesters (10 tonne/15 tonnevehicles)	135
Feed delivery	Articulated Trucks (20 tonne vehicles)	42
Milk Collection	Articulated Tankers (20 tonne vehicles)	75
Animal sales and movement	Tractors/trailers and single/double axletrucks (15 tonne vehicles)	120
Grain extraction	Tractors with double-axle trailers	180
Total		552

Table 4.2: Traffic Associated with Existing Agricultural Land Use.

	Estimated Construction Programme & Vehicle Numbers																							
		Construction Programme (Months)																						
	Week	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
Substation Construction	Enabling Works	175	175	150																					
	Civil Works				20	20	20	20	20	20	20														
	Electrical Works											20	20	15	10	5									
Grid Connection Construction	Civil and Electrical Works											205	205	205	205	205	205	205	205						
Substation Electrical Commissioning	Pre-commissioning																								
	ESB Commissioning																								
Solar Farm Construction	Solar Farm Site Set Up & Installation							264.4	344	158.4	223.7	112.6	112.6	112.6	142.8	135.9	135.9	247	247	242.8	17	17	4	118.1	71
Solar Farm Electrical Commissioning	Electrical Commissioning																					100	100	80	
	Close Out																							80	80
	Estimated Vehicles Per Month	**175**	**175**	**150**	**20**	**20**	**20**	**284.4**	**364**	**178.4**	**243.7**	**337.6**	**337.6**	**332.6**	**357.8**	**345.9**	**340.9**	**452**	**452**	**242.8**	**17**	**117**	**104**	**278.1**	**151**
	Estimated Vehicles Per Week	**43.75**	**43.75**	**37.5**	**5**	**5**	**5**	**71.11**	**91**	**44.59**	**60.93**	**84.4**	**84.4**	**83.15**	**89.45**	**86.47**	**85.22**	**113**	**113**	**60.7**	**4.25**	**29.25**	**26**	**69.53**	**37.8**
	Estimated Vehicles Per Day (5.5 days)	**8**	**8**	**7**	**1**	**1**	**1**	**13**	**17**	**8**	**11**	**15**	**15**	**15**	**16**	**16**	**15**	**21**	**21**	**11**	**1**	**5**	**5**	**13**	**7**
	Peak Daily Vehicles	**21**																							
	Peak Hourly Vehicles	**2.625**																							
	Average Daily Vehicles	**10**																							
	Average Hourly Vehicles	**1**																							

Table 4.1: Likely Vehicles to be used to construct Ballyloo Solar Farm and Substation

5 DELIVERY ROUTE AND SWEPT PATH ANALYSIS

5.1 PROPOSED DELIVERY ROUTE FOR SUBSTATION CONSTRUCTION

5.1.1 Route to Site Entrance 1 (Substation)

It is proposed to access Entrance 1 of the site via the M9 Junction 6, R448 and L-3050. Figure 5.1 shows the proposed delivery route. A *Swept Path Analysis* of the proposed route showed no difficulties with this route for the largest delivery vehicle proposed for the construction stage of the scheme.

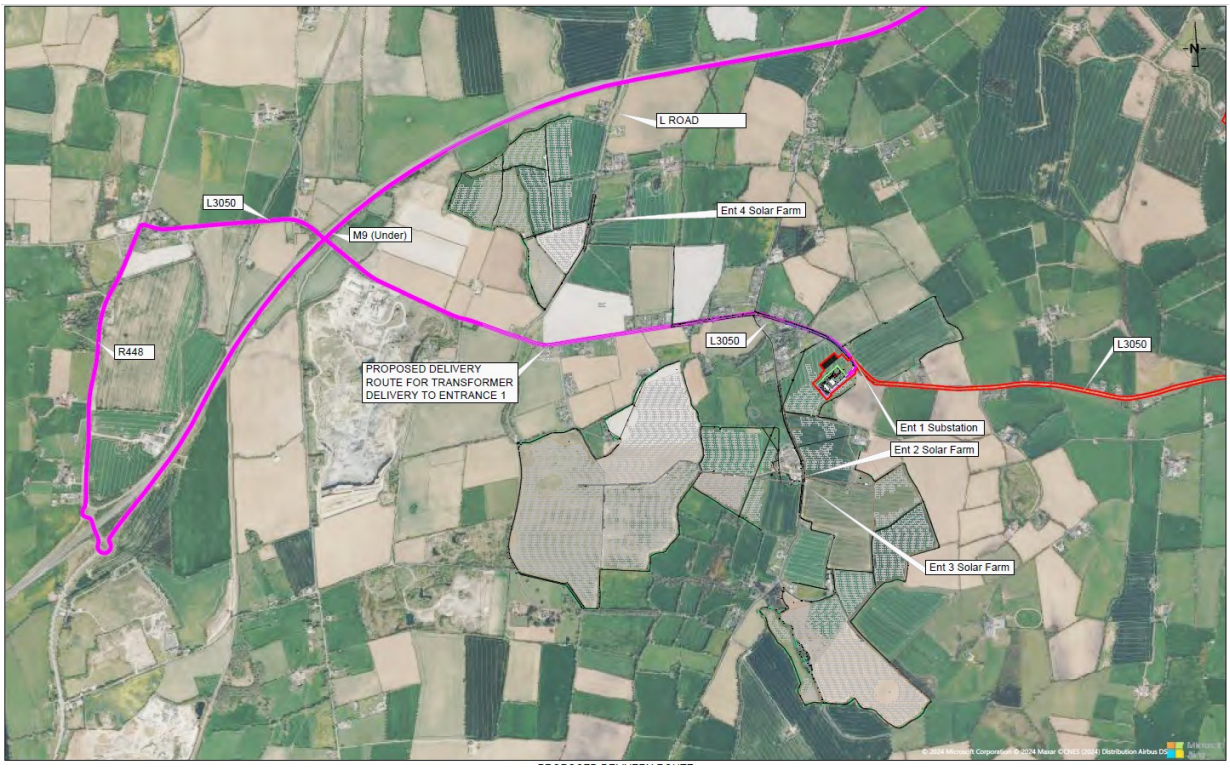
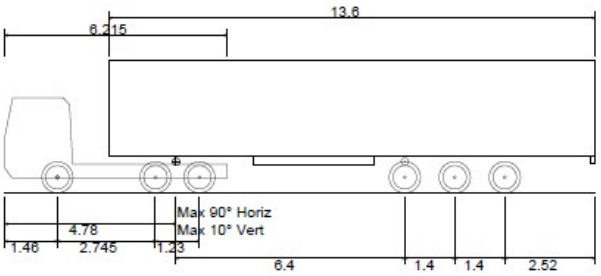


Figure 5.1: Route to Site Entrance 1 (L-3050) – Detailed Drawings are provided in the Appendix

5.2 VEHICLE TYPES FOR SWEPT PATH ANALYSIS

A *Swept Path Analysis* of the delivery routes and site entrances has been conducted using specialist software (AutoTrack by AutoDesk). *Swept Path Analysis* is helpful to identify areas on vehicle routes where trailers overfly pavement edges when turning movements are being conducted. Such areas require consideration to ensure there are no obstacles present to obstruct vehicle movements. Temporary removal of roadside features such as utility poles and boundary fences is sometimes required to facilitate vehicle movements.

The *Swept Path Analysis* of the delivery route and site entrance is based on the largest vehicles likely to require access to the site during the construction phase of the proposed development. In this case, the Vehicle Type 1 is a 40ft articulated lorry for general deliveries as shown in Figure 5.2. The exact dimensions and axle locations of the vehicle are taken from the Road Safety Authority's publication "Guidelines on Maximum Weights and Dimensions of Mechanically Propelled Vehicles and Trailers including Manoeuvrability" (current version dated March 2020). Vehicle Type 2 is an abnormal vehicle which will be used to transport large components such as transformers to the substation. This vehicle is shown in Figure 5.3.



Articulated Vehicle with Twin Steered Tractor	
Overall Length	16.500m
Overall Width	2.550m
Overall Body Height	3.691m
Min Body Ground Clearance	0.426m
Max Track Width	2.500m
Lock to lock time	6.00s
Kerb to Kerb Turning Radius	6.987m

Figure 5.2: Swept Path Analysis Vehicle Type 1: 40t Articulated Vehicle for general deliveries

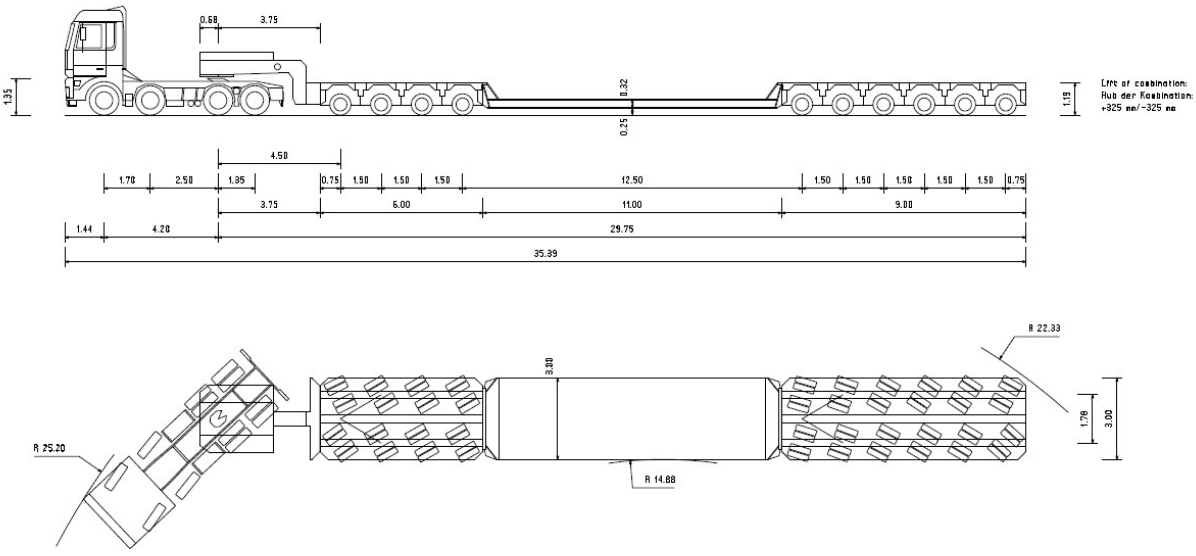


Figure 5.3: Swept Path Analysis Vehicle Type 2: Abnormal Load Vehicle (Full drawing in Appendix)

5.3 SWEPT PATH ANALYSIS –ENTRANCE 1 - L-3050

The Swept Path Analysis of Entrance 1 is provided in Figure 5.4. The analysis shows that the delivery vehicles can access and egress the site without the need for any works to the L-3050. Sight lines are discussed in Section 8 of this report.

