Appendix III:

Otter Survey Report

Otter (*Lutra lutra*) survey for the proposed Moanmore Lower Green Energy Project, Co. Clare (2026)



Prepared by Triturus Environmental Ltd. for Greensource

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1. Introduction

1.1 Background

Triturus Environmental Ltd. were contracted by Greensource to undertake a pre-construction European otter (*Lutra lutra*) survey in the vicinity of the proposed Moanmore Lower Green Energy Project near Kilrush, Co. Clare (**Figure 2.1**).

Following a Request for Further Information from An Coimisiún Pleanála (Planning Ref. No. 2560257, Case No. ACP-323152-25), an updated otter survey was required to ensure ecological data validity given that the original data was collated in the 2022-2024 period (Jennings O'Donovan, 2025). An otter survey was requested along previously surveyed areas of the Moyasta River (near the proposed site boundary) and all proposed watercourse crossings. The purpose of the survey was to "*establish more securely whether or not the proposed development might adversely affect otter commuting, resting or breeding places*". Otter is listed as a qualifying interest of the downstream connecting Lower River Shannon SAC (002165).

In light of this a comprehensive, total corridor survey scope encompassing upstream and downstream areas on the Moyasta River was applied to improve the robustness of data. The survey would inform the species' utilisation of the watercourse within and bordering the study area, including the identification of potential breeding (holt) and resting (couch) areas which are protected under the Wildlife Acts 1976-2023 and pursuant to the requirements of Articles 12, 13 and 16 of the Habitats Directive (92/43/EEC) (NPWS, 2021). The findings of the survey would inform impact assessment and identify any subsequent mitigation to protect otter populations. The survey was undertaken on Friday 28th August 2026.

1.2 Otter legislative protection

The Eurasian otter (*Lutra lutra*) is a species of conservation concern and high priority having suffered major declines in its range and population throughout Europe since the 1950s. It is classified as 'near threatened' by the IUCN Red List with a decreasing population trend and, as such, is listed in Appendix I of CITES, Appendix II of the Bern Convention (Council of Europe, 1979) and Annexes II and IV of the EU Habitats Directive (92/43/EEC).

Otters, along with their breeding and resting places, are also protected under provisions of the Irish Wildlife Acts 1976-2023. Otters have additional protection because of their inclusion in Annex II and Annex IV of the Habitats Directive 92/43/EEC, which is transposed into Irish law by the European Union (Birds and Natural Habitats) Regulations 2011-2021.

The protection of otters is outlined in Article 51(1) and (2):

Protection of fauna referred to in the First Schedule;

51.(1) *The Minister shall take the requisite measures to establish a system of strict protection for the fauna consisting of the species referred to in Part 1 of the First Schedule.*

51.(2) *Notwithstanding any consent, statutory or otherwise, given to a person by a public authority or held by a person, except in accordance with a license granted by the Minister under Regulation 54, a*

person who in respect of the species referred to in Part 1 of the First Schedule (listed below). Items (b) and (d) may be considered most relevant to developments.

(a) *deliberately captures or kills any specimen of these species in the wild,*

(b) *deliberately disturbs these species particularly during the period of breeding, rearing, hibernation and migration,*

(c) *deliberately takes or destroys eggs of those species from the wild,*

(d) *damages or destroys a breeding site or resting place of such an animal, or*

(e) *keeps, transports, sells, exchanges, offers for sale or offers for exchange any specimen of these species taken in the wild, other than those taken legally as referred to in Article 12(2) of the Habitats Directive, shall be guilty of an offence.*

According to the NPWS (2021), '*it should also be noted that in the case of Regulation 51(d) any action resulting in damage to, or destruction of, a breeding or resting place of an animal may constitute an offence unless a derogation licence has been granted and this action does not need to be deliberate*'. Furthermore, '*breeding and resting places are protected even when the animals are not using them, once there is a high probability that they will return*' (CJEU Case C-477/19) (NPWS, 2021). Regulation 51(d) therefore places a strict responsibility of due diligence on anyone proposing to carry out an 'action or project' that can 'damage or destroy' the breeding place of Annex IV species.

In an Irish context, according to the most recent Article 17 reporting (NPWS, 2025), otters remain at 'Favourable' conservation status with a stable trend. Otters were considered to be previously 'Near Threatened' (Marnell, 2009) based on a 20-25% decline between 1980 and 2005 (Bailey & Rochford, 2006). However, the current conservation status in Ireland is of 'Least Concern' (Marnell et al., 2019). Otters remain 'Near Threatened' at a global level according to the IUCN Red List (Loy et al., 2022).

1.3 Statement of authority

Bill Brazier

Bill Brazier (B.Sc. (Hons) Applied Freshwater & Marine Biology, MIFM) is an aquatic, fisheries and mammalian ecologist with over 15 year's professional experience in Ireland. He is a senior ecologist and Associate Director at Triturus Environmental Ltd. He has extensive experience in a wide range of ecological and environmental projects including EIAR, EcIA and AA/NIS reporting, as well as the areas of renewable energy developments, flood relief schemes, road schemes, invasive species management blueways/greenways, biodiversity projects and non-volant mammal monitoring. Highly competent in GIS, he specialises in aquatic ecology and freshwater fish, inclusive of fisheries assessments (electro-fishing, nettings), macrophytes, water quality, hydromorphology, riparian habitats, otter, freshwater pearl mussel, white-clawed crayfish and amphibians, holding full national licences for all of these species. Bill is one of Ireland's most experienced otter surveyors having completed a high number of small- and large-scale surveys for the species including the Dublin otter survey (2018-2020), Santry River otter survey (2021), DLR otter survey (2019-2020), Boyne Greenway otter survey (2023), Fingal otter survey (2024), Carlow otter survey (2025-2026) and the Monaghan otter survey (2026). Bill has pioneered a contemporary survey approach for otter surveys in Ireland

introducing total corridor otter survey (TCOS) and Human Disturbance Index (HDI) methodologies to accurately map otter signs and habitat quality to inform planning and policy, as well as genetic studies of otter diet (metabarcoding).

Ross Macklin

Ross Macklin (B.Sc. (Hons) Applied Ecology, HDip GIS, Dip IPM, MCIEEM, IFM) is a principal ecologist and Director at Triturus Environmental Ltd., specialising in freshwater and fisheries ecology. He studied a bachelor's degree in applied Ecology at UCC and later completed a higher diploma in Geographical Information Systems at UCC and a diploma in Integrated Pest Management at UCD. Ross has an in-depth knowledge of all freshwater ecosystems and riparian corridors. He has undertaken river habitat, lake habitat, canal habitat and fisheries assessments in professional work for 20 years. His specialist freshwater experience lies in biological and physicochemical water quality analysis, fisheries ecology, riparian habitat assessments, habitat mapping, protected species, mammal surveys, geographical information systems, ecological design and invasive species. Ross has expert experience in identifying and assessing macrophyte plant, aquatic bryophytes, fish and macroinvertebrates from a variety of aquatic habitats. He routinely undertakes fisheries assessments, protected species surveys, invasive species surveys, river hydromorphology surveys, surface water management plans, CEMP, EcIA, EIAR and NIS reporting. He holds full national licences for freshwater pearl mussel, white-clawed crayfish and amphibians inclusive of an open photography licence for numerous protected species. Ross is one of Ireland's most experienced otter surveyors having completed a high number of small- and large-scale surveys for the species including the Dublin otter survey (2018-2020), Santry River otter survey (2021), DLR otter survey (2019-2020), Boyne Greenway otter survey (2023), Fingal otter survey (2024), Carlow otter survey (2025-2026) and the Monaghan otter survey (2026). Ross has pioneered a contemporary survey approach for otter surveys in Ireland introducing total corridor otter survey (TCOS) and Human Disturbance Index (HDI) methodologies to accurately map otter signs and habitat quality to inform planning and policy, as well as genetic studies of otter diet (metabarcoding).

2. Methodology

2.1 Otter sign survey

A walkover otter survey was undertaken along the Moyasta River bordering and downstream of the proposed development on Friday 28th August 2026. The survey area comprised 3.5km of contiguous habitat along the Moyasta River, including at the proposed watercourse crossing of the grid cable route (GCR) (**Figure 2.1**). The survey was completed by Bill Brazier and Ross Macklin of Triturus Environmental Ltd. during suitable weather conditions (dry, mild, bright) and low water levels which ensured that a good representation of habitat marked by otter could be recorded in the field, including territorial marking or marking of feeding areas. The survey also deliberately coincided with a dry period to minimise rain washout of otter signs (spraint, smears etc.). To facilitate improved access to all areas, the survey of tidal areas was completed around low water on a spring tide.

Each otter sign was logged by type, location (handheld GPS), condition and approximate age for later interpretation to distinguish differences in habitat use and activity. Spraints (faecal deposits) were subjectively assessed as either fresh (very recent), mixed-age (recent & older spraints, typically indicative of a regular marking site) or old (spraint degrading and not recently deposited). Furthermore, indicative counts of spraint (i.e., number of individual spraints) and the number of sprainting sites (often separate clusters in one area) were noted. This helped indicate the frequency of otter marking that can clarify preferential use of habitat over time. High marking frequency often demarcates important territory.

2.2 Total corridor otter survey (TCOS) methodology

The survey broadly followed the best practice 'standard survey' methodology for otter as recommended by Bailey & Rochford (2006), Chanin (2003) and Lenton et al. (1980) (all based on observations by Erlinge, 1967). However, methodology differed in that the entire waterline was surveyed rather than the standard 500-600m sections selected at regular (5-8km) intervals from accessible points (e.g., bridges). The novel survey technique, known as a total corridor otter survey (TCOS) (Macklin et al., 2019), involved a continuous, unbiased survey effort along a survey reach, encompassing the entire channel and riparian zones (up to 20m from channel) in addition to any adjoining intertidal areas. Triturus has employed this comprehensive otter survey methodology in many other large scale projects across Ireland, including the Dublin Otter Survey (2018-2019), DLR Otter Survey (2019-2020), Fingal Otter Survey (2024-2025), Carlow Otter Survey (2025) and Monaghan Otter Survey (2026).

Total corridor survey methodology typically involves the use of two (or more) surveyors working independently (in tandem) along each bank of an individual watercourse (where practical). This also facilitates one to work from a more elevated position (e.g., bank top) with one surveying (with appropriate personal protective equipment (PPE) such as a dry suit or chest waders) from within the channel or watercraft. This holistic approach, whilst labour intensive, greatly increases the likelihood of otter sign detection and facilitates a more accurate estimation of otter usage and activity at the river or catchment scale. This is especially true of more cryptic signs such as holts and couches that are often located in poorly accessible areas often not covered by a standard survey approach.

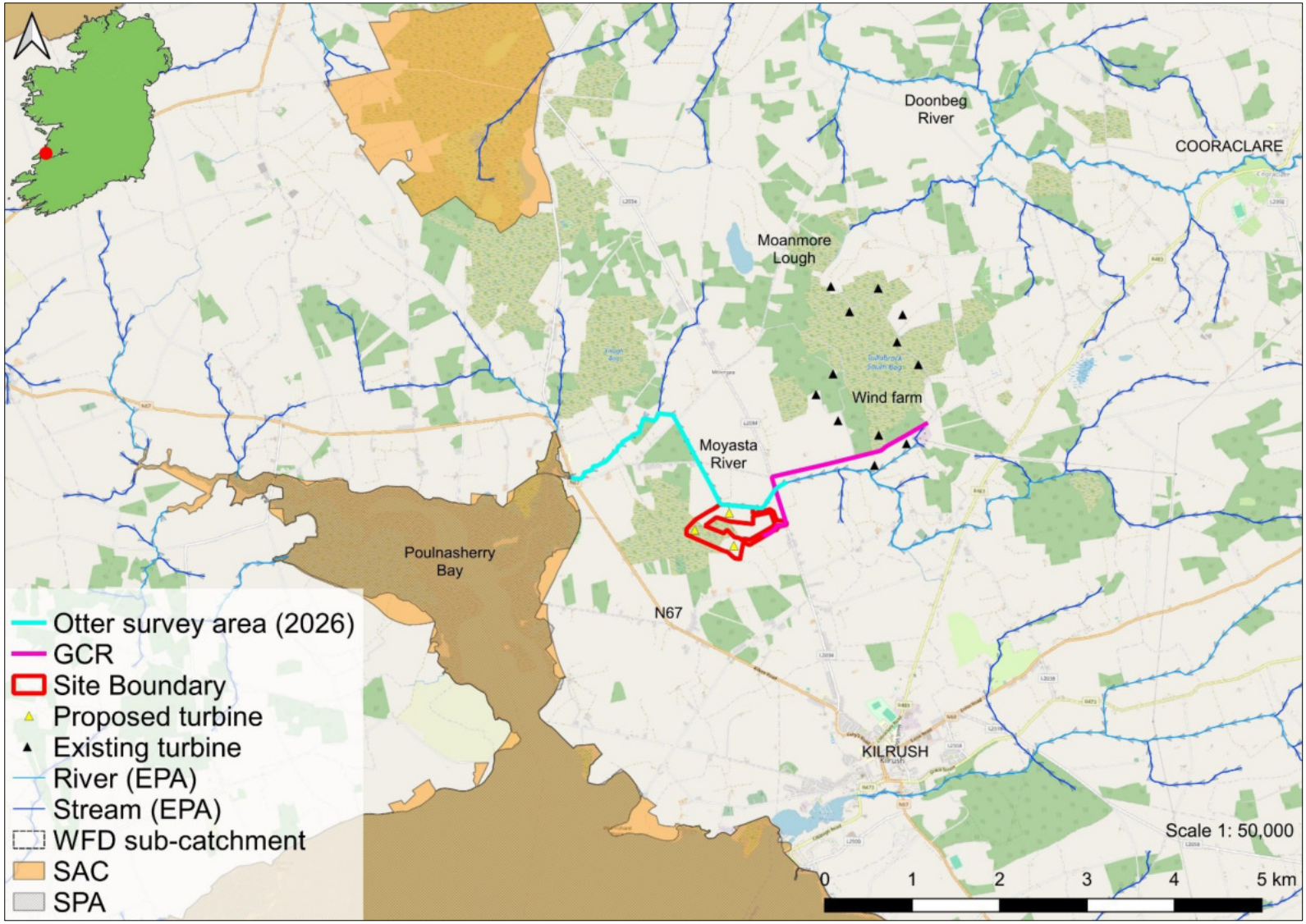

Figure 2.1 Otter survey area in the vicinity of the proposed development



Figure 2.2 Overview of the 2026 otter survey area

3. Results

3.1 Otter records

A total of *n*=19 otter signs were recorded within the survey area on the 28th August 2026. Signs were scattered throughout the survey area with a concentration of otter activity near the site boundary and proposed GCR crossing (**Figure 3.1**).

Spraint sites (16) accounted for the majority of all signs recorded, with a low number of latrines[1] (2) and prints (**Table 3.1**). No legally protected breeding areas (holts) or resting areas (couches) were identified.

Further detailed notes on individual otter signs is provided in **Table 3.2** below. An interpretation of the relevance of the otter survey findings is presented in the Discussion (section 5).

Table 3.1 Summary of otter signs recorded in August 2026

Otter sign	Total no.
Spraint site	16
Latrine	2
Prints	1
Total	**19**

[1] Latrines are defined as regularly used faecal/spraint deposition sites with digging behaviour, often on sand, mud or grass (pers. obs.) and are often associated with resting otter (Findlay et al., 2023)

Table 3.2 Summary of the *n*=19 otter signs recorded in the survey area on the 28th August 2026 (results presented upstream to downstream)

Sign ID	Location	Sign type	Spraint no.	Sign age	ITM x	ITM y	Notes
Otter _01	Upstream of GCR crossing	Spraint site	2 (4)	Mixed age	498326	658452	Mixed age spraint site on fallen mossy willow trunk
Otter _02	Downstream of GCR crossing	Spraint site	1 (1)	Fresh	498226	658352	Fresh spraint on cross-channel willow trunk
Otter _03	Downstream of GCR crossing	Spraint site	1 (4)	Mixed age	498225	658349	Regular spraint site on isolated large instream boulder near woody debris dam. Urine scorching of mosses
Otter _04	Adjacent to site boundary	Spraint site	1 (2)	Old	498114	658202	Old spraint on rare flat muddy platform of ground at mature willow
Otter _05	Adjacent to site boundary	Spraint site	1 (4)	Old	498088	658203	Old spraint site on mossy willow root system along flat area of bank at base of embankment slope
Otter _06	Adjacent to site boundary	Spraint site	1 (1)	Fresh	497986	658212	Otter trail and fresh spraint on small island/cobble bar
Otter _07	Adjacent to site boundary	Spraint site	2 (8)	Mixed age	497946	658211	Very regular spraint site on grassy platform under shade of willows along south bank. Fish remains. Slide to water with anal jelly also.
Otter _08	Adjacent to site boundary	Spraint site	1 (6)	Mixed age	497916	658215	Spraint on small boulder on island. Crab remains.
Otter _09	Downstream of site boundary	Latrine	1 (5)	Mixed age	497562	658398	Latrine on flat muddy ledge under heavy cover of willow opposite livestock access point
Otter _10	L2036 road crossing	Spraint site	1 (4)	Mixed age	497387	658730	Spraint site (mostly old) with prints in mud/sand under road bridge
Otter _11	Downstream of L2036 road crossing	Spraint site	1 (3)	Medium & old	497329	658842	Spraint site with medium age and old spraint on muddy willow root at cattle drink
Otter _12	Downstream of L2036 road crossing	Spraint site	1 (2)	Fresh & medium	497324	658853	Spraint on discarded fertilizer bag along channel margins
Otter _13	Downstream of L2036 road crossing	Spraint site	1 (2)	Old	497322	658866	Old spraint with crab remains on willow root on top of flat bank section (north bank)
Otter _14	Downstream of local road crossing	Latrine	1 (3)	Fresh	497118	659242	Latrine on muddy sandy mound under willows, mostly fresh, digging marks also
Otter _15	Downstream of local road crossing	Spraint site	1 (4)	Mixed age	496971	659283	Spraint site and prints on conspicuous muddy ledge under shade of willows, south bank

Otter _16	Near Einagh Stream confluence	Spraint site	1 (5)	Mostly old	496926	659284	Spraint site on muddy ledge and willow trunk on large 90° meander, west bank. One spraint very fresh
Otter _17	Small pond	Spraint site	1 (3)	Old	496682	659028	Old spraint site on boulder along margins of small pond
Otter _18	Near old Moyasta rail station	Prints		Recent	496354	658750	Recent otter prints in soft sandy mud at base of modified bank
Otter _19	Moyasta Bridge (N67)	Spraint site	1(1)	Old	495970	658545	Old single spraint on boulder revetment immediately upstream of road crossing



Figure 3.1 Overview of all otter signs recorded during the August 2026 survey



Plate 3.1 View of the Moyasta River c. 150m upstream of the proposed GCR crossing, August 2026



Plate 3.2 Otter spraint site on a mossy willow trunk (with urine scorching of mosses) upstream of the proposed GCR crossing



Plate 3.3 Moyasta River at the proposed GCR crossing of the L2034 (no otter marking opportunities in the culvert)



Plate 3.4 View of the Moyasta River downstream of the proposed GCR crossing



Plate 3.5 Steep, historically deepened banks adjoining the proposed site boundary with some instream woody debris improving habitat diversity



Plate 3.6 Cover of filamentous algae was high in open, less shaded areas of the Moyasta River, indicating significant enrichment pressures



Plate 3.7 Characteristic otter spraint site (with urine scorching of mosses) on a prominent instream boulder – such features were rare in the survey area due to historical channel modifications



Plate 3.8 Otter spraint (with marine crab remains) on a small island c. 3km upstream of Moyasta Bridge (N67 road crossing), proof that otters commute between the freshwater and tidal reaches of the river



Plate 3.9 Open glide habitat on the Moyasta River adjacent to the site boundary with steep, heavily scrubbed banks and poor flow diversity



Plate 3.10 Historically cleared riparian zone for agriculture/pasture along the Moyasta River (low seclusion levels for otter)



Plate 3.11 Very heavy instream growth of aquatic plants, characteristic of historically deepened and straightened channels, upstream of the L2035 road crossing



Plate 3.12 Extensively straightened and deepened section of river downstream of the L2035 road crossing



Plate 3.13 Otter latrine with spraint and digging on a marginal sand bar downstream of the L2036 road crossing



Plate 3.14 Example of an area of the Moyasta River with better instream and riparian recovery from historical deepening (better quality fisheries & otter habitat)



Plate 3.15 The lower meandering reaches of the Moyasta River were often very heavily vegetated and silted



Plate 3.16 Lower tidal reaches alongside the old rail line with evident bank modifications



Plate 3.17 The lower tidal reaches of the Moyasta River featured abundant cobble and boulder which would provide high quality eel nursery habitat and thus abundant prey resources for otters



Plate 3.18 The tidal Moyasta River at Moyasta Bridge (N67 road crossing)

4. Discussion

The August 2026 survey recorded a total of *n*=19 otter signs along 3.5km of contiguous habitat along the Moyasta River in vicinity of the proposed Moanmore Lower Green Energy Project. Otters were previously known from the Moyasta River as well as the connecting Poulnasherry Bay and wider Lower River Shannon SAC site (Triturus, Jennings O'Donovan & NBDC data), but the current survey has significantly expanded the knowledge of the species on this watercourse.

Otter signs by way of spraint sites, latrines and prints, were scattered throughout the survey area with a concentration of activity near the proposed site boundary and grid cable crossing (**Figure 3.1**). Due to extensive historical channel deepening and straightening ('channelisation'), many areas of the river featured few suitable features for otter marking such as instream boulders or fallen trees (Wang et al., 2021; Reuther et al., 2000). This naturally reduces the number of otter signs detectable by surveyors.

As part of land drainage, the Moyasta River has been extensively deepened and locally straightened historically, resulting in a channel with frequently steep banks, poor floodplain connectivity, narrow riparian buffer zones and poor habitat diversity (hydromorphology). However, some instream recovery was evident, especially near the proposed site boundary where dense tree growth and root systems (primarily from willows, *Salix* spp.) along/within the channel resulted in frequent woody debris dams and improved habitat heterogeneity (e.g. **Plate 3.5**). This created improved fisheries habitat compared with many other reaches, thus benefiting foraging otters whose primary prey is fish (Triturus data; Tolrá et al., 2024; Drake et al., 2023; Krawczyk et al., 2016; Reid et al., 2013).

The Moyasta River flows freely to the Shannon Estuary at Poulnasherry Bay (i.e. no instream barriers) and supports migratory salmonids (including Atlantic salmon & sea trout), resident brown trout, lamprey (*Lampetra* sp.) and European eel (Triturus data). Common transitional fish species such as flounder (*Platichthys flesus*) and thick-lipped mullet (*Chelon labrosus*) are present in the lower tidal reaches and provide additional foraging opportunities for otter. The close proximity of the survey area to the coast also provides otter with alternative prey resources such as marine crustaceans. The remains of crabs were identified in several otter spraints on the Moyasta River, including a site adjacent to the site boundary (sign Otter_08; **Plate 3.8**), located c.3km upstream of Moyasta Bridge. This indicates that otters regularly commute between the freshwater reaches of the Moyasta River and downstream transitional habitats (inclusive of the Lower River Shannon SAC) for foraging.

4.1 No otter breeding & resting areas identified

Otters, along with their breeding and resting places, are protected under provisions of the Irish Wildlife Acts 1976-2023 and also pursuant to the requirements of Articles 12, 13 and 16 of the Habitats Directive (92/43/EEC) as an Annex IV species. Much of the survey area was exposed to low levels of human-related disturbance, a known prerequisite for otter breeding and resting sites (Brazier & Macklin, 2025; Dettori et al., 2021; Martin-Collado et al., 2020; Brazier & Macklin, 2020; Macklin et al. 2019; Scorpio et al., 2016; Ruiz-Olmo et al., 2011; Mason & Macdonald, 2009; Loy et at., 2009; Kruuk, 2006; Liles, 2003). However, in spite of low disturbance levels, no legally protected breeding or resting areas were identified during the survey.

Holting suitability was generally poor in the survey area due to historically modified, steep compacted banks not conducive to holt excavation. This included the river section near the proposed development (e.g. **Plate 3.5**). Some improved suitability was noted in loamy bank sections downstream of the L2036 road crossing. However, poor floodplain connectivity due to extensive historical deepening of the Moyasta River encourages high water levels within the channel during spate events, significantly reducing the availability of bank sections located above flood heights favoured for the location of holts. The narrow riparian buffer zones along much of the survey area (adjoining farmland) further reduced the potential for otter holts above flood levels given reduced seclusion.