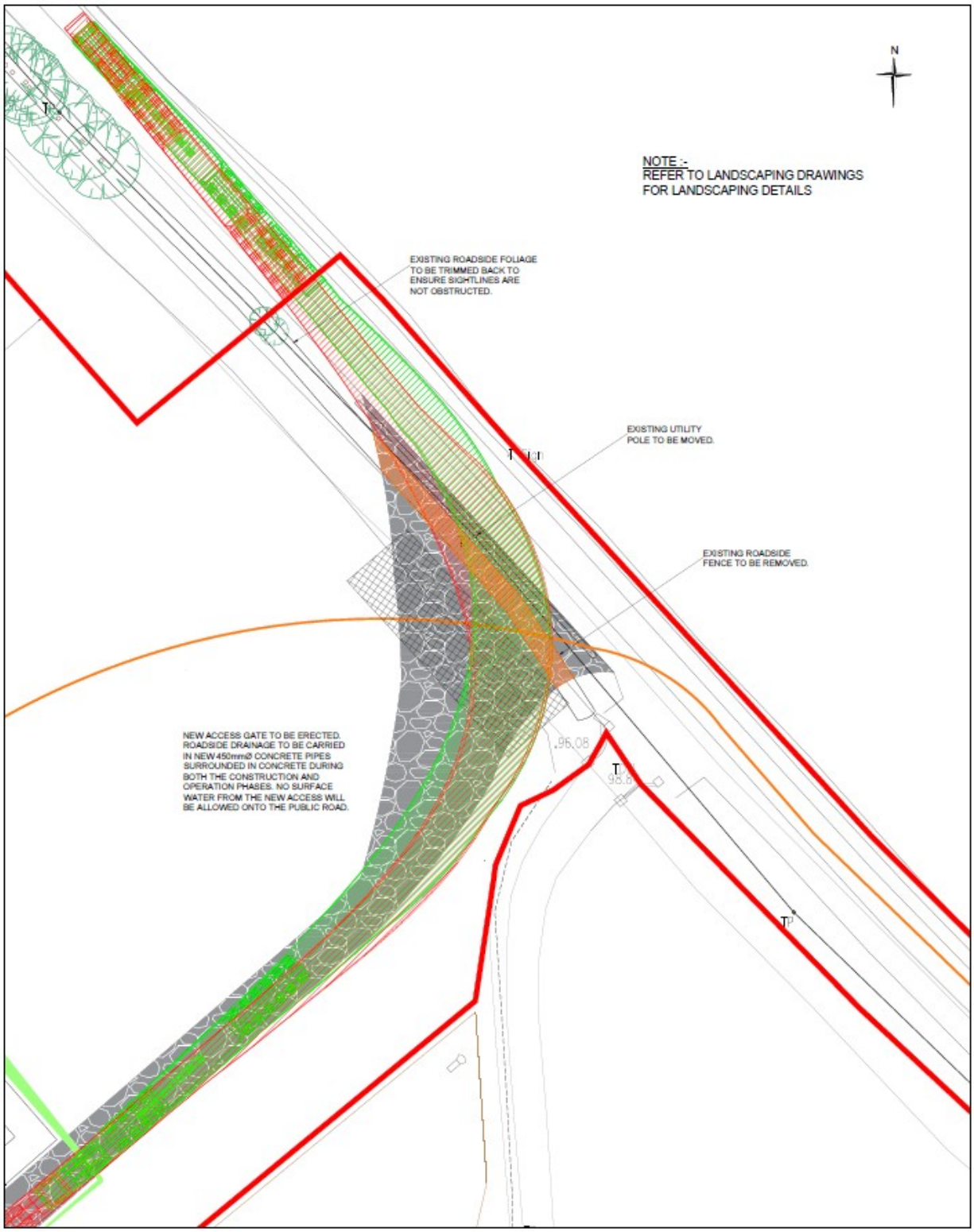


Figure 5.4: Swept Path Analysis of Entrance 1. (Detailed drawing in Appendix A).

6 VERTICAL AND HORIZONTAL ROAD GEOMETRY

6.1 VERTICAL GEOMETRY

It is proposed that guidance documents from the wind farm industry and the forestry industry provide a basis for the vertical geometry review for construction vehicles to the proposed substation development. These guidance documents are:

- Vestas Transportation Guidelines V52.
- COFORD Forest Road Manual – Guidance for the Design, Construction and Maintenance of Forest Roads.

These documents allow access routes to be appraised in terms of the ability of delivery vehicles to access and egress construction sites for energy projects with regard to vertical geometry. The maximum gradients permitted in these guidance documents are:

- Vestas Transportation Guidelines V52 – 14%.
- Forest Roads Manual – Maximum Engineered Track Gradient – 16.7%.

For precautionary purposes, the lower figure of 14% will be used to assess the vertical geometry in relation to the proposed development.

There are no locations on the proposed delivery routes where the gradient exceeds 14%. The road gradients on the proposed route are shallow. The road level at Entrance 1 is approximately 101mOD. The average gradient from the junction of the R448 / L-3050 to Entrance 1 is 1.45%. A review of the vertical geometry for crests and dips that could cause difficulties for long wheelbase delivery vehicles was undertaken and no significant crests nor dips in the existing alignment were found.

6.2 HORIZONTAL GEOMETRY

For the horizontal geometry review, the same guidance documents as those listed in Section 6.1 form the basis of the review and they are supplemented by the Swept Path Analysis described in Section 5 of this report.

The horizontal geometry design parameters from the guidance documents are:

- Vestas Transportation Guidelines V52: Minimum Inner Bend Radius: 3m, Minimum Outer Bend Radius 27.5m.
- Forest Roads Manual: Desirable Minimum Radius for Curves: 20m; Absolute Minimum Bend Radius at Hairpins: 12m.

The existing horizontal geometry of the proposed route was found to be adequate in accordance with these parameters. The Swept Path Analysis of the proposed delivery route showed that no works are required to the local road network to facilitate the passage of a 40ft articulated lorry or the abnormal load vehicle to and from the site (see Section 5).

6.3 PAVEMENT WIDTH

Pavement widths measured on site (R448, L-3050) were typically in the range 5.0m to 6.5m. The maximum width of mechanically propelled vehicle permitted on the public road network is 2.7m. The maximum width of a vehicle together with its load is 2.9m (Figure 6.1). The width of the abnormal load vehicle is 3.092m (Figure 5.2). Further information with regard to road widths and provision of passing bays can be found in Section 9.

MAXIMUM WIDTH

THESE DIMENSIONS DO NOT APPLY TO A LAND IMPLEMENT OR VEHICLE FOR GRASS CUTTING, HEDGE-TRIMMING OR FORESTRY OPERATIONS WHILE USED IN THE DAY TIME, OR A LAND IMPLEMENT USED DURING LIGHTING UP HOURS FROM JULY TO AUGUST INCLUSIVE, PROVIDED THAT THE VEHICLE COMPLIES WITH THE ROAD TRAFFIC (LIGHTING OF VEHICLES) REGULATIONS 1963 (S.I. NO. 189 OF 1963).

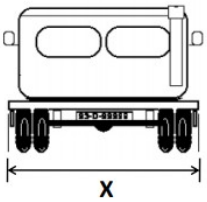
DESCRIPTION	WIDTH (X)	IMAGE
AGRICULTURAL TRAILER / PIECE OF INTERCHANGEABLE TOWED EQUIPMENT	2.55m[8]	
CONDITIONED VEHICLE	2.6m	
LARGE TRACTOR	2.75m	
PASSENGER VEHICLE WITH SEATING CAPACITY FOR MORE THAN EIGHT PASSENGERS	2.55m	
REFRIDGERATED VEHICLE, TRAILER OR SEMI-TRAILER	2.55m (For vehicles first registered or trailers first licensed on or before 31st Dec 1997 the limit was 2.6m but this expired on 31st Dec 2006)	
RIGID TRUCK, TRACTOR UNIT OF AN ARTICULATED VEHICLE, TRAILER OR A SEMI-TRAILER	2.55m (Provided that the vehicle's DGVW exceeds 3.5 tonnes)	
VEHICLE OR TRAILER	2.5m	
VEHICLE TOGETHER WITH ITS LOAD (Apart from loose agricultural produce which is not in bales or crates)	2.9m	

Figure 6.1: Excerpt from Road Safety Authority's publication "Guidelines on Maximum Weights and Dimensions of Mechanically Propelled Vehicles and Trailers including Manoeuvrability" (current version dated March 2020).

7 PAVEMENT AND ROADSIDE DRAINAGE

7.1 DELIVERY ROUTE INSPECTION

The delivery route was inspected in January 2024 and September 2025. The direction of the inspection of the delivery route was East-bound on the L-3050 to the N80 / L-3050 junction at Graiguenaspiddoge, South-bound on the L-3051 and South-bound on the L-3052 from Ballyloo cross roads. Pavement conditions and widths were noted as well as roadside drainage and utility plant. Images of the proposed delivery route to the site are provided in Table 7.1. The locations of the images are provided in Figure 7.1. Dashcam footage of the delivery route is available[1].

Photo No.	Description	Photo
01	L-3050 Pavement width 6.5m. Pavement in good condition throughout. Drainage generally over the edge. No ponding noted.	
02	L-3050 Pavement width 6.5m. Pavement in good condition throughout. Drainage generally over the edge. No ponding noted.	

[1] https://www.dropbox.com/scl/fo/vq8sfiddqee5z71rmdk0j/h?rlkey=4tfuq6ip2oh0orx1kenprx2fi&dl=0

Photo No.	Description	Photo
03	L-3050 Pavement width 6.5m. Pavement in good condition throughout. Drainage generally over the edge. No ponding noted.	
04	L-3050 Pavement width 6.5m. Pavement edge fretting adjacent gate, otherwise good. Drainage generally over the edge. No ponding noted.	
05	L-3050 Pavement width 6.5m. Pavement in good condition throughout. Drainage generally over the edge. No ponding noted.	
06	L-3050 at Entrance 1 Pavement width 6.5m. Pavement in good condition throughout. Drainage generally over the edge. Localised ponding noted.	

Photo No.	Description	Photo
07	L-3050 at Entrance 1 Pavement width 6.5m. Pavement in good condition throughout. Drainage generally over the edge. No ponding noted.	
08	L-3050 at Entrance 1 Pavement width 6.5m. Pavement in good condition throughout. Drainage generally over the edge. No ponding noted.	
09	L-3050 Pavement width 6.5m. Pavement in good condition throughout. Drainage generally over the edge. No ponding noted.	
10	L-3050 Pavement width 6.5m. Pavement in good condition throughout. Drainage generally over the edge. Localised ponding noted.	

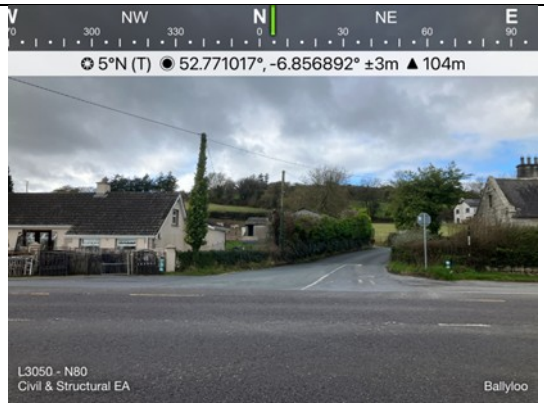
Photo No.	Description	Photo
11	L-3050 Pavement width 6.5m. Pavement in good condition throughout. Drainage generally over the edge. No ponding noted.	
12	L-3050 at N80 Junction Pavement width 6.5m. Pavement in good condition throughout. Drainage generally over the edge. No ponding noted.	
13	L-3050 at N80 Junction Pavement in good condition throughout. Drainage generally over the edge. No ponding noted.	
14	L-3050 at N80 Junction Pavement in good condition throughout. Drainage generally over the edge. No ponding noted.	

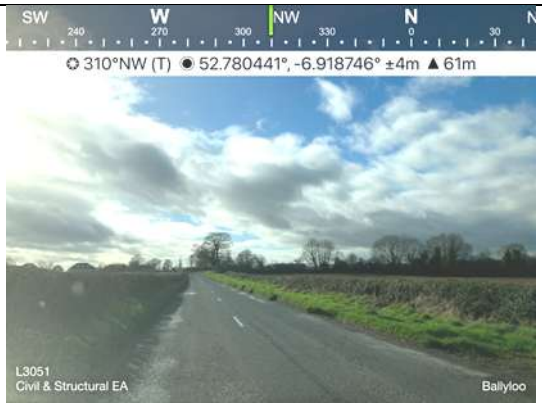
Photo No.	Description	Photo
101	L-3051 Pavement width 6.5m. Pavement in good condition throughout. Drainage generally over the edge. No ponding noted.	
102	L-3051 Pavement width 6.5m. Pavement in good condition throughout. Drainage generally over the edge. No ponding noted.	
103	L-3051 Pavement width 6.5m. Pavement in good condition throughout. Drainage generally over the edge. No ponding noted.	
104	L-3051 Pavement width 6.5m. Pavement in good condition throughout. Drainage generally over the edge. Localised ponding noted.	