Like holts, otter couches (resting areas) are also usually situated in low disturbance areas with high rates of seclusion (Triturus pers. obs.; Tolrà et al., 2024; Weinberger et al., 2019). Although numerous low gradient areas of bank under heavy tree/scrub cover showed some suitability as couches, no utilisation of such areas was confirmed during the survey.

Given the absence of legally protected otter breeding and resting areas within 150m of the proposed development, there are no requirements for a derogation to disturb breeding/resting otter under Article 16 of the Habitats Directive and Regulation 54 of the European Communities (Birds and Natural Habitats) Regulations, 2011-2021.



Plate 4.1 Example of a section of scoured river bank with overhanging vegetation with some suitability for use as an otter resting (couch) area – but no signs of use here or elsewhere were identified during the survey

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Appendix IV:
Updated Biodiversity Enhancement and Management Plan

PROPOSED WIND FARM
AT MOANMORE LOWER, CO. CLARE

UPDATED BIODIVERSITY ENHANCEMENT
AND MANAGEMENT PLAN

SEPTEMBER 2026

Prepared for

Moanmore Lower Green Energy Ltd.

by

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1.0 INTRODUCTION

1.1 Background

This Biodiversity Enhancement and Management Plan (BEMP) has been prepared in support of the Environmental Impact Assessment Report (EIAR) produced for the proposed Moanmore Lower Wind Farm, Co. Clare. Full details of the Development are given in **Chapter 2** of the EIAR.

As part of the Development, an area of cutover bog (0.8 ha), which is part of an extensive area of bog that includes a remnant area of uncut raised bog (see EIAR **Chapter 6: Sections 6.3.3.4 & 6.3.3.5**), will be directly impacted as a result of the construction of Turbine T2 and its associated access track. As the bog complex in its entirety is rated of County Importance, mitigation is being provided to off-set the habitat loss through the implementation of a Biodiversity Enhancement and Management Plan (BEMP), as described in this report.

Mitigation is also required to offset the loss of a small area of Molinia meadow (estimated at 200 m^2) (see EIAR **Section 6.3.3.2**), an Annex I listed habitat, as a result of the construction of Turbine T3. The mitigation will enhance the main area of this habitat (c.1.78 ha) within the site and will also focus on increasing the suitability of the habitat for the Annex II listed marsh fritillary (while not recorded in the baseline survey, part of the Molinia meadow habitat was rated as 'suitable').

While hedgerows are not a significant feature of the Moanmore Lower site, there will be a loss of an estimate 20 m due to new access tracks and a loss of 70 m at the location for the proposed blade set-down area. In addition, an estimated 175 m of hedging will be removed to provide a bat buffer around T1 (the other two turbines do not require hedge removal). Mitigation for loss of hedging will be provided by a replanting programme which forms part of the BEMP.

The BEMP has been revised in response to Point no .4 of An Coimisiún Pleanála's Further Information Request (dated 06 May 2026);

"You are required to submit revised proposals for the proposed blade transfer area to allow for the rehabilitation/restoration of the underlaying peat habitat once the conifer plantation is clear felled and site works have ceased. The revised proposals should be included in an updated Biodiversity Enhancement and Management Plan."

The areas for the BEMP are within the Redline Boundary for the Development (see **Figure 1**).

The programme described in this report will be implemented in accordance with published guidance and best practice, namely:

- SNH (now NatureScot) "Planning for development: What to consider and include in Habitat Management Plan – Guidance" (Version 2, March 2016).

- CIEEM (2023) Briefing Paper on 'Biodiversity Enhancement for New Developments in Ireland', (the "CIEEM Guidance")

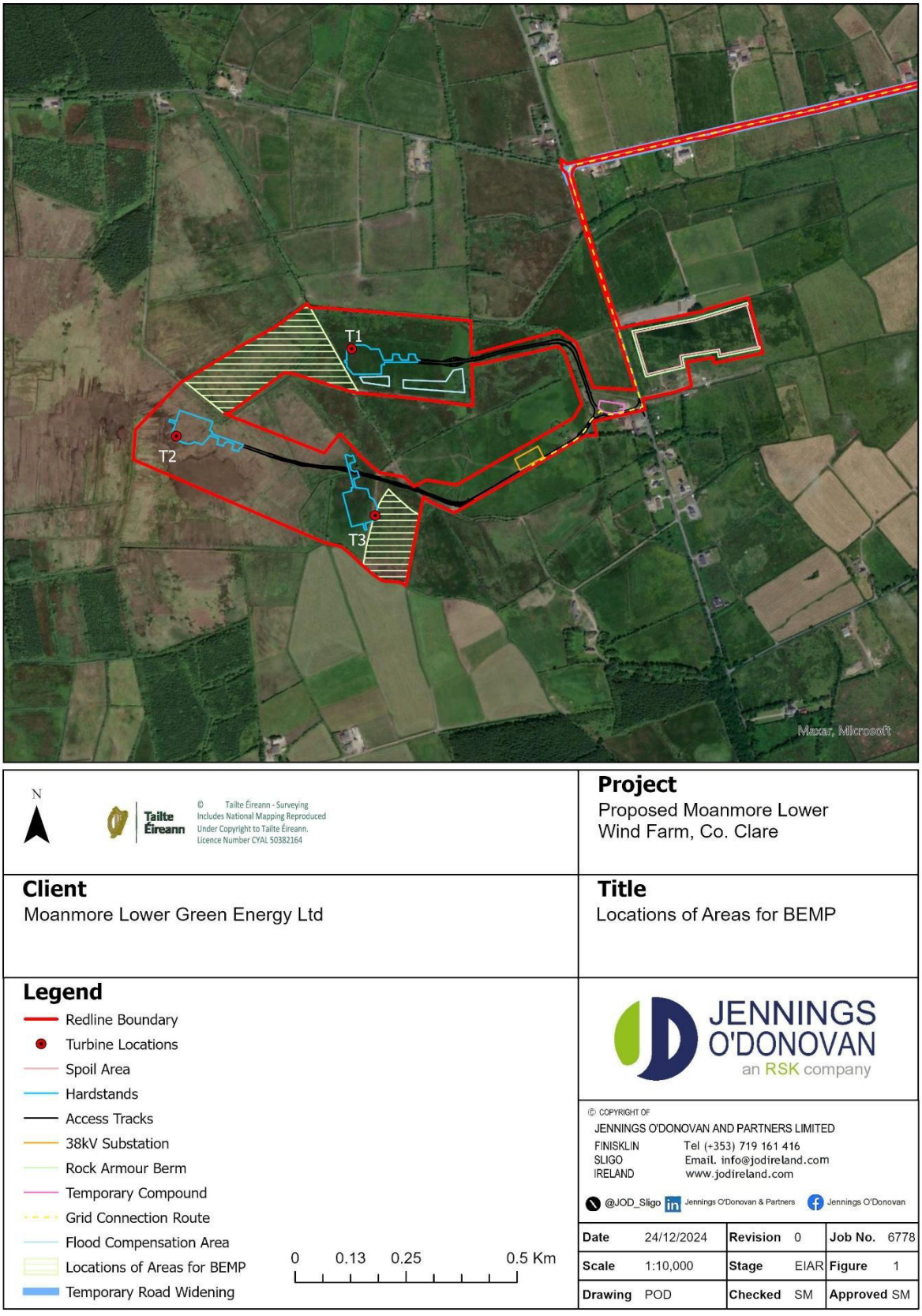


Figure 1. Locations of areas for the BEMP (shown by hatched lines).

1.2 Outline Description of Proposed Wind Farm Site

The wind farm Site, as shown in **Figure 1 above**, is located in south-west county Clare, 3 km northwest of the town of Kilrush and 6.8 km southwest of Cooraclare village. The wind farm Site is located within the townland of Moanmore Lower.

The proposed Development is situated within a landscape dominated by agricultural land (mainly used for livestock grazing) and with scattered stands of commercial conifer plantation. Remnant raised bogs, now almost entirely cut, are a feature of the area. There are a number of operational wind farms in the area, including Moanmore Wind Farm, located c. 1.7 km to the northeast and Tullabrack Wind Farm, located c. 2.16 km to the east of the Site.

From a conservation perspective, the River Shannon system is the dominant feature of the local area, with Poulnasherry Bay located just over 1 km to the west of the Site. Various small lakes and wetlands occur in the hinterland of the Site, including Tullaher Lough, Tullabrack Lough, Gower Lough and Moanmore Lough.

The mapped geological formation underlying the Site and GCR is the Gull Island Formation, which is a grey SILTSTONE with up to 20% sandstone towards the base decreasing upwards (see **EIAR Chapter 8** for details). Much of the Site is covered in peat, particularly in the western sector. Peat depths at survey points (266 no.) ranged from 0.00 m to 5.1 m, though generally depths were very shallow to moderately deep. Deepest peats occurred south of T2 and south / southwest of T3.

The wind farm Site is characterised by relatively flat lying topography with associated elevations ranging between 8 to 16 m AOD and an average slope of 2.5°.

The proposed wind farm Site and Grid Connection Route to the Tullabrack 110kV substation are situated within the Shannon Estuary North catchment (ID: 27, Area: c.1,651.27 km²) (for details see **EIAR Chapter 9: Hydrology and Hydrogeology**). The Site and its surroundings have indirect hydraulic connectivity to the Shannon estuary via natural and artificial drainage that connect to the Moyasta River, which drains the Site. A section of the river flows along the northern boundary of the site, and continues in a westward direction before draining to Poulnasherry Bay and into the Shannon Estuary. In addition to the Moyasta River, there are numerous drainage ditches located within the proposed Site and its surrounds.

Ecologically, the Site for the proposed wind farm can be described as being dominated by Wet grassland (GS4) (semi-improved to varying extents) and Cutover bog (PB4), with a small area of Raised bog (PB1). The bog type is former raised bog of the 'Western' category. In a detail evaluation of raised bogs in Ireland, Cross (1990) refers to Co. Clare and writes "*Raised bogs occurred in two*

areas; small bogs in the undulating lowlands east of Tulla and an extensive tract near Kilrush at the mouth of the Shannon (Monmore Bog). All bogs have been largely cut away leaving a few very small remnants behind." A full ecological description of the site is given in **Chapter 6** of the EIAR.

1.3 Objectives of the BEMP

Objective no. 1

To enhance an existing area of cutover bog that has been improved for grazing and is now largely dominated by wet grassland with frequent rushes.

Objective no. 2

To enhance an area of Molinia meadow (Annex I listed) which has been degraded by over-grazing and which has potential to provide habitat suitable for marsh fritillary (Annex II listed).

Objective no. 3

To offset the loss of hedgerows by a replanting programme.

Objective no. 4

To rehabilitate the underlying peat habitat at the blade transfer area.

1.4 Statement of Authority

This BEMP has been prepared by Brian Madden, with expertise on the marsh fritillary component provided by Ryan Mitchell.

Brian Madden BA Mod. (Hons.), PhD, MCIEEM

Brian graduated in Natural Sciences from the University of Dublin in 1984 and earned a Ph.D degree from the National University of Ireland for his research on ecosystem processes in raised bogs. Since 1994, Brian has been the principal ecologist with BioSphere Environmental Services.

Brian has carried out botanical surveys and habitat assessments for most terrestrial habitats which occur on the island of Ireland. He is also an experienced ornithologist, with particular interest in birds of peatland and wetland habitats.

BioSphere Environmental Services has been involved in energy related projects, and particularly wind farms, since the 1990s. Many of the projects have included Biodiversity Enhancement and Management Plans, including Castlepook Wind Farm, Co. Cork, Oweninny Wind Farm, Co. Mayo and Eglish Wind Farm, Co. Tyrone.

Ryan Mitchell, B.Sc. – Senior Ecologist & Marsh Fritillary expert

Ryan is a senior Environmental Scientist / Ecologist working at Jennings O'Donovan & Partners Ltd. He is an experienced entomologist, with specialisation in pollinator insects and Diptera (True flies). Ryan has much experience of working on large scale renewable energy projects (onshore wind & solar) as a Marsh Fritillary surveyor both in planning and construction stages. He has also carried out invertebrate monitoring surveys for NPWS within various Natura 2000 sites. He has published numerous papers in peer reviewed journals on terrestrial invertebrates in Britain and Ireland.