Photo No.	Description	Photo
201	L-3052 Pavement width 5.0m. Pavement in fair condition with patch repairs evident throughout. Drainage generally over the edge. Localised ponding noted.	
202	L-3052 Pavement width 5.0m. Pavement in fair condition with patch repairs evident throughout. Drainage generally over the edge. Localised ponding noted.	
203	L-3052 Pavement width 5.0m. Pavement in fair condition with patch repairs evident throughout. Drainage generally over the edge. Localised ponding noted.	
204	L-3052 Pavement width 5.0m. Pavement in fair condition with patch repairs evident throughout. Drainage generally over the edge. Localised ponding noted.	

Photo No.	Description	Photo
205	L-3052 Pavement width 5.0m. Pavement in fair condition with patch repairs evident throughout. Drainage generally over the edge. Localised ponding noted.	
206	L-3052 Pavement width 5.0m. Pavement in fair condition with patch repairs evident throughout. Drainage generally over the edge. Localised ponding noted.	
207	L-3052 Pavement width 5.0m. Pavement in fair condition with patch repairs evident throughout. Drainage generally over the edge. Localised ponding noted.	
208	L-3052 Pavement width 5.0m. Pavement in fair condition with patch repairs evident throughout. Drainage generally over the edge. Localised ponding noted.	

Photo No.	Description	Photo
209	L-3052 Pavement width 5.0m. Pavement in fair condition with patch repairs evident throughout. Drainage generally over the edge. Localised ponding noted.	
210	L-3052 Pavement width 5.0m. Pavement in fair condition with patch repairs evident throughout. Occasional weak edges. Drainage generally over the edge. Localised ponding noted.	

Table 7.1: Proposed Access Route (Refer to Figure 7.1 for Image Locations)



Figure 7.1: Access Route Image Locations

7.2 PAVEMENT CONDITION AND ROADSIDE DRAINAGE

The L-3050 (Entrance 1) and the L-3051 are in good condition. These roads have a width of 6.5m with good operational drainage. The L-3052 is in fair condition with patch repairs throughout and occasional weak edges. Localised edge ponding was encountered in sections of the road surveyed. The typical width of the L-3052 is 5.0m.

8 SIGHT LINE APPRAISAL AT SITE ENTRANCE

8.1 VISIBILITY STANDARDS

Transport Infrastructure Ireland's document *DN-GEO-03060 Geometric Design of Junctions (Priority Junctions, Direct Accesses, Roundabouts, Grade Separated and Compact Grade Separated Junctions)* provides the visibility standards required for junctions and accesses. The basic design parameters are shown in Figure 8.1 and include the 'X Distance' which is the distance back along the minor road / direct access from which the full visibility is measured, the 'Y Distance' which is the distance that the driver on the minor road / access road must be able to see clearly to the left and to the right on the nearer edge of the major road carriageway and the 'Z Distance' which is the unobstructed visibility distance that drivers approaching the junction from the minor road / direct access must have to allow him/her to slow down safely and stop.

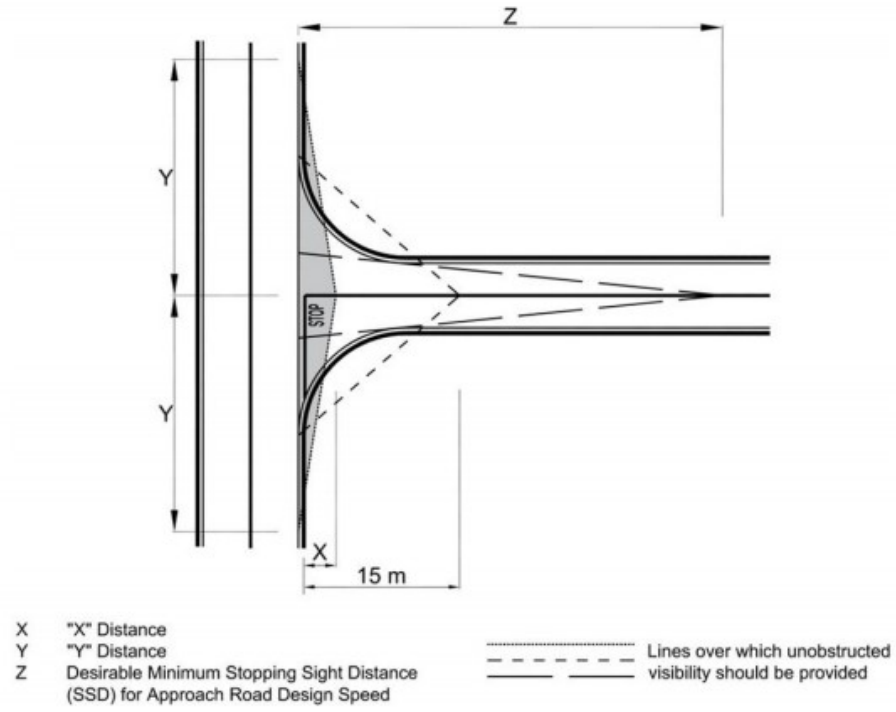


Figure 8.1: Visibility Standards (TII Document DN-GEO-03060)

An 'X Distance' of 2.4m and a 'Y-Distance' of 90m have been adopted as the visibility standard for the proposed site entrances on regional roads and 70m on local roads. The 'Z Distance' is the Stopping Sight Distance and relates to the design speed of the minor road. In the case of direct accesses a 'Z-Distance' of 35m is proposed and this is based on a conservative design speed within the site of 30km/h (Table 5.7 of DN-GEO-03060 refers).

The visibility requirement for drivers emerging from a minor road or direct access is to a high object (1.05m) on the major road. It is best practice (and mandatory for National Roads) that the full 'Y Distance' be achieved to this 1.05 metre height. The purpose of having a high object in the visibility standards is to ensure the that vertical geometries of the road junctions are considered in the visibility analysis. An appraisal of the sight lines at the proposed site entrances has been undertaken. Detailed drawings are provided in Appendix A and the analysis results are presented below.

In common with all junctions, ongoing routine maintenance will be required to ensure vegetation is removed each year to ensure sightlines are not obstructed by seasonal vegetation growth.

8.2 ENTRANCE 1 (L-3050)

The Sight line Analysis of Site Entrance 1 is provided in Figure 8.2. The 90m sightlines are available at the proposed location. The vertical geometry of the road is essentially flat at the entrance location and the visibility to the 1.05m high object is achieved over the full 'Y-Distance' of 90m in both directions. The 'Z-Distance' of 35m is also achieved within the site boundary.



Figure 8.2: Sight lines at Site Entrance 1 at the L-3050. (Refer to Appendix A for the Detailed Drawing).

8.3 DRAINAGE AT SITE ENTRANCE

No surface water from the proposed site entrance will be allowed to drain onto the local roads. This will be achieved by the provision of a linear drainage system, within the site lands, which will run parallel to the public road at the site entrances. This drainage system will be designed to intercept any surface water at site entrances and direct such surface water to soakaways located within the site lands. The linear drainage system will be a heavy-duty system with D400 rating to EN 1433 complete with 450 diameter precast concrete drainage pipes in surround concrete to ensure it is of sufficient robustness for site traffic.

9 MITIGATION

As described in Section 4 of this document, the temporary construction phase will see the highest traffic volumes associated with the proposed development. Construction traffic volumes are likely to have the most impact on the L-3050, L-3051 and L-3052 local roads leading to the site entrances for the substation and the permitted solar farm at Ballyloo. In order to minimise the impact of this temporary period on existing road users and to secure against any impacts on the surface condition of the roads, the following mitigation is proposed during the temporary construction phase. These mitigation measures should be read in conjunction with the Construction Management Plan submitted with this planning application.

9.1 STOP / GO SYSTEM

It is proposed to provide a temporary manual controlled STOP/GO system, which will briefly stop through traffic flow on the L-3050 while construction vehicles are accessing and egressing the proposed site entrance. The final layout and sequencing arrangements of the Stop/Go system will be agreed with Carlow County Council Area Engineers' Office in advance of commencing construction.

Having regard to the low background local traffic observed during this assessment, the modest volumes of construction vehicles set out in Section 4 and the use of the manual controlled STOP/GO system during access /egress of construction traffic only; delays to vehicles waiting at the STOP/GO discs will be of minimal duration.

9.2 ROAD SIGNAGE

It is proposed to provide advance warning signage of the construction site access along the L-3050 local road at 50m, 100m and 150m distances in both directions. In addition, there will be advance warning signage to alert road users of the temporary Stop/Go system. All warning signage will be in accordance with Chapter 8 "Temporary Traffic Measures and Signs for Roadworks" from the Department of Transport, Tourism and Sports Traffic Signs Manual. Preliminary traffic management drawings are provided in Appendix A.

9.3 PASSING BAYS

The public roads leading to the site entrance can accommodate the largest construction vehicle which will access the development during the construction phase. However, it may be beneficial for the pavement to be permanently widened in one or two locations to provide enhanced passing opportunities for vehicles along these local roads..

9.4 BOOKING SYSTEM

In order to streamline and manage the arrival/departure of construction vehicles over a working day, a delivery booking and scheduling system will be implemented. On a weekly basis the site manager will evaluate the daily profile of truck movements proposed for the upcoming week and schedule them to spread out over the day to prevent any potential overlap. Sufficient time will be given between truck movements to allow for any delays in arrival times or when loading/unloading takes longer than expected. Prior to departure of a delivery truck from the site, the site manager will review the delivery schedule for that day, and if there is any risk of conflict with another scheduled delivery arrival, the departing vehicle will be held on site until that vehicle arrives.

9.5 PAVEMENT CONDITION INDEX SURVEY

Prior to the commencement of works, a detailed Pavement Condition Index Survey will be carried out in accordance with ASTM Standard D8433[2] (or alternative standard to be agreed in advance with Carlow County Council). This Pavement Condition Index Survey will be repeated on completion of the works to ascertain if there has been deterioration (beyond normal wear and tear) of the pavement in the works period. Any deterioration which has occurred as a result of works traffic will be addressed by the developer through a programme of remedial works. These remedial measures are subject to Carlow County Council's approval and will be agreed with the Council in advance of construction.

9.6 DRAINAGE AT PROPOSED SITE ENTRANCES

No surface water from the proposed site entrances will be allowed to drain onto the local roads. This will be achieved by the provision of a linear drainage system, within the site lands, which will run parallel to the public road at the site entrances. This drainage system will be designed to intercept any site surface water at site entrances and direct such surface water to soakaways located within the site lands. The linear drainage system will be a heavy duty system with D400 rating to EN 1433 complete with 450 diameter precast concrete drainage pipes in surround concrete to ensure it is of sufficient robustness for site traffic. Typical drainage details are provided in Appendix A. It is noted that a detailed Site Specific Flood Risk Assessment has been prepared by IE Consulting and provided with the planning application.

9.7 PROVISION FOR HGV'S ARRIVING AT CLOSED SITE GATES

Site gates shall be set back a sufficient distance to allow HGV's leave the public road and wait for site gates to be opened. This measure is proposed to preclude local delays to traffic which may otherwise occur if a HGV is waiting for gates to be opened.

9.8 EDGE STRENGTHENING WORKS AT SITE ENTRANCE

Edge strengthening works to pavement at the site entrance shall be undertaken for a distance of 15m each side of site gates on the public roads to prevent premature edge failure of pavement edges at site entrances.