Examples of energy projects requiring lepidoptera studies that Ryan has worked on include: Derrinlough Wind Farm, Co. Offaly; Carrickatane Wind Farm, Co. Tyrone, Clooncunny Wind Farm, Co. Sligo, and Timahoe North Solar Farm, Co. Kildare.

2.0 PLAN DETAILS: OBJECTIVE 1 – CUTOVER BOG ENHANCEMENT

2.1 Background

The enhancement plot, which measures approximately 4.04 ha, lies to the west of the location for turbine T1 (see **Figure 1**) (separated by a distance of 35.4m). It is essentially used as a field, demarcated by drains, for rough grazing of cattle. The area is shown as bog on the OS 6 inch and 25 inch historical maps, and even then drains demarcated much of the boundary. The north-east tip of the plot extends to the Moyasta River. There is one main internal drain which separates the south-eastern sector (triangular shaped plot) from the main sector (rectangular shaped). Main drains occur along the western, southern and eastern boundaries, with a minor drain along the northern boundary. In general, the eastern part of the plot is more improved and drier.

The present land use is grazing by cattle which appears to be at a low to moderate level and on a seasonal basis. Some localised areas of poaching were evident in the wet grassland areas at the time of survey (September 2023).

Vegetation description

The area comprises a mix of cutover bog and wet grassland habitat on peat soil (**Figure 2**). The western half of the area is dominated by a revegetated cutover bog surface, which is characterized by varying proportions of *Molinia caerulea, Juncus effusus* and *Juncus acutiflorus* and with frequent *Carex panicea, Erica tetralix, Succisa pratensis, Calluna vulgaris* and *Potentilla erecta*. Sphagnum moss is locally frequent (**Plate 1**), with *Sphagnum capillifolium* and *Sphagnum papillosum* the main species present. Another common moss species is *Aulocomium palustris*, which is typical of wet bog habitat. The cutover bog habitat present has not been subject to peat cutting for a considerable time. Areas of bare peat are absent and there is no evidence of recent cutting activity.

The eastern half of the enhancement area is generally dominated by wet grassland vegetation which has a high cover of soft rush *Juncus effusus* (**Plate 2**) with bog species either absent or present at a low cover. Frequent species occurring, in addition to *Juncus effusus,* include *Juncus acutiflorus, Ranunculus repens, Succisa pratensis, Cirsium palustre* and *Holcus lanatus* with *Rhytidiadelphus squarrosus* the main moss species seen.

In places the cutover bog and wet grassland habitats intermix and form a habitat mosaic.

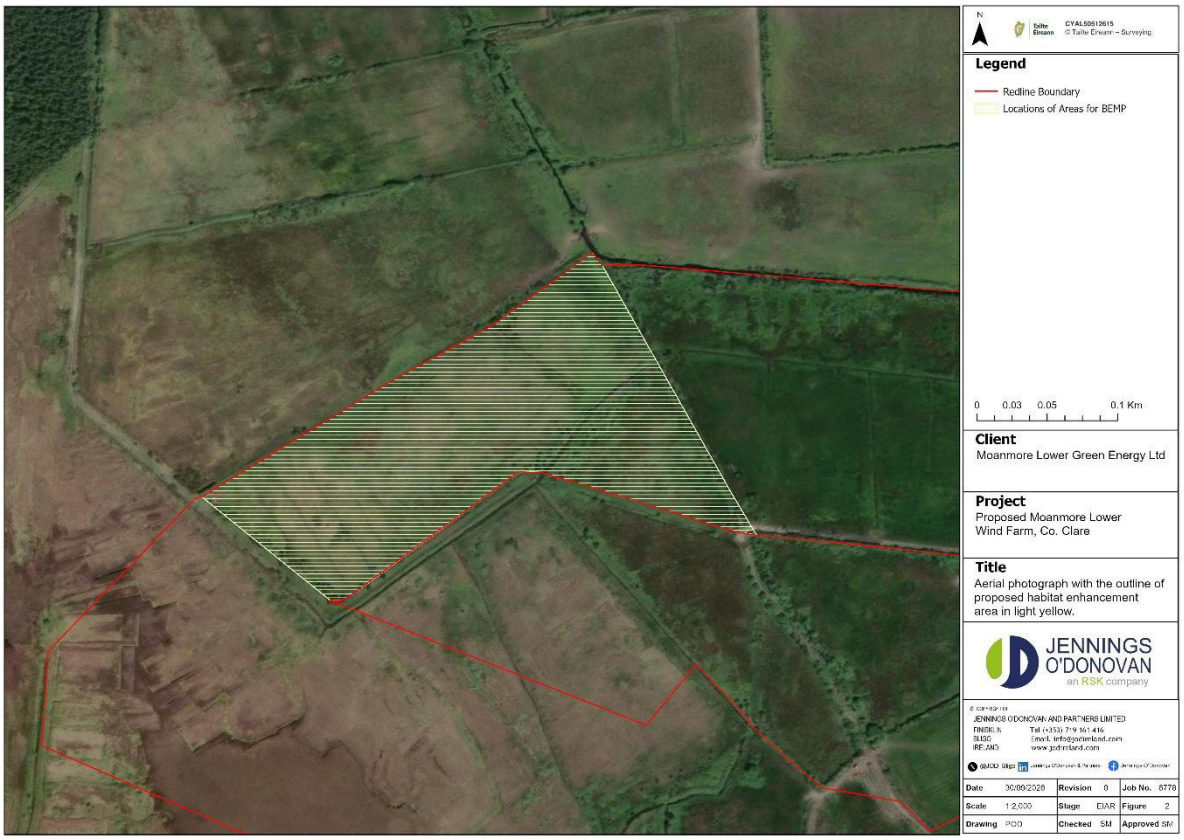


Figure 2. Aerial photograph with the outline of proposed habitat enhancement area in yellow.



Plate 1: View of cutover bog vegetation in the west of the area, showing *Sphagnum capillifolium* growing along with various sedges and grasses (September 2023).



Plate 2: General view of wet grassland habitat in the eastern half of the plot (September 2023).

2.2 Proposed Management Methodology

The principal aim is to maximise over the lifetime of the Plan the amount of cutover bog within the Plot. This will off-set the loss of cutover bog as a result of the Project and will also enhance the quality of habitat for important bird species such as hen harrier, snipe and meadow pipit.

This aim will be achieved through reducing the amount of rush cover (mainly soft rush) throughout the plot by sensitive mowing/cutting and an appropriate level of grazing. However, in areas dominated by wet grassland and perhaps less likely to revert fully back to bog, increasing the diversity of wetland plant species within the grassland sward will be desirable.

The closure of internal drains will be undertaken in conjunction with the project ecologist and hydrologist so as to maximise the wetness of the surface.

The initial task in Year 1 of the BEMP will be a detailed vegetation review of the plot and the setting out of an appropriate programme of works for the first 5 Years of the Plan

It is noted that during the lifetime of the Plan, there will be no spreading of fertilisers within the Plot.

2.2.1 Measure no. 1: Survey and review of work programme

During the year prior to construction, a detailed vegetation survey of the Plot will be carried out during the summer period which will aim to map in detail the distribution of the bog and wet grassland habitats. The areas which are identified as predominantly existing cutover bog will be marked out (using bamboo canes or similar) as these will be excluded from subsequent mowing to minimise disturbance.

In conjunction with the project hydrologist and ecologist, any internal drains to be blocked will be marked out so as to increase the wetness of the surface layer.

Following this review, a suitable programme of works will be identified for the first 5 Years of the Plan.

Outlines of the likely approaches for the work programmes are given in the following.

2.2.2 Measure no. 2: Control of rushes by cutting

Much of the plot has a moderate to high coverage of rushes, mostly soft rush *Juncus effusus*. This species forms tussocks which can occur densely and outcompete other species. While some rushes will always be present in disturbed bog habitats and wet grassland, coverage of more than 30% is undesirable.

Rushes will be controlled by a combination of mowing/cutting and an appropriate level of stock grazing (see next section). [It is not proposed to use herbicides during the operation of the Plan to control rushes or weed species.] It is proposed that in Year 1 of Plan, the entire Plot will be mowed,

with the exclusion of the areas identified as predominantly existing cutover bog. This will be done either in early spring (prior to start of bird nesting season) or, more likely, in September (after bird nesting season). Mowing in Year 1 will be done using a low ground pressure tractor suitable for use on peat bogs. The cutting should be as low to the ground as possible and will be done by a machine mounted flail or brush-cutter. The cut rushes will be collected and removed from site so as to reduce soil fertility. Grazing will then be allowed in period September to end of October to assist in control of rushes.

In Year 2, an inspection will be made at start of February to consider whether another early full or even partial (say 50%) cut of Plot by tractor and mower would be useful. If ground is too wet, this will be delayed until autumn (as above).

After 1-3 years of above approach, it may be desirable to continue cutting, at least in some parts of the Plot, by a hand method using a flail or similar tool so as to reduce disturbance to the surface.

With annual cutting, the vigour of the rushes will be reduced (in combination with appropriate grazing). However, it is anticipated that some cutting will be required in each Year of the Plan.

The mowing works will be carried out by an experienced operator under the guidance of the project ecologist.

2.2.3 Measure no. 3: Grazing

An appropriate level of grazing is required to control and reduce the cover of rushes and other robust plant species.

A level of 1 livestock unit per hectare per year (1 LU/ha/yr) is considered appropriate for the first three to five years of the Plan (after which the level will be reviewed). While this level is higher than would be recommended for uncut bog, it is appropriate for semi-natural grassland or in this case cutover bog with rushes. On this basis, 4 cattle will be allowed within the Plot for grazing.

Grazing will be on a seasonal basis being limited to the periods (i) March to mid-May (say 15th), and (ii) September and October.

The avoidance of the summer period mid-May to end of August will facilitate the flowering and seed production of the flora in the summer months.

The avoidance of the winter period November to February (inclusive) will prevent poaching.

The use of ring feeders for supplementary feeding can cause damaging enrichment of bog and poaching. If supplementary feeding is necessary, this will be discussed with the project ecologist and the most suitable area will be selected.

2.2.4 Measure no. 4: Drain blocking

A walk-over survey in September 2023 suggested that there are few active internal drains within the management plot.

However, as part of Measure no. 1, a detailed inspection will take place in the pre-construction year by an ecologist and hydrologist to determine where blocking of drains would be feasible and be beneficial to increasing the wetness of the surface (see **Chapter 9; Hydrology & Hydrogeology, section 9.6.2.12**).

Identified drains will be blocked by hand using either wooden or recycled plastic dams (see **Plate 3**) which are hammered into place with a mallet. Procedure for drain blocking in raised bogs is described in detail in Mackin *et al*. (2017).

The ultimate purpose of blocking drains is to raise water levels and encourage peat-forming vegetation and especially the growth of Sphagnum mosses.



Plate 3. An example of a recycled plastic dam used to block functioning drains on a raised bog site.

2.3 Monitoring

To confirm that the objectives of the Plan are being achieved, the area of enhancement will be monitored during the lifetime of the wind project. SNH (2016) note that a Habitat Management Plan should be a live document, which may be altered following monitoring results, unexpected events or

evolving guidance. Any alterations would only occur following approval by the relevant stake-holding parties, in this case Clare County Council and NPWS.

2.3.1 Monitoring for cutover bog enhancement

After the baseline survey at the commencement of the Plan, a series of permanent quadrats will be set up for the purpose of monitoring of vegetation change over time. The location of these quadrats will be marked using wooden pegs and the grid reference will be recorded using GPS. It is expected that up to ten quadrats will be described. These will be of an appropriate size, probably 2 m x 2 m, to take into account the scale of the plan area. The occurrence and cover of vascular plant and moss species will be recorded in these quadrats along with a number of other important parameters such as the height of vegetation, cover of bare peat, flowering of plant species etc. This survey will take place in the late summer/autumn period of each monitoring year. Photographs of the quadrats will also be taken on deployment and subsequently during the following years of monitoring.

Monitoring will take place during the wind farm Operational Years 1, 2, 3 & 5 of the Plan implementation, with Year 1 being the base year at the time the works are carried out. After Year 5, a review of the progress will be conducted in light of the Plan objectives, and a programme will be developed for the next 5-Year period of the Plan (and so on for the lifetime of the project).

From the monitoring results in each year, an assessment will be made by the project ecologist on whether modifications are required in either the mowing or grazing regimes in place.

Peat water level monitoring, by means proposed standpipe installations, will also be carried out to monitor the effectiveness of the bog re-wetting, i.e. blocking of drains. The monitoring will continue through the lifetime of the Project (see **Chapter 9: section 9.7.2.13**).

2.4 Time Period for Plan Implementation

Year 1 of the Plan will include the baseline survey, the first mowing of rushes, and the establishment of the grazing programme. The site will be assessed by the project hydrologist and ecologist and internal drains marked where blocking will occur to raise water levels in the peat soils. Where this is required, such works will be undertaken within Year 1 of the Plan.

Year 1 will coincide with the completion of wind farm construction works.

Year 2 to Year 5

Throughout the lifetime of the Plan there is a need to ensure that the mowing and grazing measures are carried out in each year in accordance with the outline descriptions within the present document. This will be achieved through 1-2 site visits (one at time of mowing operations) each year. The monitoring of quadrats will be an additional visit focused on the state of the vegetation. Drain blocking

will be visually inspected to ensure that the dam is operating as required and does not require adjusting (should water be escaping) and water levels measured.

Year 5 onwards

As noted, a review of the Plan progress will be made after Year 5. At that stage, it will be apparent how successful the works are in achieving the objective of enhancing the distribution of cutover bog within the Plot. Modifications to the mowing and grazing programmes may be made for the next 5-Year period.

3.0 PLAN DETAILS: OBJECTIVE 2 – MOLINIA MEADOW ENHANCEMENT AND MARSH FRITILLARY

3.1 Background

The baseline botanical assessment identified one field where the Annex I listed habitat Molinia meadow (code 6410) was dominant (see **EIAR Chapter 6: section 6.3.3.2**). This is located east of turbine T3, with the turbine positioned on the western margin of the field (see **Figure 1**). The sward has developed in an area of cutover bog where a residual peat soil occurs (see **Plate 4**). As the sward has been degraded in parts by recent heavy grazing, it was rated as of Local Importance (higher value). The field has an area of 1.78 ha.

Due to the frequency within the sward of the foodplant of the marsh fritillary butterfly (Annex II listed), devil's-bit scabious *Succisa pratensis,* a survey of the field for larval webs of marsh fritillary was carried out in September 2023 (see **EIAR Appendix 6.3**) (see **Figure 3**).

While no larval webs were discovered on site, habitat suitability assessments were undertaken and concluded that the field contains 'suitable' habitat for marsh fritillary. The area was assessed as '*Suitable (Over-grazed) Habitat'* for Marsh Fritillary. The overall habitat has a relatively species-rich sward ranging in average height of 25 cm tall. There was extensive evidence of heavy grazing across the entire survey area. The devil's-bit scabious cover was dense in many places (>10 plants per m^2), with the distribution widespread and reasonably consistent across the survey area. Where devil's-bit scabious occurred, the sward height was mostly 12 cm. However, there were only a few small pockets of '*Good Habitat Condition*' for marsh fritillary throughout the site.

In addition, the desktop study indicated that there is a total of 34 NBDC records of marsh fritillary within a 5 km radius of the Site, and hence it can be considered as being relatively widespread in the wider area of Moanmore Lower.

As the wind farm project will encroach slightly into an area dominated by an Annex I listed habitat, and considering that there is good potential for the Annex II listed marsh fritillary, management and enhancement of this plot is proposed as part of this BEMP.

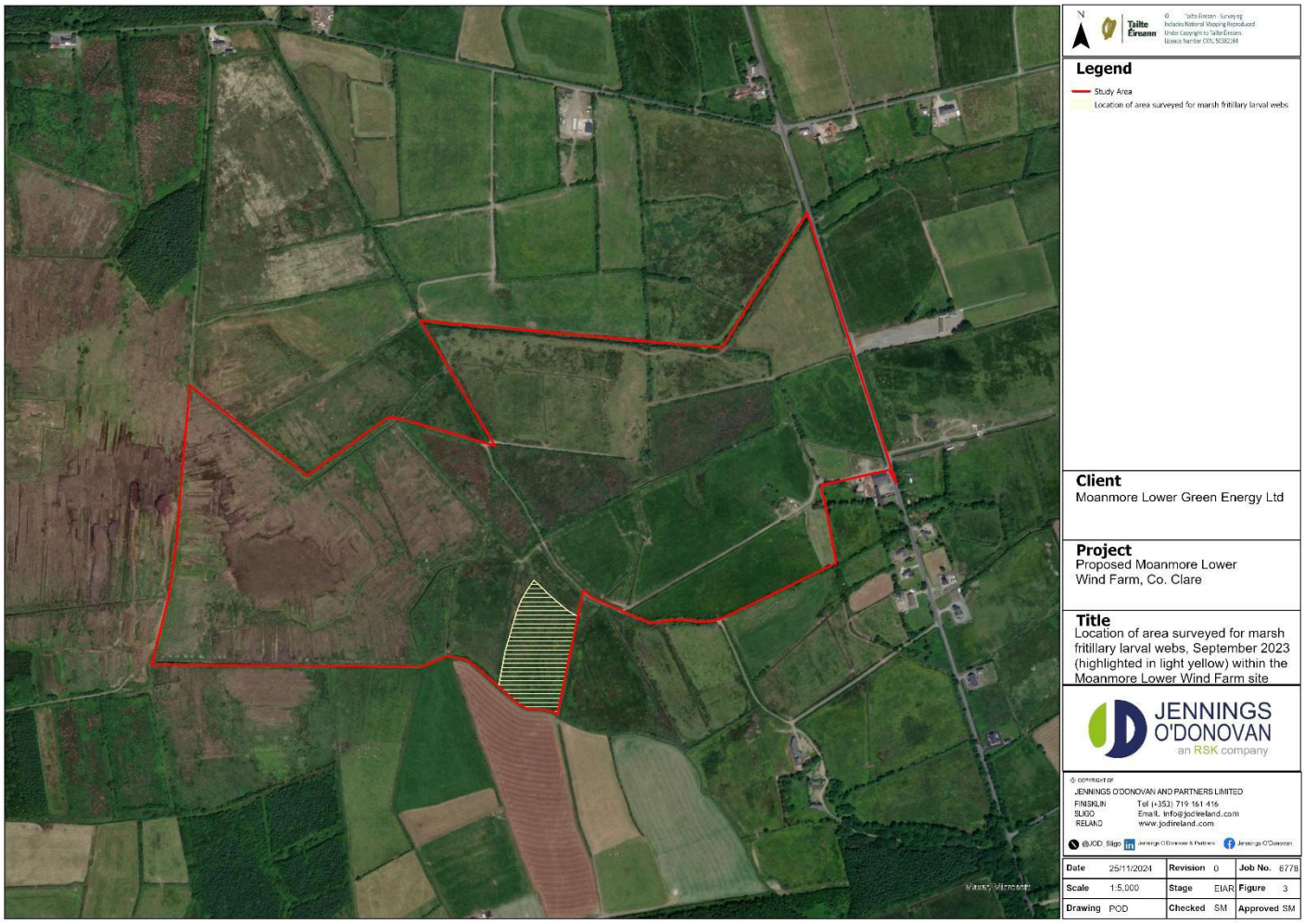


Figure 3: Location of area surveyed for marsh fritillary larval webs, September 2023 within the Moanmore wind farm Site.

Vegetation description

As noted, habitat classified as the EU Annex I habitat Molinia meadows has developed in an area of cutover bog. The main species in the relatively species-rich vegetation are purple moor-grass *Molinia caerulea*, marsh bird's-foot trefoil *Lotus uliginosus* and sweet vernal grass *Anthoxathum odoratum,* with tormentil *Potentilla erecta*, soft rush *Juncus effusus*, sharp-flowered rush *Juncus acutiflorus*, carnation sedge *Carex panicea* and ling heather *Calluna vulgaris* also locally frequent. Moss cover is mainly provided by *Pleurozium schreberi* and *Rhytidadelphus squarrosus*.

In 2023, the field had been subject to apparent heavy grazing pressures and the sward was classified as being in a somewhat degraded state.



Plate 4: General view of Molinia wet grassland in the south of the survey area (September 2023).

3.2 Proposed Management Methodology

The principal aim is to enhance the habitat, both from the perspective of the Annex I habitat itself and the potential for marsh fritillary, by maintaining an appropriate level of grazing during the lifetime of the Plan. This will be achieved by following best guidance for the creation of suitable habitat for the butterfly.

While the management will be focused on grazing levels, no other land use activities will be allowed within the plot, such as insertion of new drains or tracks, or the planting of trees.

It is noted that the enhancement of this plot will also benefit bird species which already occur in the general area, such as foraging hen harrier and kestrel, breeding meadow pipit and skylark, and wintering snipe. Other invertebrate species will also benefit.

3.2.1 Measure no. 1: Grazing

Best practice management of grasslands for marsh fritillary is detailed in the following:

> Byrne, D. & Moran J. (2018). Best practice guidelines from managing lowland species-rich grasslands and marsh fritillary grassland habitat in north-west Ireland. Report prepared for the European Commission, DG Environment, Agreement No. 07.027722/2014/697042/SUB/B2. (https://www.researchgate.net/publication/334277108_RBAPS_Lowland_Species-Rich_Grassland_Marsh_Fritillary_Grassland_Habitat_Best_Practice_Guidelines)

A detailed plan for the management of the Plot will be compiled by an ecologist with experience of marsh fritillary at the commencement of the wind farm construction. As several years will have passed since the 2023 baseline survey, a resurvey of the condition of the Molinia meadow in the context of habitat suitability for the butterfly will be undertaken prior to the commencement of works on site (pre-construction year)

For management of wet grassland (inc. Molinia meadow) for marsh fritillary, Byrne and Moran note the following:

> *Grazing is needed to provide a patchwork of vegetation heights for the different life cycles of the butterfly. Ideally, grasslands should have areas with vegetation height ranging from 5 to 60 cm during summer and autumn. If over that period, the majority of the grassland is grazed lower than 5cm, it would be advisable to remove livestock to give it a chance to recover and be of use for the butterfly.*
>
> *Stocking levels on the wet grasslands suitable for marsh fritillary are usually low (0.5 LU/ha or less), which reduces potential for over poaching and trampling of the larval webs. Depending on the grassland condition, and farm practices, livestock may graze in spring to summer or it may be beneficial to outwinter livestock, particularly if this has been done traditionally, as they will break down plant litter and reduce purple moor-grass cover. If overwintering, supplementary feed the livestock with concentrates designed to meet their minimum nutritional conditions as this will minimize excess nutrients in the grassland system.*
>
> *Extensive grazing will also result in some areas that look under-grazed and may have dead plant litter - these areas are used for basking by adult butterflies. However, keep an eye on these areas as they can be prone to invading scrub.*
>
> *Avoid mowing grassland suitable for marsh fritillary as this removes the different sward heights—however mowing small areas of tussocky grass / rushes annually might be useful in restoring habitat for the butterfly.*

On the basis of a recommended stocking rate of 0.5 LU/ha, it is likely that only 1-2 cattle will be allowed access to the Plot and on a seasonal basis.

In addition to optimising the stocking level for the Plot, measures may need to be taken to reduce dense patches of rushes and encroaching scrub (as noted, such features will be assessed in the resurvey at the time of construction). However, it is likely that such control and removal would be localised and could be done by hand to minimise disturbance to the surface.

3.3 Monitoring

To confirm that the objectives of the Plan are being achieved, the area of enhancement will be monitored during the lifetime of the wind project.

Monitoring on an annual basis in the first five years of the Plan would be required to assess the structure of the vegetation in the context of its suitability as habitat for marsh fritillary. This would be done in late summer/early autumn period during optimal weather conditions by an ecologist with experience of the habitat requirements of marsh fritillary. Search for larval webs would also be conducted.

After Year 5, a review of the Plan progress will be made. At that stage, it will be apparent how successful the works are in achieving the objective of enhancing the Molinia meadow and of providing suitable habitat for marsh fritillary. Modifications to the grazing programme may be made for the next 5-Year period.