[2] ASTM D8433 Standard Practice for Roads and Parking Lots Pavement Condition Index Surveys

10 SUMMARY AND CONCLUSION

An engineering appraisal of the local road network for the proposed substation and grid connection at Ballyloo, Castletown, Graiguenaspiddoge, Kellistown East, Kellistown West, Kilballyhue, Knockbower, Leagh Or Ballybeg, Linkardstown and Moyle Big (townlands), County Carlow has been undertaken. The site is well served by the local and national road network. The local topography comprises gentle gradients and there are no severe inclines present that adversely affect road geometry. Discussions with Carlow County Area Engineers from previous permitted solar farm projects have provided recommendations which help frame the access route proposals. Continuing liaison with Carlow County Council Area Engineers will be required at all stages of the project to ensure local issues are considered as the project plans develop.

A detailed breakdown of the vehicle numbers associated with the temporary 24 month construction phase of the substation and Ballyloo solar farm has been provided. Over the 24 month period, the average number of return trips is 58 per week with a daily average of 10. The peak number of return trips to the site is 113 per week with a daily average of 21. This peak activity is associated with the delivery and installation of solar farm panels in Months 17 and 18. Vehicle numbers reduce substantially in the final months of the programme. This traffic will cease when the construction of the solar farm commences and remain absent from the local road network thereafter. Given that traffic numbers for the solar farms operational phase are an average of 2 – 4 vehicles per month, it is proposed that over the lifetime of the project there will be a net reduction of traffic related to the subject site on the local road network.

A Swept Path Analyses of the delivery routes proposed to the site entrance shows that no works are required to the local road network to facilitate the passage of a 40ft articulated vehicle along local roads to the site entrance. A Swept Path Analysis of the delivery route for a special oversized vehicle for transformer delivery to Entrance 1 has also been undertaken and no works are required to the local roads to facilitate this vehicle.

The average gradients on the local road delivery routes are shallow and will not be problematic for delivery vehicles. A review of the horizontal alignment of the delivery routes coupled with the Swept Path Analyses described above shows that there are no issues of concern for the passage of delivery vehicles around horizontal road bends. The pavement width on the delivery route is typically between 5.0 and 6.5m and can accommodate the largest construction vehicle which will access the solar farm during the temporary construction period.

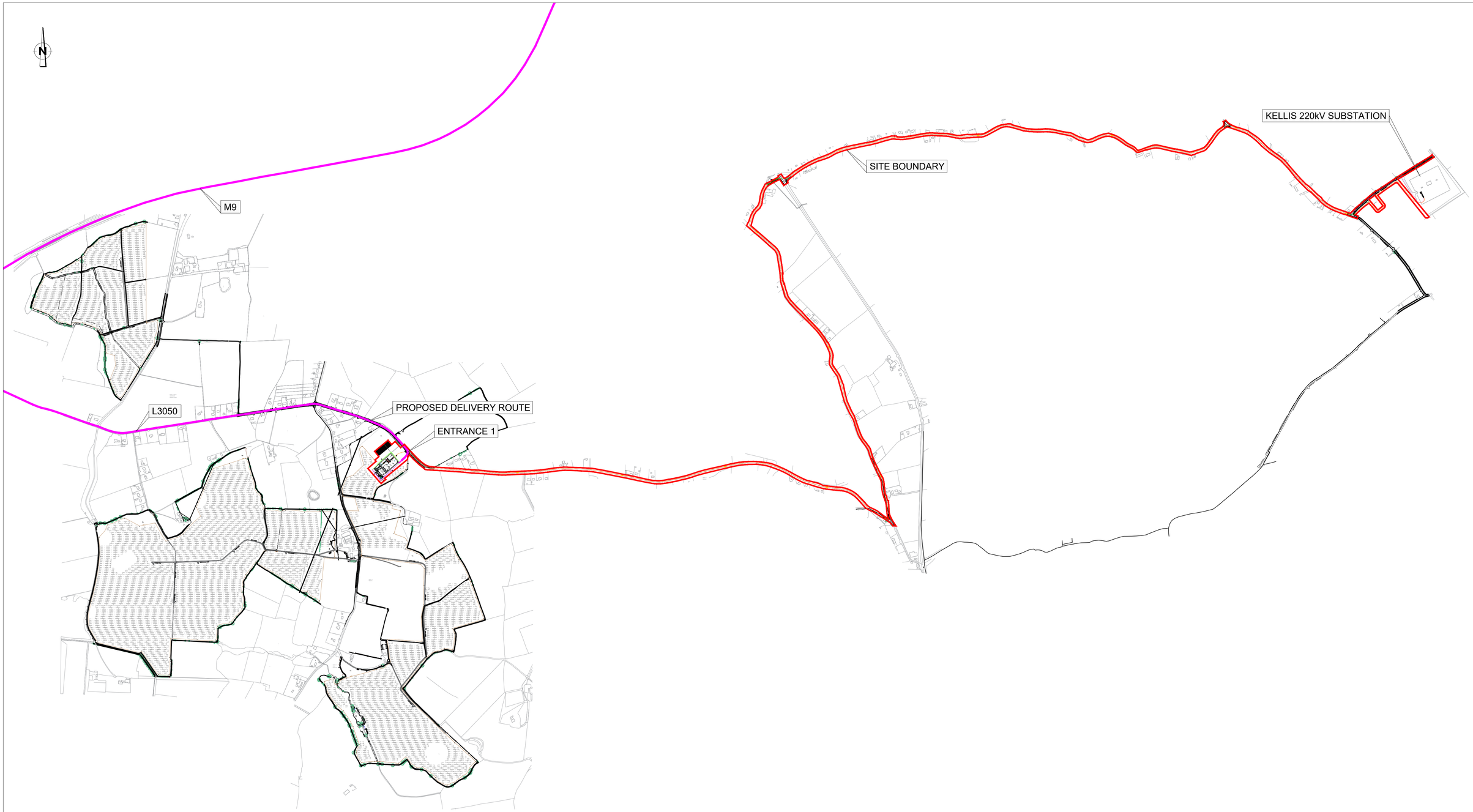
In line with past solar farm development applications, an ‘X Distance’ of 2.4m and a ‘Y-Distance’ of 90m have been adopted as the visibility standard for the proposed site entrance. 90m sightlines are available at the entrance.

A suite of mitigation measures is proposed for the construction phase of the development as part of this site access appraisal. These include a temporary Stop/Go system, temporary road signage, a booking system for construction deliveries and a pavement condition survey. At the proposed site entrance, new drainage works will mitigate the potential for surface water flowing onto the adjacent public roads.

When the existing conditions are taken into account with construction phase mitigation and a net reduction in traffic volumes over the project lifetime, it is proposed that the substation and grid connection at Ballyloo, Castletown, Graiguenaspiddoge, Kellistown East, Kellistown West, Kilballyhue, Knockbower, Leagh Or Ballybeg, Linkardstown and Moyle Big (townlands), County Carlow does not pose any significant residual risks and on this basis, should be granted planning permission.

APPENDIX A

DRAWINGS



PROPOSED SITE PLAN

(Scale 1 : 10,000)

Client

Ballyloo Solar Farm Ltd.

General Notes

No.	Date	Dr./Chk.	Amendment / Issue	App
D01	Oct.'25	DC / KR	DRAFT ISSUE FOR DISCUSSION	KR

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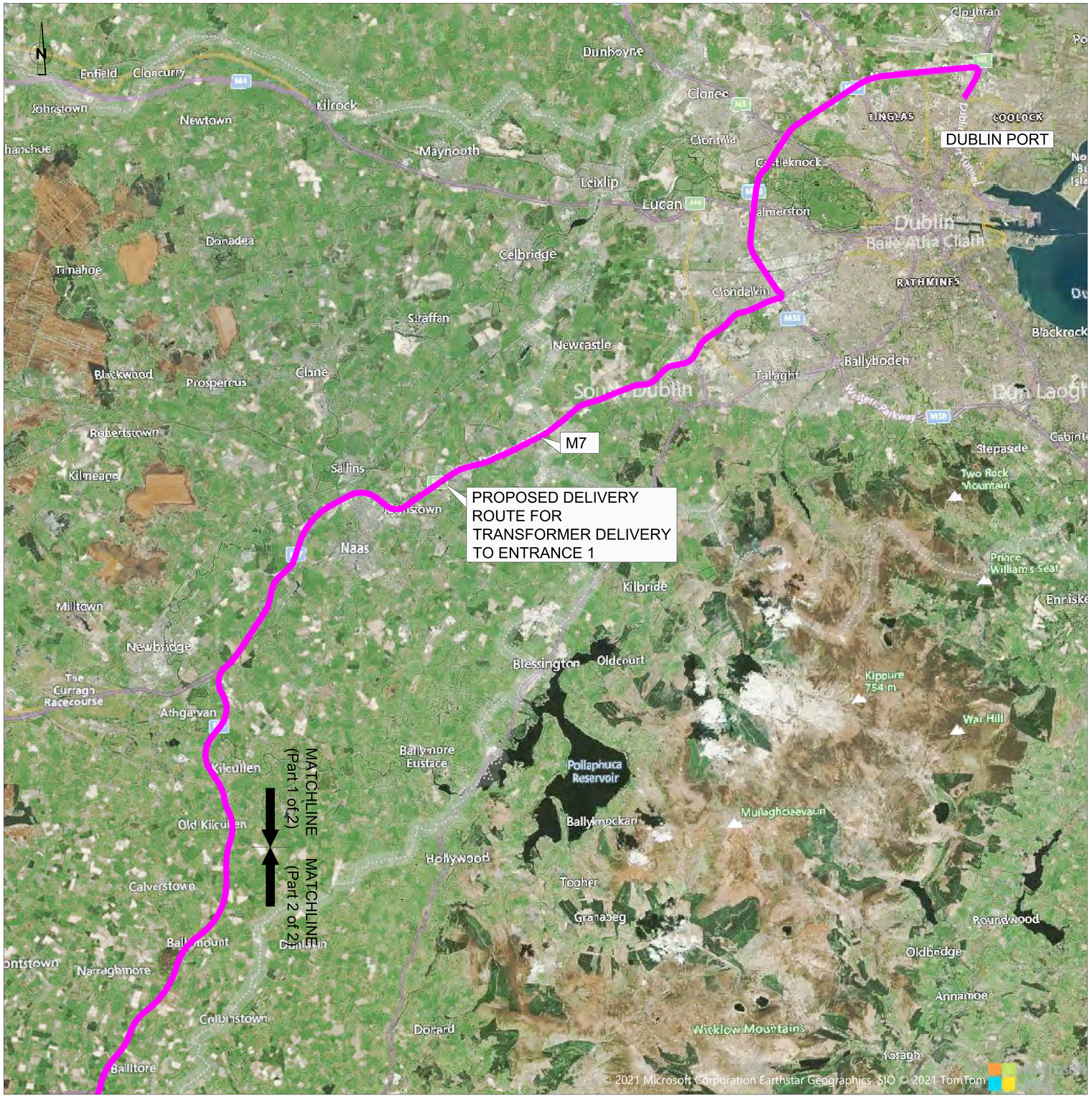
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Approved	KR
Date	Oct. 2025
Scale	Half @ A3
Shown	@ A1

Project: **Ballyloo Substation and Grid Connection**

Title: Proposed Site Plan

(Sheet 1 of 1)

Job No.	File Ref.	Drg. No.	Rev.
	2025-09-01.dwg	01	D01



PROPOSED DELIVERY ROUTE (Part 1 of 2)
(Scale 1 : 100,000)

PROPOSED DELIVERY ROUTE (Part 2 of 2)
(Scale 1 : 100,000)

Client

Ballyloo Solar Farm Ltd.