3.4 Time Period for Plan Implementation

Year 1 of the Plan will include the baseline survey and the compilation of a detailed management programme for grazing.

If necessary, scrub (often dominated by dense bramble and gorse) and rushes may be cut back, as considered necessary, in the autumn period.

Year 1 will coincide with the completion of wind farm construction works.

Year 2 to Year 5

Site surveys to assess the state of the vegetation for marsh fritillary suitability, and to check for presence of larval webs, will be carried out. If required, modifications may be made to the grazing regime.

Year 5 onwards

As noted, a review of the Plan progress will be made after Year 5. At that stage, it will be apparent how successful the works are in achieving the objective of enhancing the Molinia meadow grassland and providing suitable habitat for marsh fritillary. Modifications to the grazing programme may be made for the next 5-Year period.

4.0 PLAN DETAILS: OBJECTIVE 3 – OFFSETTING THE LOSS OF HEDGEROWS

4.1 Background and Management Approach

While hedgerows are not a prominent feature of the Moanmore Lower wind farm site, hedgerows are of biodiversity importance in a local context for a range of wildlife.

The main permanent losses occur where the new access track leading to turbine T3 breaches a hedge along the existing farm track (c.20m) and also at the blade set-down area where a strip of approximately 70 m of former hedge (now a scrubby willow strip) along the northern margin of the plantation will be removed to allow access from the local road.

It is noted that the main track upgrade from the site entrance leading to the T3 area has hedging only along the southern side and the upgrade works will leave this hedgerow in situ.

Hedge removal is required at turbine T1 to provide a bat buffer around the turbine (see **Chapter 6: Section 6.5.5.1**). This amounts to removal of 175 m of low hedging dominated by gorse.

The total loss of hedging amounts to 265 m, including the 175 m bat buffer.

Additional hedgerow habitat will be created to offset the loss following best practice. The new plantings, which will be a total length of 880 m, will comprise native hawthorn *Crataegus monogyna* and willow (*Salix aurita* and/or *Salix cinerea* subsp. *oleifolia).* Hazel *Corylus avellana* and holly *Ilex aquilifolium* will be include as secondary species. All plantings will be of certified Irish genetic stock.

Planting will be along the boundaries of fields within the Redline Boundary of the wind farm Site where there is either no existing hedging (usually just a drainage ditch with perhaps a bramble strip) or where there is an existing hedge that is poorly grown with gaps and would be improved through bolstering. The exact locations will be selected during the construction phase, with options shown on **Figure 4.** (It is noted that the areas shown are outside of the buffer zones for bats)

Planting will take place in the first appropriate season (autumn/winter) after construction commences and will be by a contractor with experience of laying new hedgerows.

4.2 Monitoring

The contractor will carry out an annual inspection for failed plantings and will replace same at the earliest opportunity. This will be done for as long as it takes the hedging to become fully established.

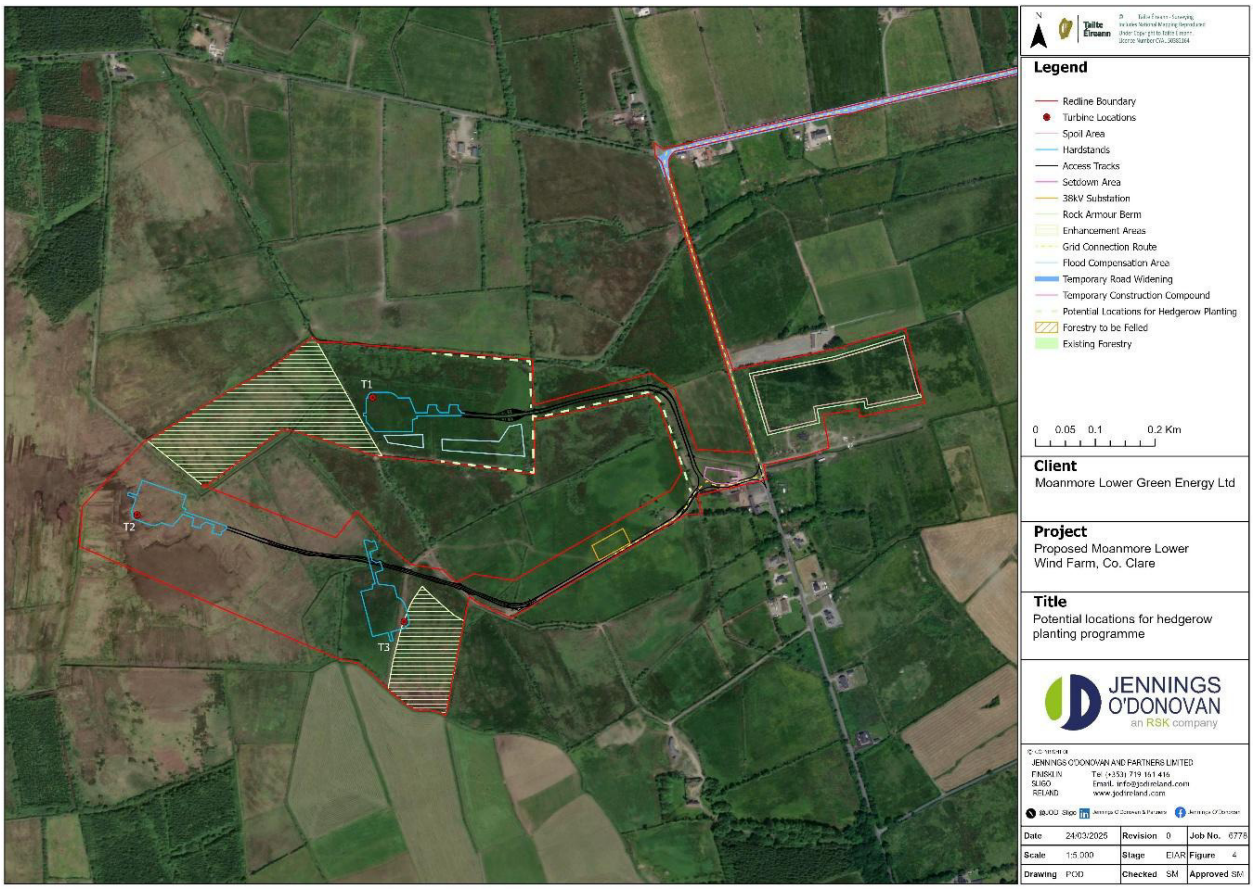


Figure 4. Potential locations for hedgerow planting programme.

5.0 PLAN DETAILS: OBJECTIVE 4 – REHABILITATION OF UNDERLYING PEAT HABITAT AT BLADE TRANSFER AREA

5.1 Background and Management Approach

Prior to commercial planting, the area of the blade transfer had been part of a western raised bog though much of this was likely already disturbed from local peat cutting.

The objective of the proposal is to promote the re-establishment of bog vegetation. This objective will be developed and implemented in accordance with the procedures set out in the Best Practice in Raised Bog Restoration (Mackin et al. 2017).

The area of the blade transfer area is 0.382 ha, as shown on Figures 5 and 6.

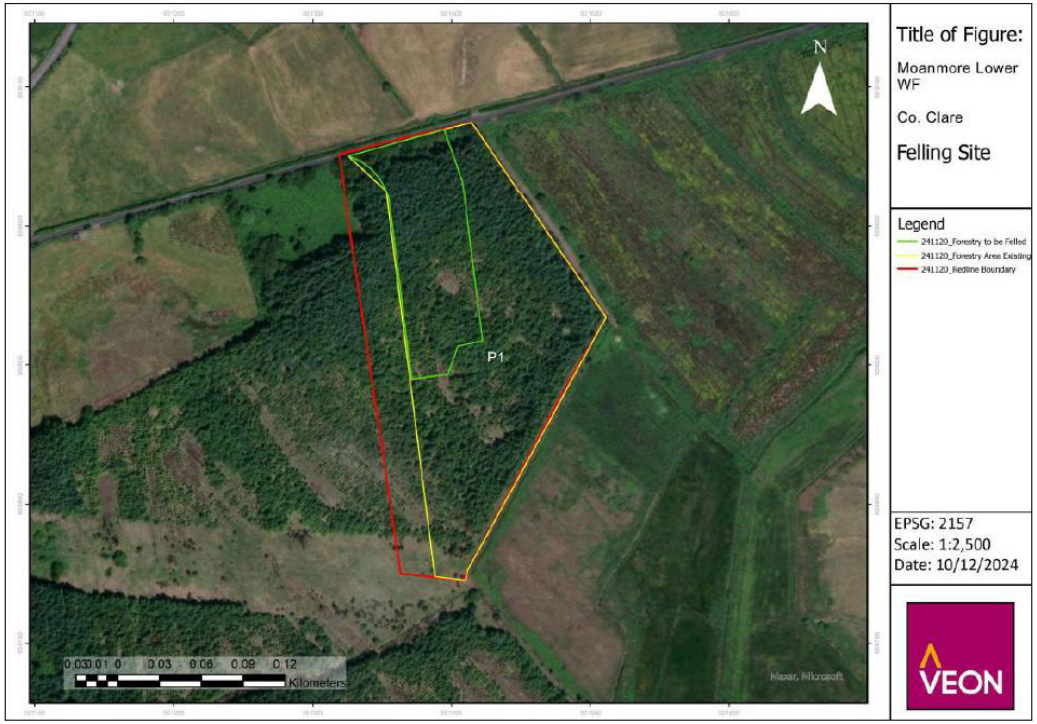


Figure 5. Intrastructural felling for proposed Blade Transfer Area

(Ref: EIAR Appendix 15.3 Forestry Report – Figure 2.2)

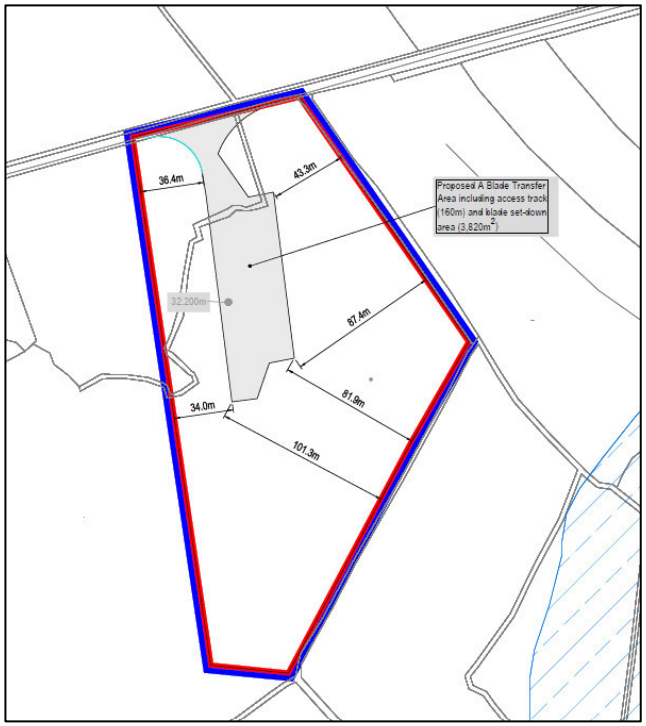


Figure 6. Blade Transfer Area

(Ref: Snip of Planning Drawing 6778-JOD-MM-XX-DR-C-01)

The bog here was drained and prepared for commercial afforestation in the early to mid-1990s (as shown on OS Geohive aerial imagery). The peat here is deep, ranging from 3.9 m to 5 m (see EIAR Appendix 8.1). Despite the peat depth, the trees have grown fairly well, with a complete closed canopy.

After removal of trees, the main prerequisite of bog restoration is the raising of the water table so as to rewet the original peat and encourage peat-forming vegetation and especially the growth of Sphagnum mosses. This usually requires the blocking of forest drains. A site inspection by an ecologist and hydrologist will take place to determine which drains are still functioning and should be blocked. Identified drains will be blocked by hand using either wooden or recycled plastic dams which are hammered into place with a mallet. Alternatively, peat plugs may be suitable. Procedure for drain blocking in raised bogs is described in detail in Mackin *et al*. (2017).