General Notes

No.	Date	Dsn. / Drn.	Amendment / Issue	App
D01	Oct.25	DC / KR	DRAFT ISSUE FOR DISCUSSION	KR

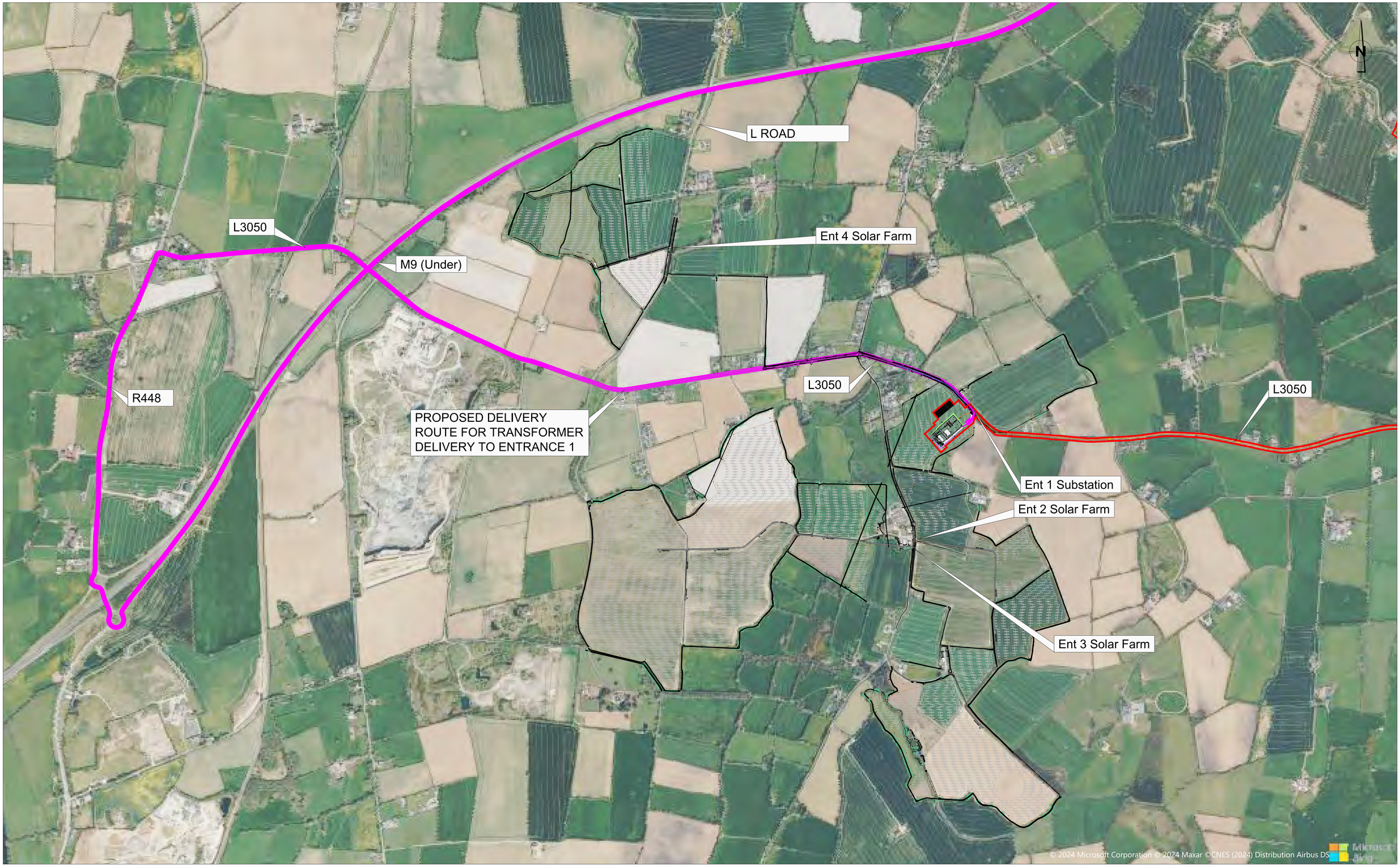
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Date	Oct. 2025
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Job No.	

Project: **Ballyloo Substation and Grid Connection**

Title: Proposed Delivery Route For Transformer Delivery To Entrance 1 - 1 : 100,000 (Sheet 1 of 1)

File Ref.	Drg. No.	Rev.
2025-09-02.dwg	01	D01



PROPOSED DELIVERY ROUTE

(Scale 1 : 7,500)

Client

Ballyloo Solar Farm Ltd.

General Notes

SITE BOUNDARY

No.	Date	Dr/ Ch	Amendment / Issue	App
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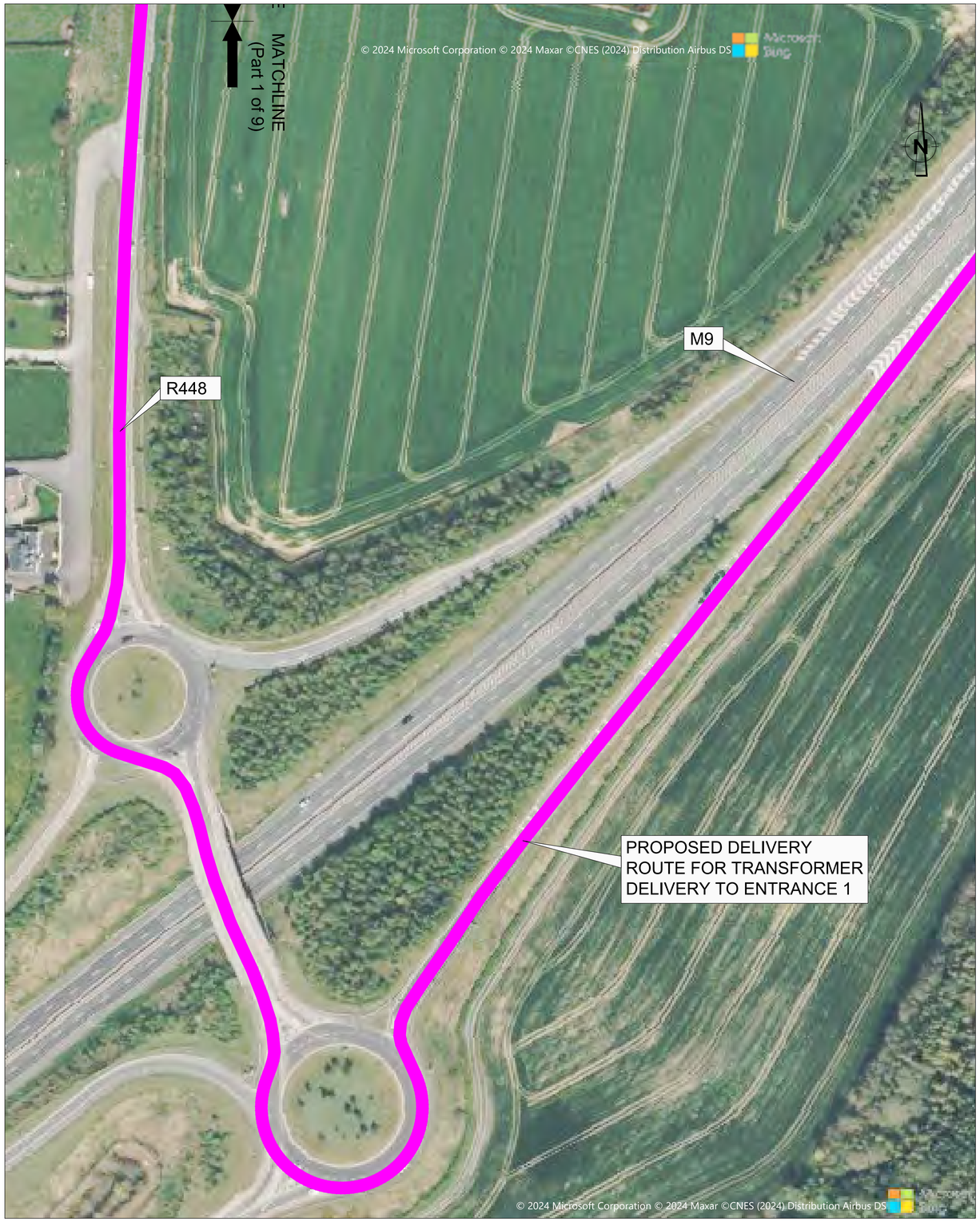
CIVIL AND STRUCTURAL ENGINEERING ADVISORS LTD.

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Approved	KR
Date	Oct. 2025
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Job No.	

Project **Ballyloo Substation and Grid Connection**

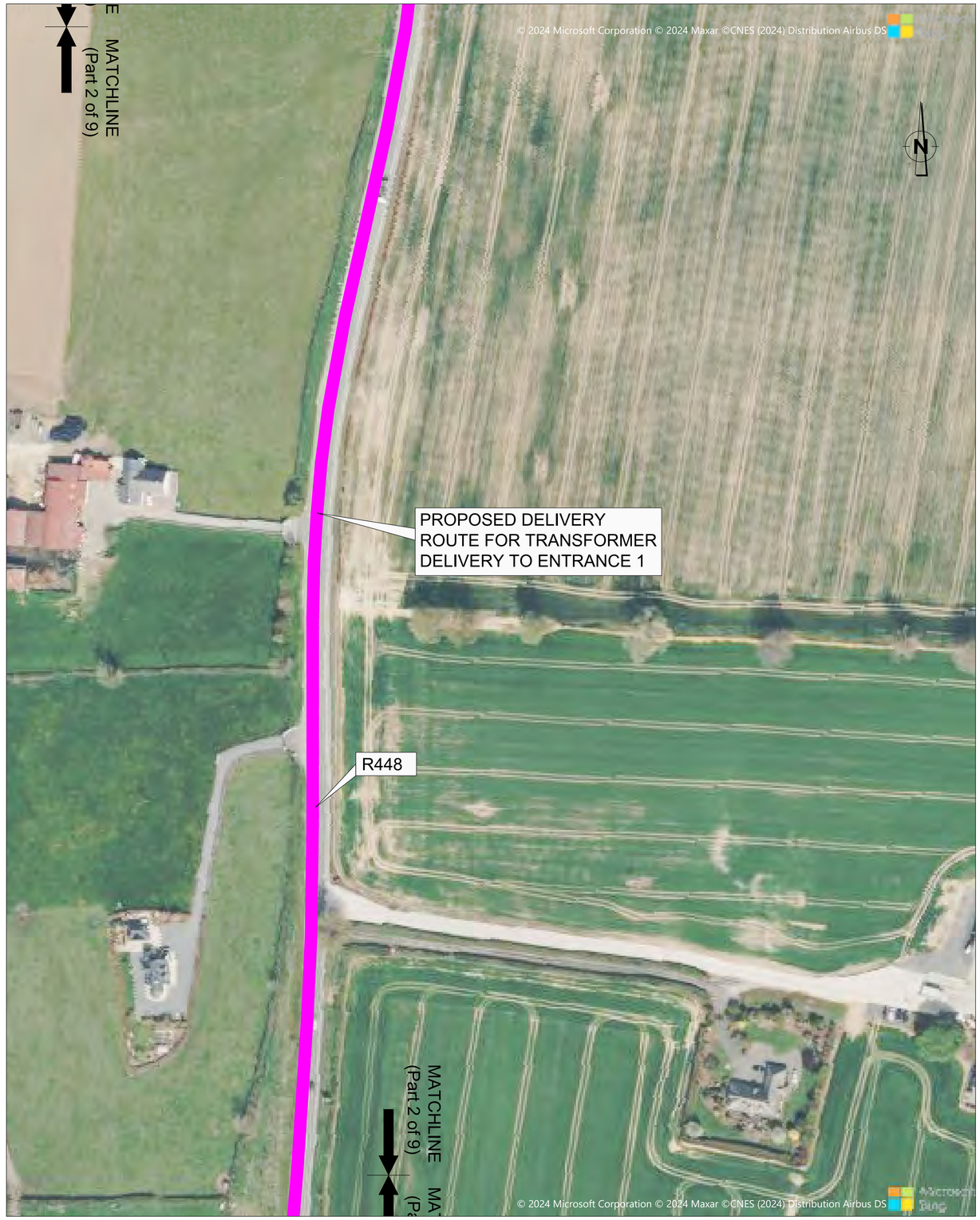
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File Ref. 2025-09-02.dwg | Drg. No. 02 | Rev. D01



PROPOSED DELIVERY ROUTE FROM N80 WITH SWEPT PATH ANALYSIS LINES SHOWN ON ROUTE (Part 1 of 9)

(Scale 1 : 1,000)



PROPOSED DELIVERY ROUTE FROM N80 WITH SWEPT PATH ANALYSIS LINES SHOWN ON ROUTE (Part 2 of 9)

(Scale 1 : 1,000)

Client

Ballyloo Solar Farm Ltd.

KEY PLAN



General Notes

No.	Date	Dr. / Chk.	Amendment / Issue	App
D01	Oct.'25	DC / KR	DRAFT ISSUE FOR DISCUSSION	KR

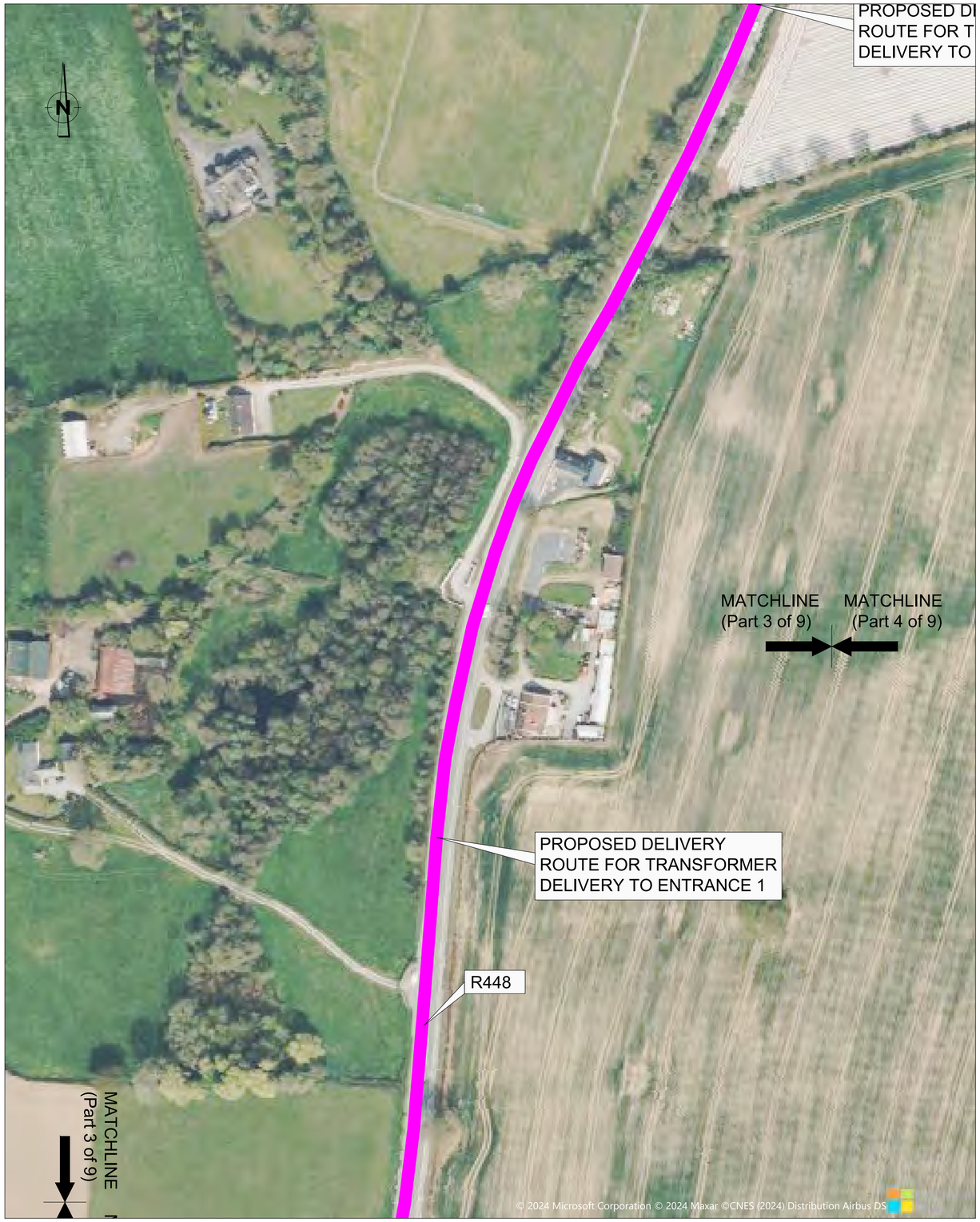
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Project: **Ballyloo Substation and Grid Connection**

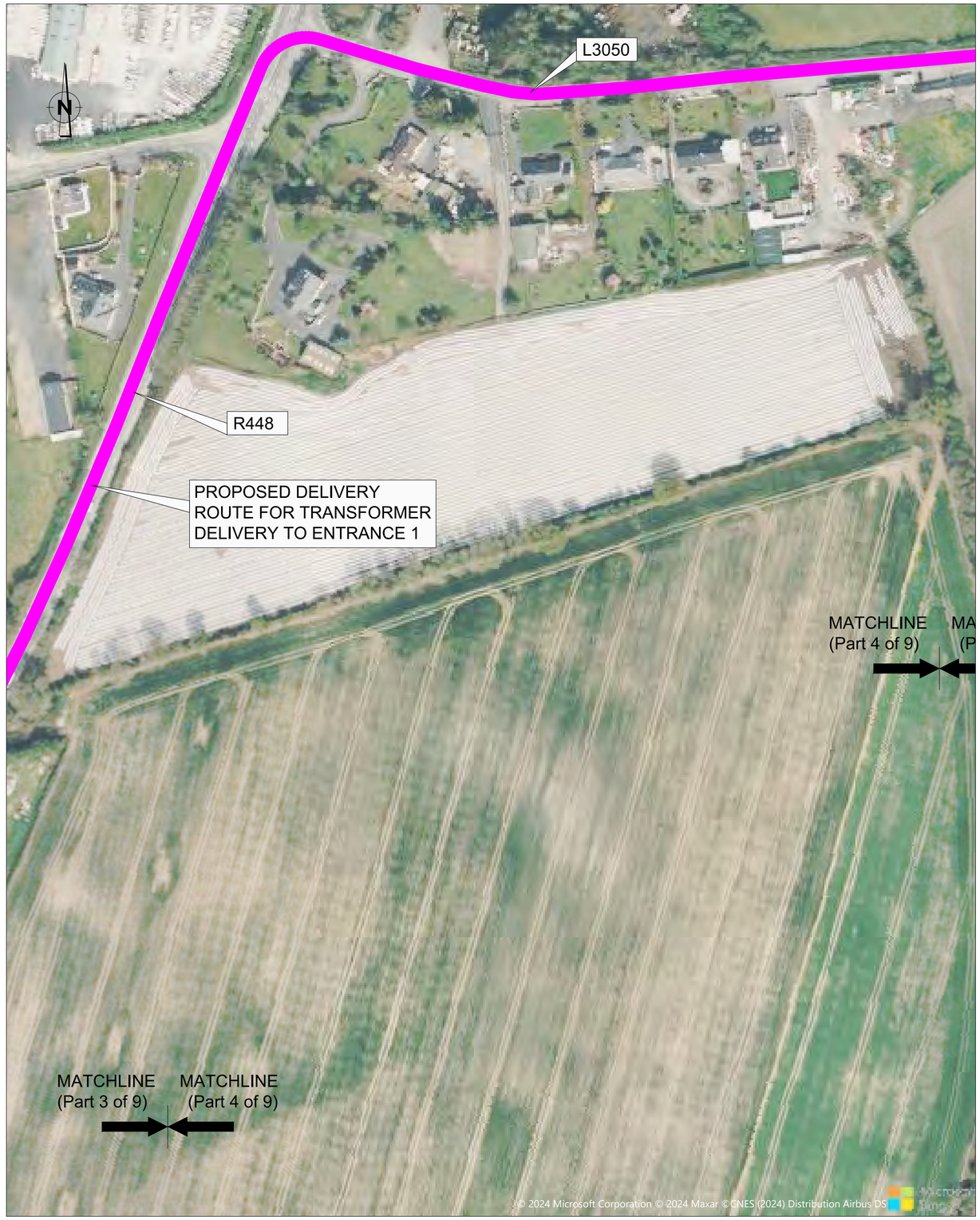
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(Sheet 1 of 6)

Job No.	File Ref.	Drg. No.	Rev.
	2025-09-03.dwg	01	D01



PROPOSED DELIVERY ROUTE FROM N80 WITH SWEPT PATH ANALYSIS LINES SHOWN ON ROUTE (Part 3 of 9)

(Scale 1 : 1,000)



PROPOSED DELIVERY ROUTE FROM N80 WITH SWEPT PATH ANALYSIS LINES SHOWN ON ROUTE (Part 4 of 9)

(Scale 1 : 1,000)

Client

Ballyloo Solar Farm Ltd.

KEY PLAN

1 2 3 4 5 6 7 8 9

General Notes

No.	Date	Drn. / Chk.	Amendment / Issue	App
D01	Oct.'25	DC / KR	DRAFT ISSUE FOR DISCUSSION	KR

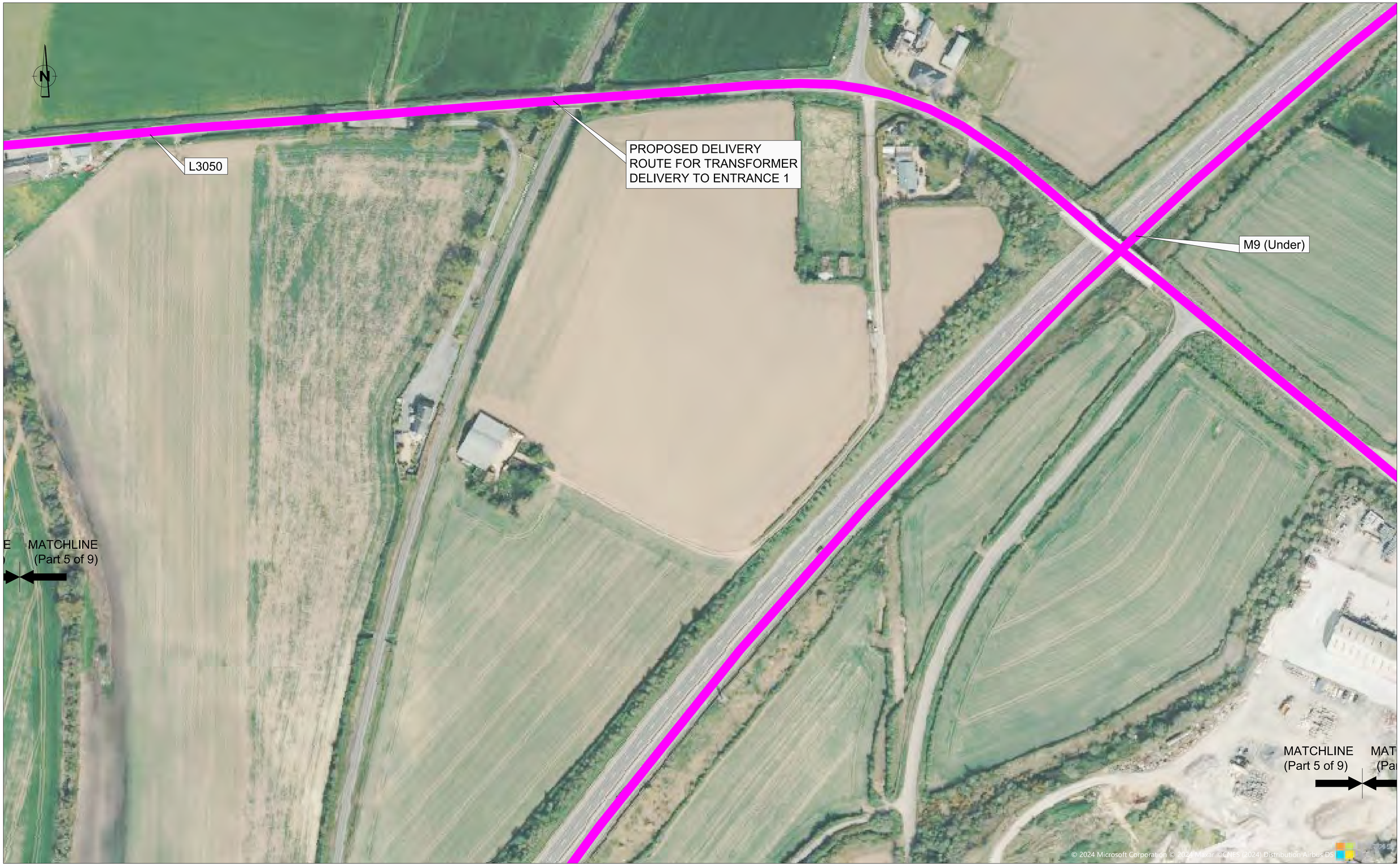
CIVIL AND STRUCTURAL ENGINEERING ADVISORS LTD.