After the trees are removed and drains blocked (as required), a series of permanent quadrats will be set up for the purpose of monitoring of vegetation change over time. The location of these quadrats will be marked using wooden pegs and the grid reference will be recorded using GPS. The number of quadrats will be determined by the ecologist but as the plot is small the number is unlikely to exceed five. The quadrats are likely be 2 m x 2 m in size to take into account the scale of the plan area. The occurrence and cover of vascular plant and moss species will be recorded in these quadrats along with a number of other important parameters such as the height of vegetation, cover of bare peat, peat depth, flowering of plant species etc. Photographs of the quadrats will also be taken on deployment and subsequently during the following years of monitoring.

During the site visits for vegetation monitoring, a walk-over survey will take place to check for the presence of self-seeded conifers that may become established or which may have been missed at time of initial tree clearing. Seedings up to approximately 20 cm in height can be easily plucked out by hand, while larger saplings may need to be taken out by hand-saw at some stage later in the year.

The walk-over survey will also observe if any of the inserted dams have failed and are in need of repair or re-instatement. The survey will also check for any additional drains which should be blocked to minimise water loss from the bog. Should remediation or further works be required, the works will be undertaken by the wind farm operating company.

5.2 Monitoring

Monitoring will take place during the wind farm Operational Years 1, 2, 3 & 5 of the Plan implementation, with Year 1 being the base year at the time the works are carried out. After Year 5, a review of the progress will be conducted in light of the Plan objectives, and a programme will be developed for the next 5-Year period of the Plan (and so on for the lifetime of the project).

6.0 REPORTING

Reports detailing the monitoring works carried out, the results obtained and a review of their success along with any suggestions for amendments to the BEMP will be prepared in years 1, 2, 3, 4, 5 and submitted to Clare County Council and the NPWS yearly for review. After Year 5 monitoring intervals will be increased to Years 10, 15, 20, 25, 30 and 35 subject to agreement. The BEMP should be considered as a live document to be reviewed and modified as required, pending submission to and approval by Clare County Council and the NPWS.

Implementing and managing the plan will be the responsibility of the wind farm operator. It is the wind farm operator's obligation to uphold the objectives included in this management plan, to be accountable for the maintenance of the habitats that will be created and monitoring of the species as specified.

Monitoring and reporting on the measures will be undertaken by independent, suitably experienced and qualified ecologists and hydrologists employed by the wind farm operator, with reporting submitted to Clare County Council and the NPWS on behalf of the wind farm operator.

7.0 CONCLUSION

The BEMP for the Moanmore Lower Wind Farm project will enhance an area (4.04 ha) of cutover bog that has been used for grazing and is largely dominated by rushes. This will offset the loss of a relatively small area of cutover bog (c.0.8 ha) as a result of the Development. By including a large area of bog within the Plan compared to the relatively small loss as a result of the Development, the Plan recognises and highlights the importance of this habitat.

The BEMP will also manage sensitively an area of Annex I listed Molinia meadow (1.78 ha), of which a small part (c.200m^2) is being affected by the Development. The meadow, which has been somewhat degraded through over-grazing, will be managed with a particular focus on providing suitable habitat for the marsh fritillary butterfly (Annex II listed species).

The BEMP will also offset the loss of hedgerows as a result of the Development by a hedgerow replanting programme within the Site.

The BEMP also incorporates the blade transfer area where best practice will be followed to rehabilitate bog vegetation after the conifer plantation is removed.

The total area covered by the BEMP is 6.20ha.

The success of these measures will be evaluated through a detailed monitoring and reporting programme, which will be submitted to Clare County Council and the NPWS every monitoring year as evidence of compliance.

It is anticipated that with the implementation of the BEMP, the overall ecological value of the Site will increase over time, with benefits not just for habitats and marsh fritillary, but also birds, mammals and invertebrates.

The objectives for the Plan are achievable, as the methods to be used are straightforward and have been implemented at many other sites throughout Ireland.

It is noted that the Plan will allow for remediations and/or modifications to ensure that the objectives are being achieved throughout the lifetime of the Proposed Development.

8.0 REFERENCES

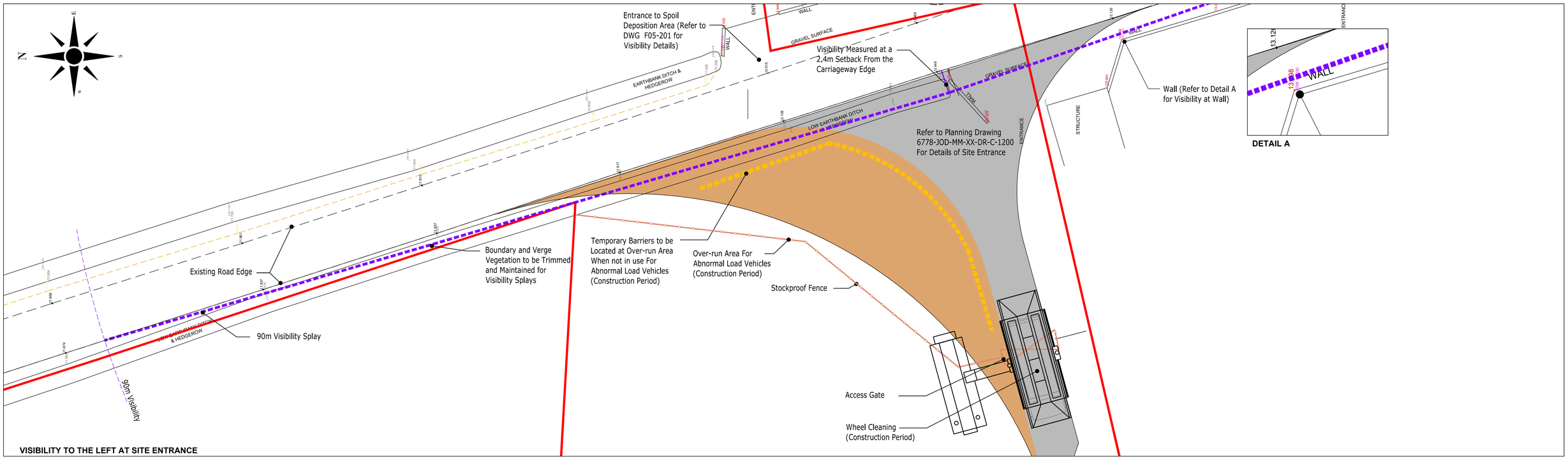
Fossitt, J. (2000) *A Guide to Habitats in Ireland*. Heritage Council, Kilkenny.

Mackin, F., Barr, A., Rath, P., Eakin, M., Ryan, J., Jeffrey, R. & Fernandez Valverde, F. (2017) *Best practice in raised bog restoration in Ireland.* Irish Wildlife Manuals, No. 99. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.

SNH (now NatureScot) “Planning for development: What to consider and include in Habitat Management Plan – Guidance” (Version 2, March 2016).

Appendix V:

Revised Site Plans



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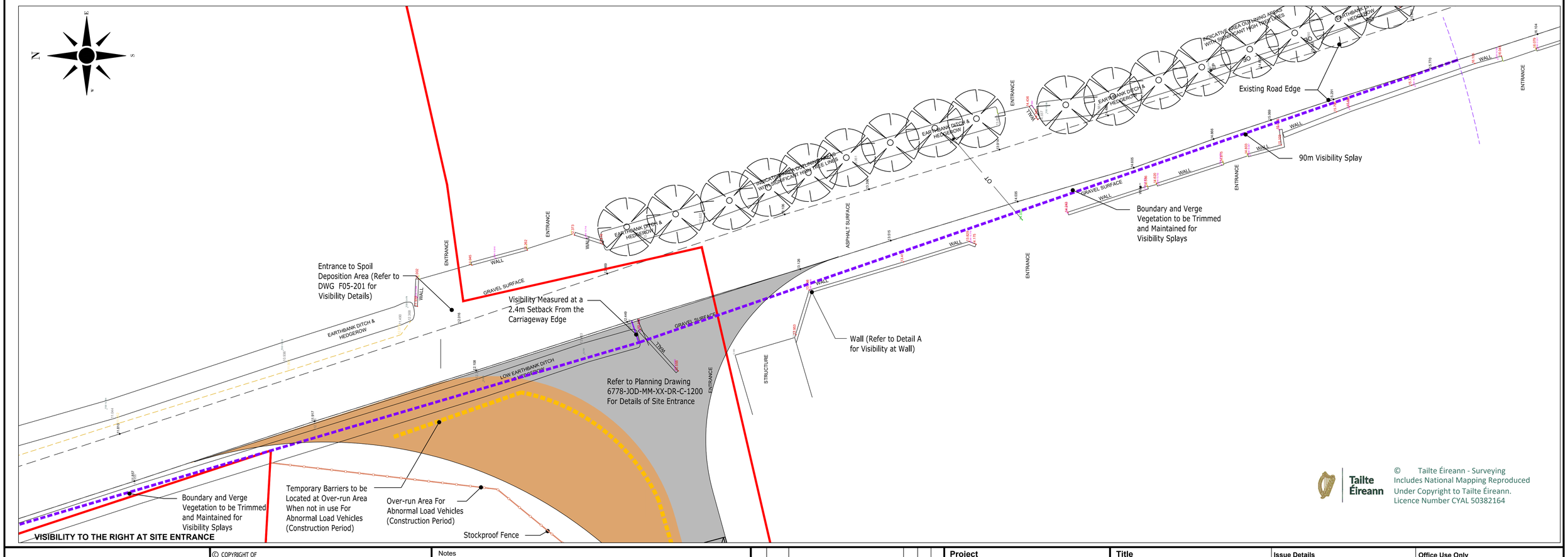

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Notes

- Temporary Access Road For Turbine Delivery
- Wind Farm Access Road
- Site Boundary
- Visibility Splay

Rev.	Date	Amendments
D		
C		
A		

Project

MOANMORE LOWER WIND FARM,
COUNTY CLARE.

Title

VISIBILITY AT SITE ENTRANCE ON THE L2034 LOCAL ROAD

Issue Details			
Surveyed:	0SI	Information	
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Checked:	SM	Tender	
Approved:	DK	Construction	
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Job Ref.	Date.	Rev.
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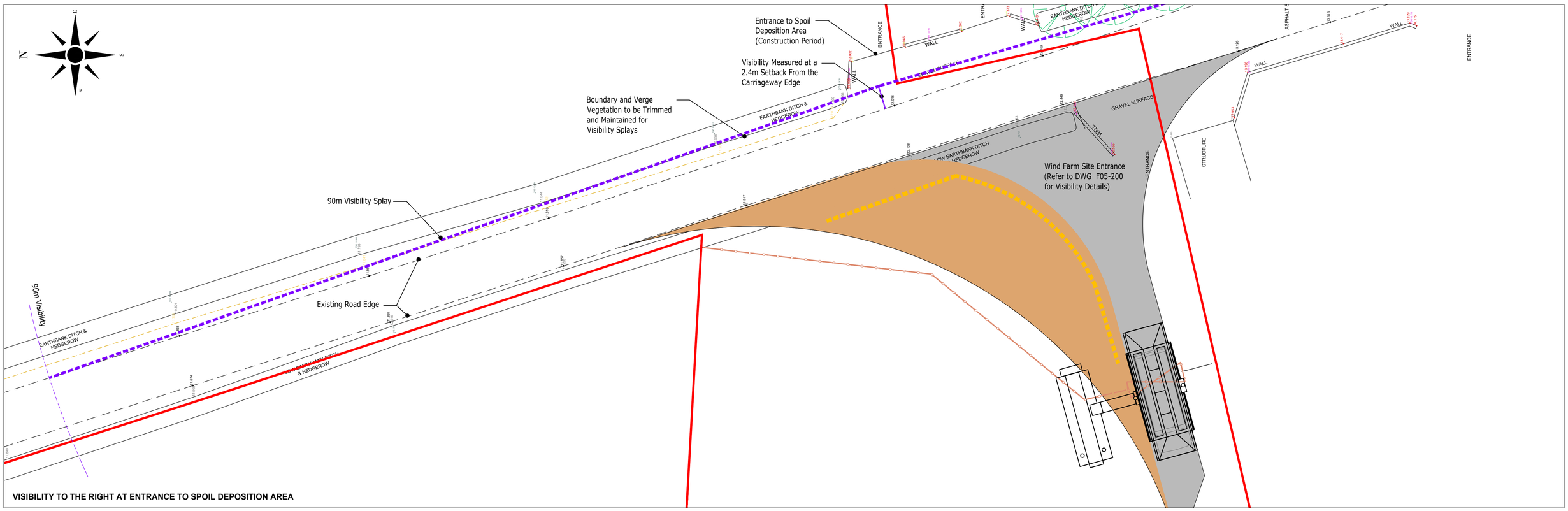