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Approved	KR
Date	Oct. 2025
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Project: **Ballyloo Substation and Grid Connection**

Title: Proposed Delivery Route From M9 For Transformer Delivery To Entrance 1 : 1,000 - Part 3 & 4 (Sheet 2 of 6)

Job No.	File Ref.	Drg. No.	Rev.
	2025-09-03.dwg	02	D01



PROPOSED DELIVERY ROUTE FROM N80 WITH SWEPT PATH ANALYSIS LINES SHOWN ON ROUTE (Part 5 of 9)

(Scale 1 : 1,000)

Client

Ballyloo Solar Farm Ltd.

KEY PLAN

1 2 3 4 5 6 7 8 9

General Notes

No.	Date	Dr. / Chk.	Amendment / Issue	App
D01	Oct.'25	DC / KR	DRAFT ISSUE FOR DISCUSSION	KR

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Job No.	

Project **Ballyloo Substation and Grid Connection**

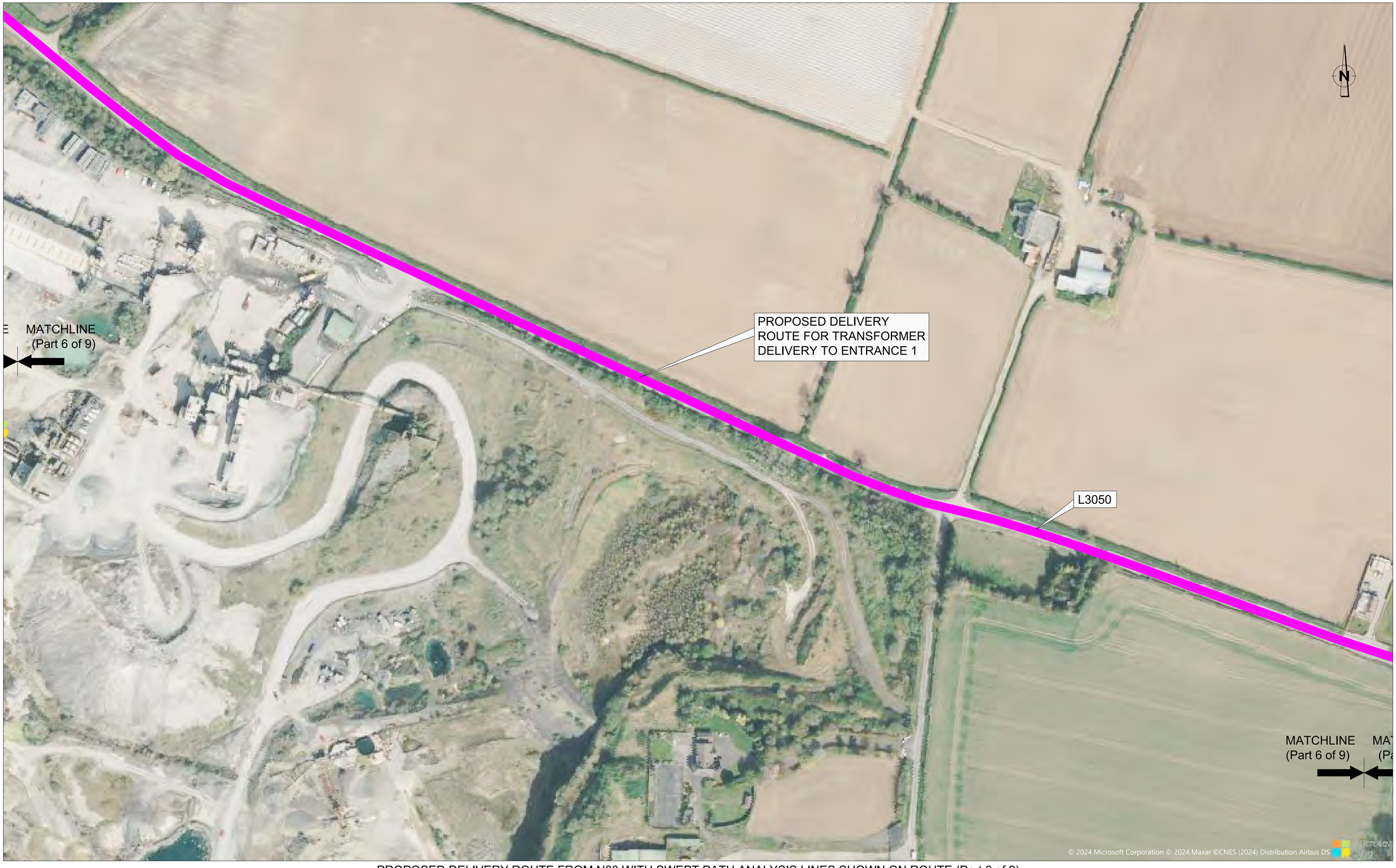
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(Sheet 3 of 6)

File Ref. 2025-09-03.dwg

Drg. No. 03

Rev. D01



PROPOSED DELIVERY ROUTE FROM N80 WITH SWEPT PATH ANALYSIS LINES SHOWN ON ROUTE (Part 6 of 9)

(Scale 1 : 1,000)

Client

Ballyloo Solar Farm Ltd.

KEY PLAN

3 4 5 6 7 8 9 2 1

General Notes

No.	Date	Drn. / Chk.	Amendment / Issue	App
D01	Oct.'25	DC / KR	DRAFT ISSUE FOR DISCUSSION	KR

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Approved	KR
Date	Oct. 2025
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Project: **Ballyloo Substation and Grid Connection**

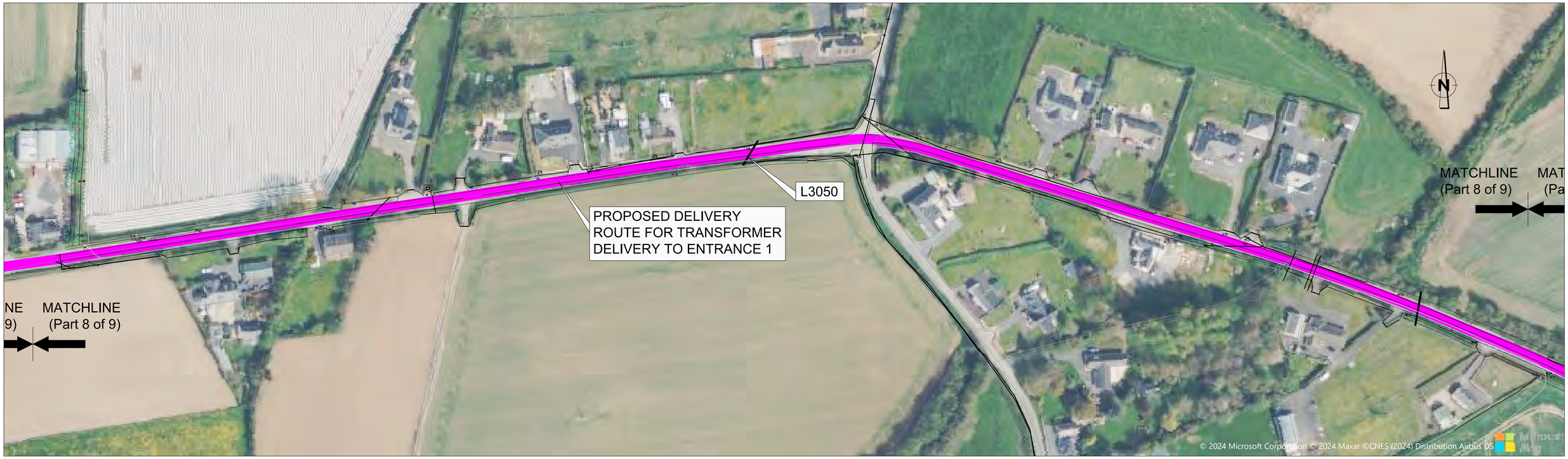
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(Sheet 4 of 6)

Job No.	File Ref.	Drg. No.	Rev.
	2025-09-03.dwg	04	D01



PROPOSED DELIVERY ROUTE FROM N80 WITH SWEPT PATH ANALYSIS LINES SHOWN ON ROUTE (Part 7 of 9)

(Scale 1 : 1,000)



PROPOSED DELIVERY ROUTE FROM N80 WITH SWEPT PATH ANALYSIS LINES SHOWN ON ROUTE (Part 8 of 9)

(Scale 1 : 1,000)

Client

Ballyloo Solar Farm Ltd.

KEY PLAN

1 2 3 4 5 6 7 8 9

General Notes

No.	Date	Dsn. / Chk.	Amendment / Issue	App
D01	Oct.'25	DC / KR	DRAFT ISSUE FOR DISCUSSION	KR

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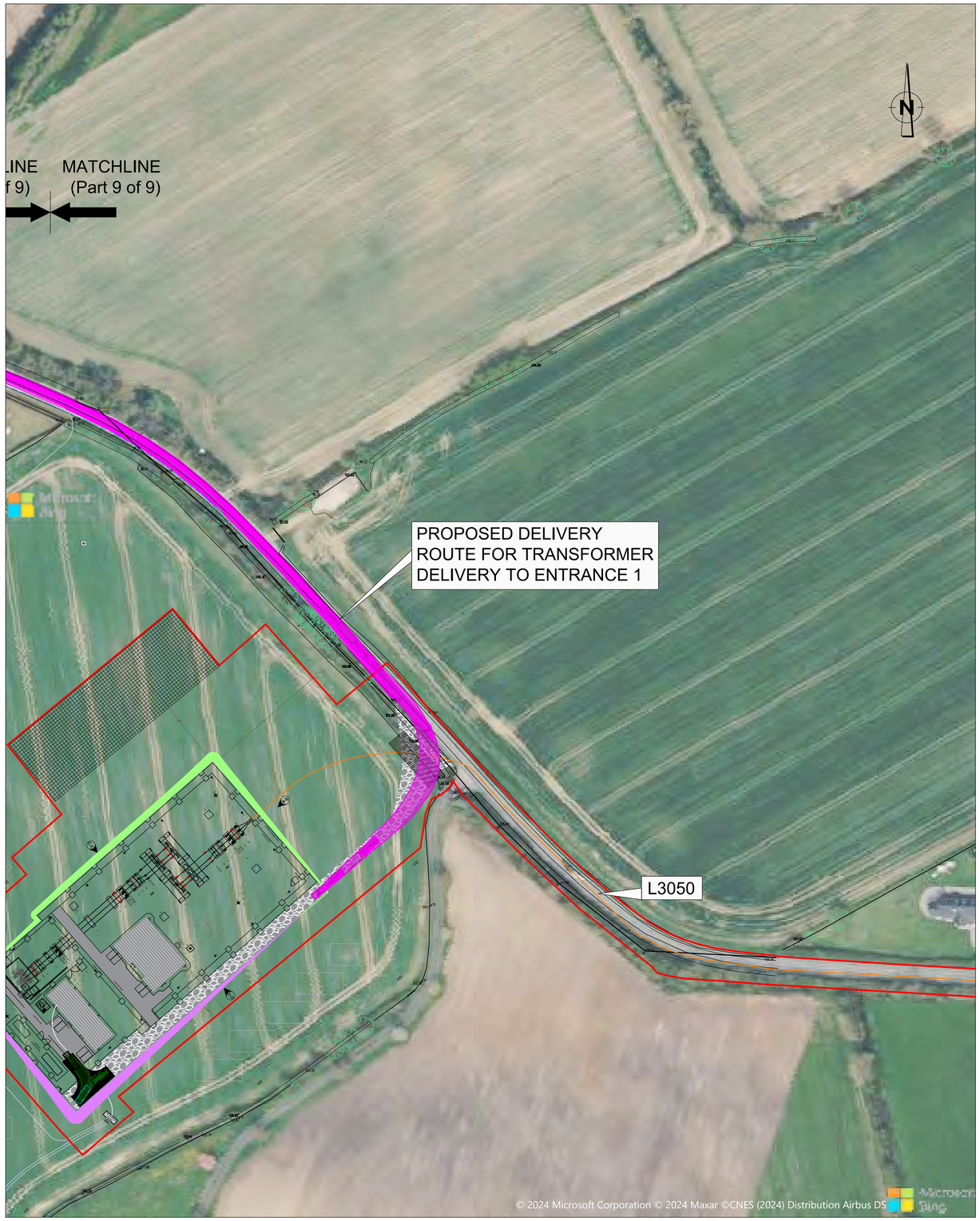
Project: **Ballyloo Substation and Grid Connection**

Title: Proposed Delivery Route From M9 For Transformer Delivery To Entrance 1 : 1,000 - Part 7 & 8 (Sheet 5 of 6)

File Ref.: 2025-09-03.dwg

Drg. No.: 05

Rev.: D01



PROPOSED DELIVERY ROUTE FROM N80 WITH SWEPT PATH ANALYSIS LINES SHOWN ON ROUTE (Part 9 of 9)

(Scale 1 : 1,000)

Client

Ballyloo Solar Farm Ltd.

KEY PLAN

1 2 3 4 5 6 7 8 9

General Notes

No.	Date	Drn. / Chk.	Amendment / Issue	App
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Project: **Ballyloo Substation and Grid Connection**

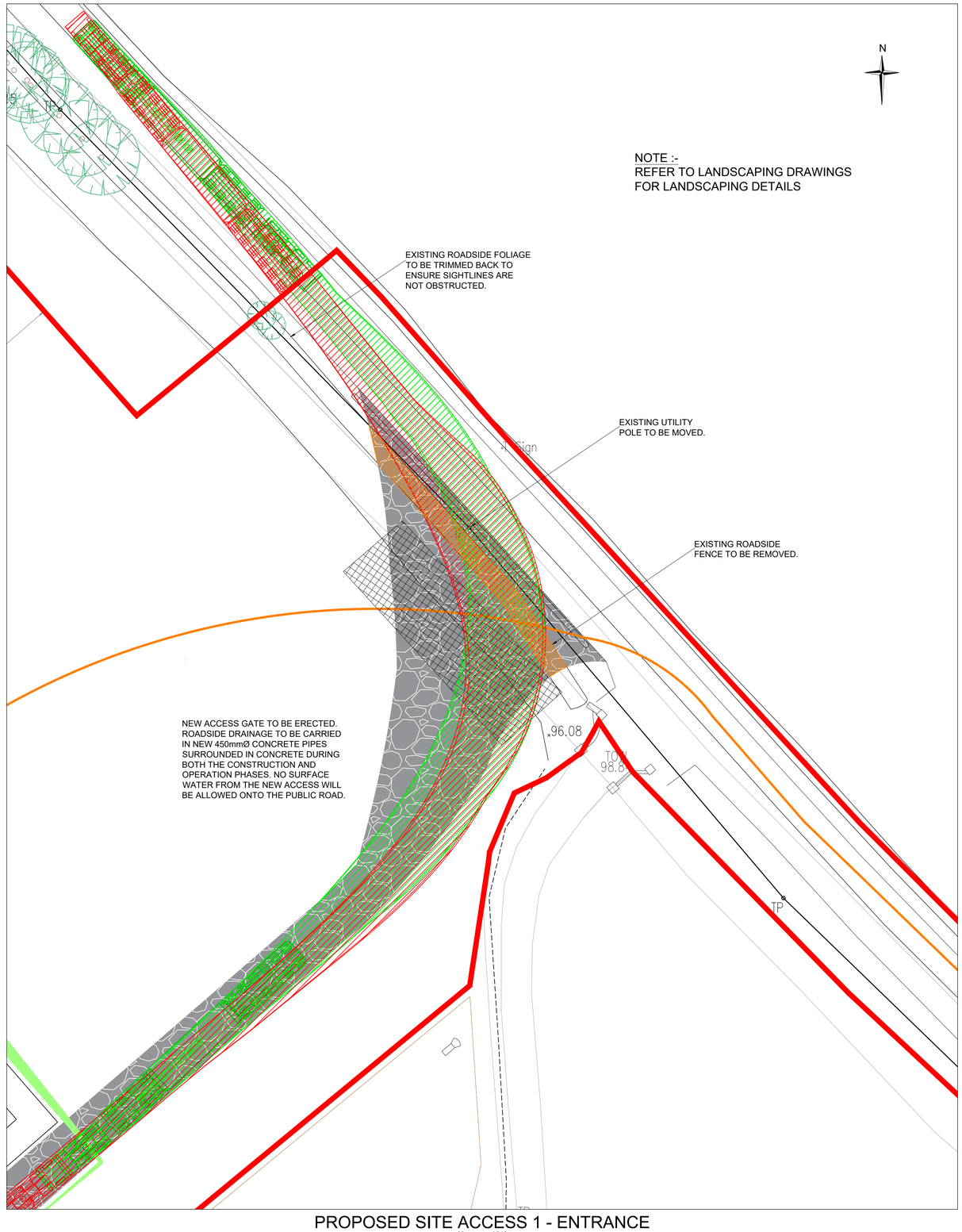
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(Sheet 6 of 6)

Job No.	File Ref.	Drg. No.	Rev.
	2025-09-03.dwg	06	D01



PROPOSED SITE ACCESS 1 - SIGHTLINES

(Scale 1 : 500)



PROPOSED SITE ACCESS 1 - ENTRANCE

(Scale 1 : 250)

Client

Ballyloo Solar Farm Ltd.

VEHICLE IN

VEHICLE OUT

General Notes

No.	Date	Dsn / Chk	Amendment / Issue	App
D01	Oct.'25	DC / KR	DRAFT ISSUE FOR DISCUSSION	KR

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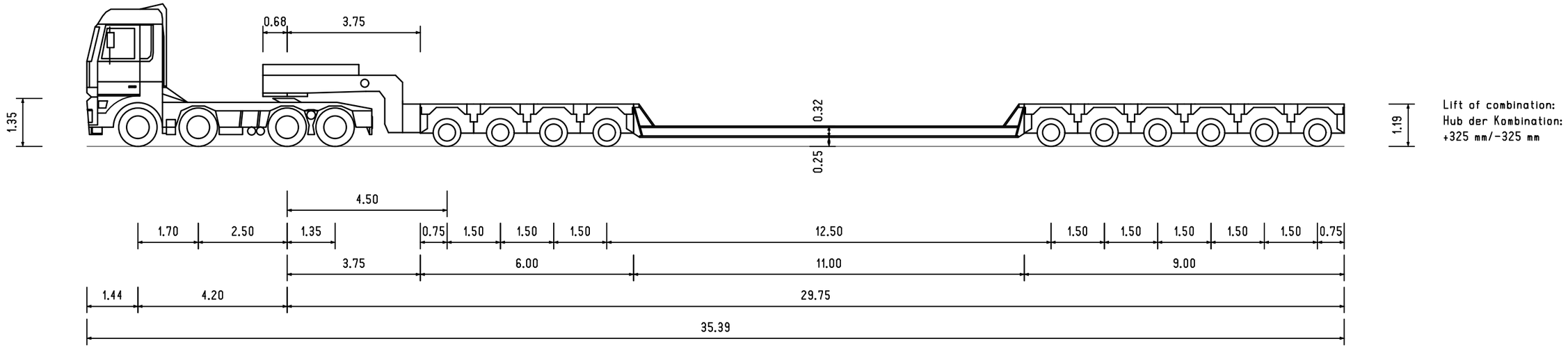
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Project: **Ballyloo Substation and Grid Connection**

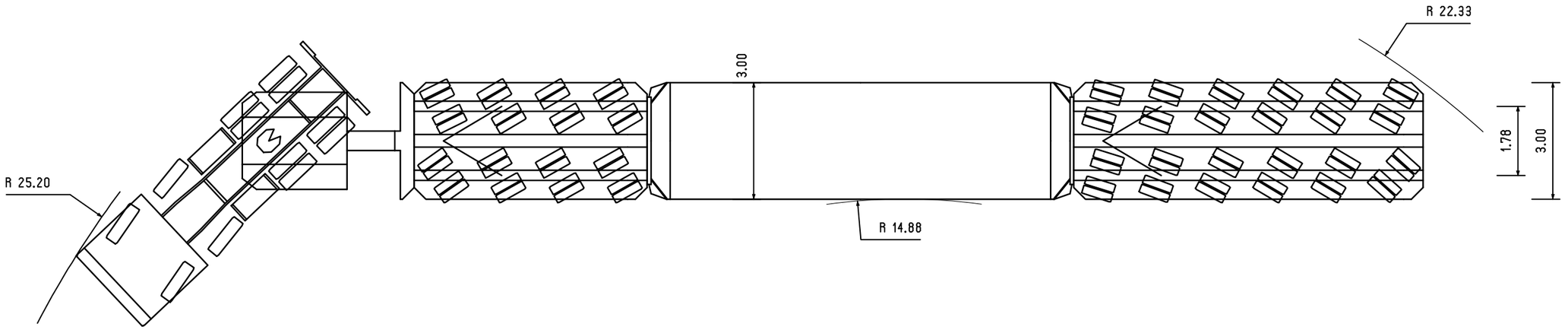
Title: Proposed Enrtrance 1

(Sheet 1 of 1)

Job No.	File Ref.	Drg. No.	Rev.
	2025-09-04.dwg	01	D01



Lift of combination:
Hub der Kombination:
+325 mm/-325 mm



GN2,75mSO; 4axleSO_steer; Deck tractrix 3-15m; 6axleSO
SH2,75mSO; 4AchsSO_Lenk; Brücke Schleppkurve 3-15m; 6AchsSO

Illustration of dimensions of the specified combination including curve radius.
Darstellung der Abmessungen der angegebenen Kombination einschließlich Kurvenradien.

The operating manual of the vehicle units as well as the currently valid "information on transport investigations" mandatory have to be observed
Die Bedienungsanleitung zu den Fahrzeug-Einheiten und die aktuell geltenden "Hinweise zu Transportuntersuchungen" sind zwingend zu beachten

Gooseneck; 4A; Deck; 6A
Schwanenhals; 4A; Br; 6A

Date	02/08/2023
Time	05:27:12
Name	Salsa
A3 Landscape	

SCHEUERLE
Fahrzeugfabrik GmbH
Postfach/P.O.Box 20
D-74627 Pfedelbach

dimensional sketch
Maßskizze

Scale 1 : 120
Page 1/1

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