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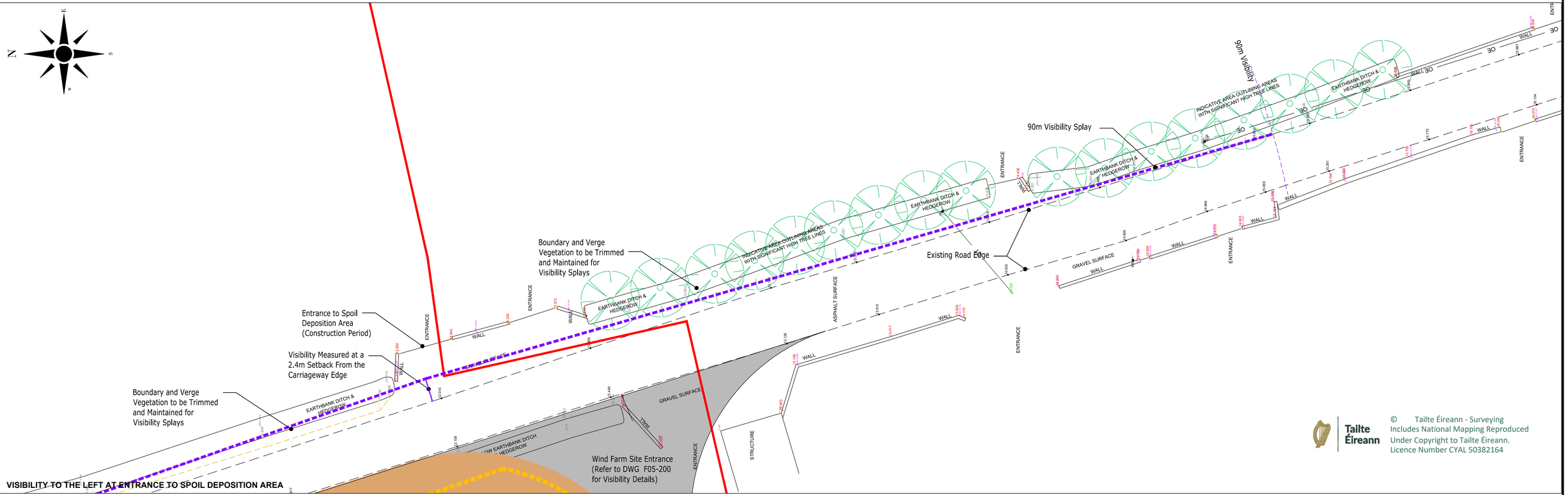

VISIBILITY TO THE LEFT AT ENTRANCE TO SPOIL DEPOSITION AREA

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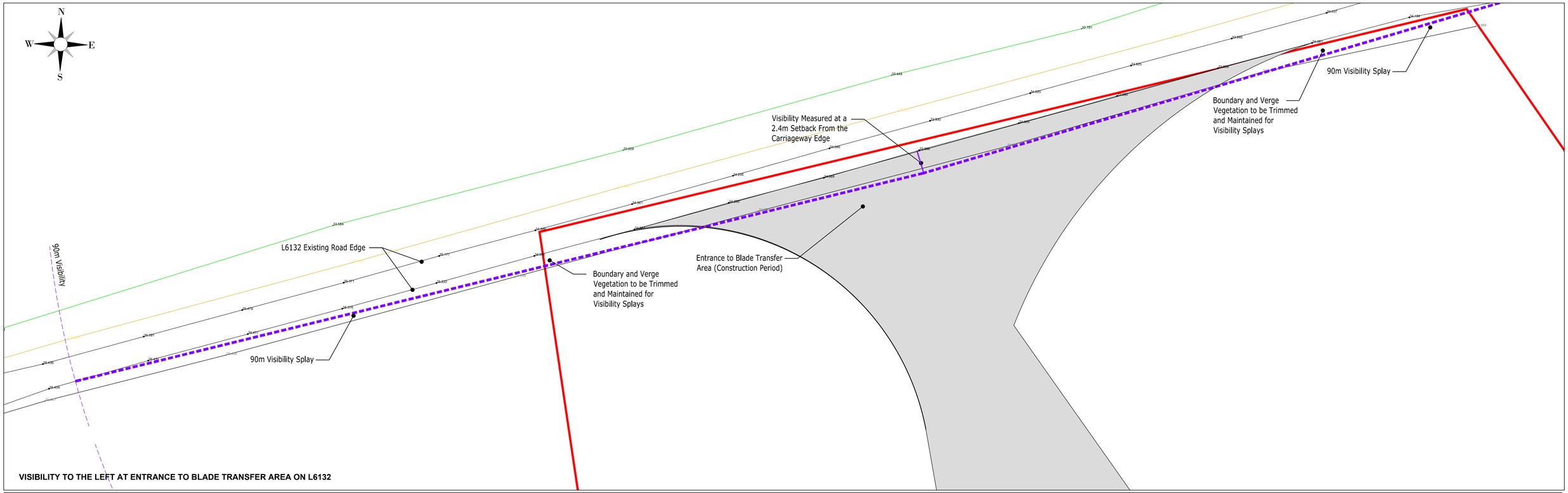

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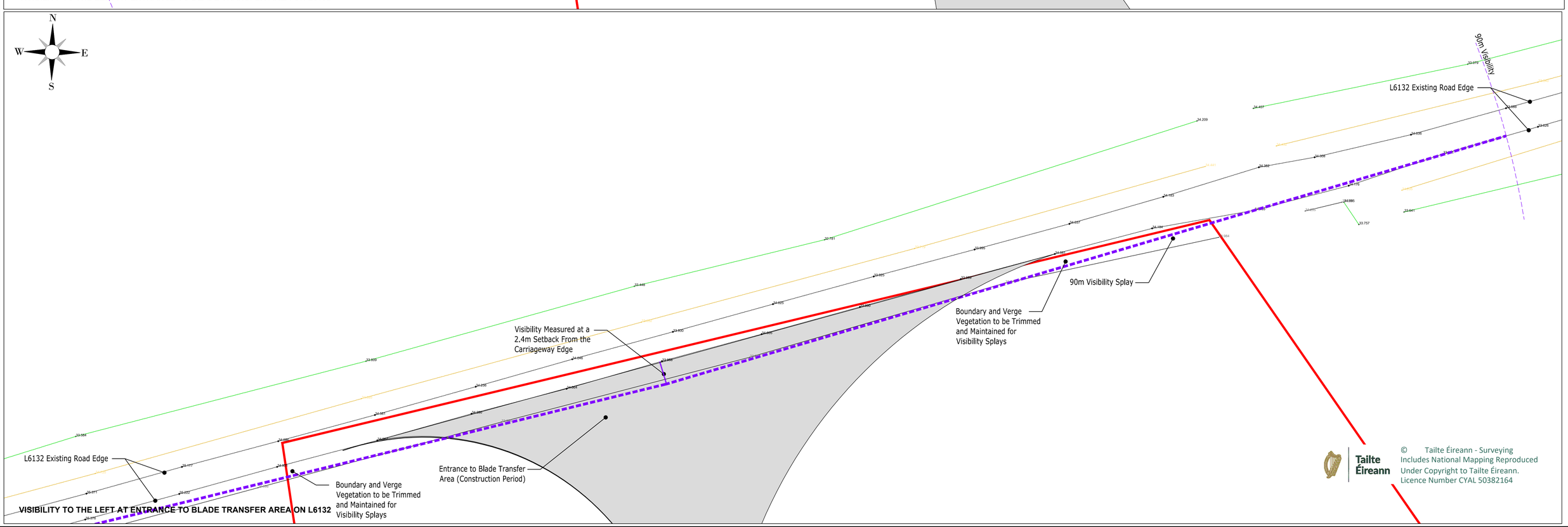

VISIBILITY TO THE LEFT AT ENTRANCE TO BLADE TRANSFER AREA ON L6132

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Notes

Blade Transfer Area
Site Boundary
Visibility Splay

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Title
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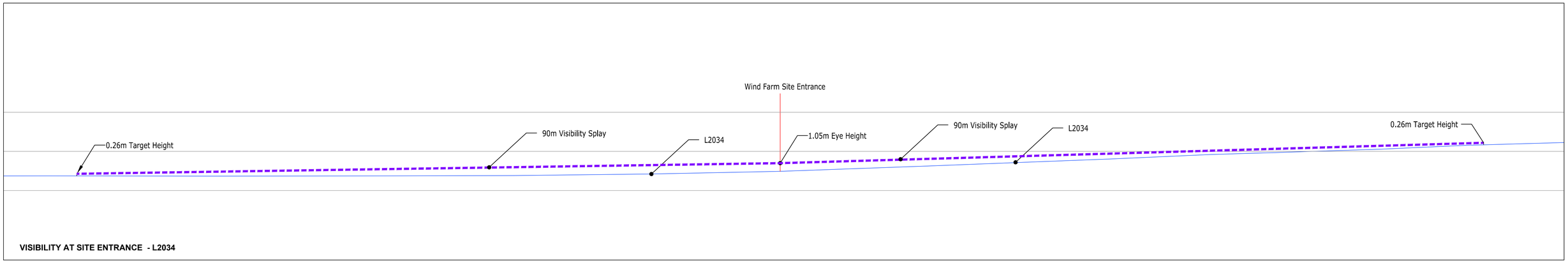

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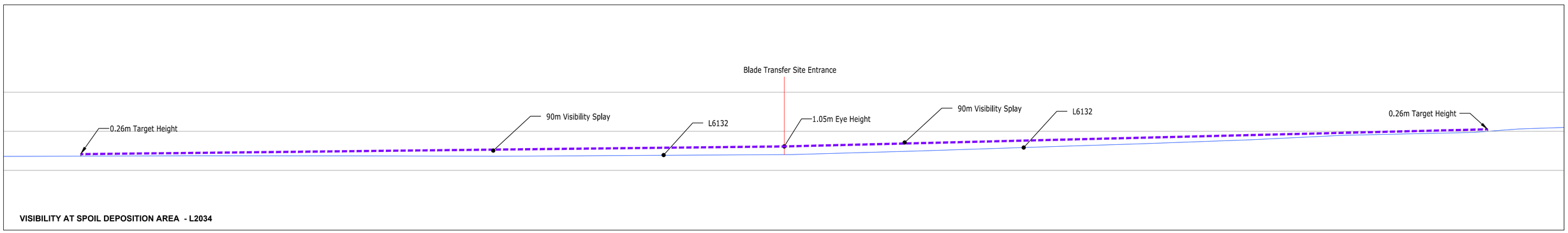

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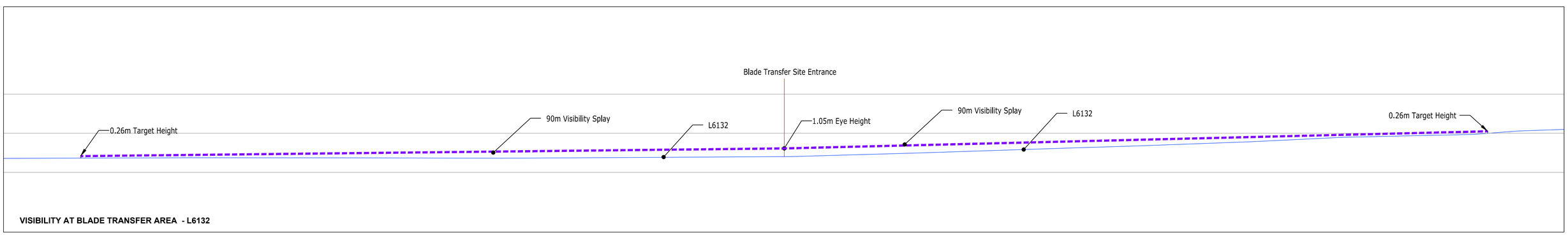

VISIBILITY AT BLADE TRANSFER AREA - L6132

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- Wind Farm Access Road
- Site Boundary
- Visibility Splay

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C		
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Project

MOANMORE LOWER WIND FARM,
COUNTY CLARE.

Title

VERTICAL VISIBILITY AT SITE ENTRANCES

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Checked:	SM	Tender	
Approved:	DK	Construction	
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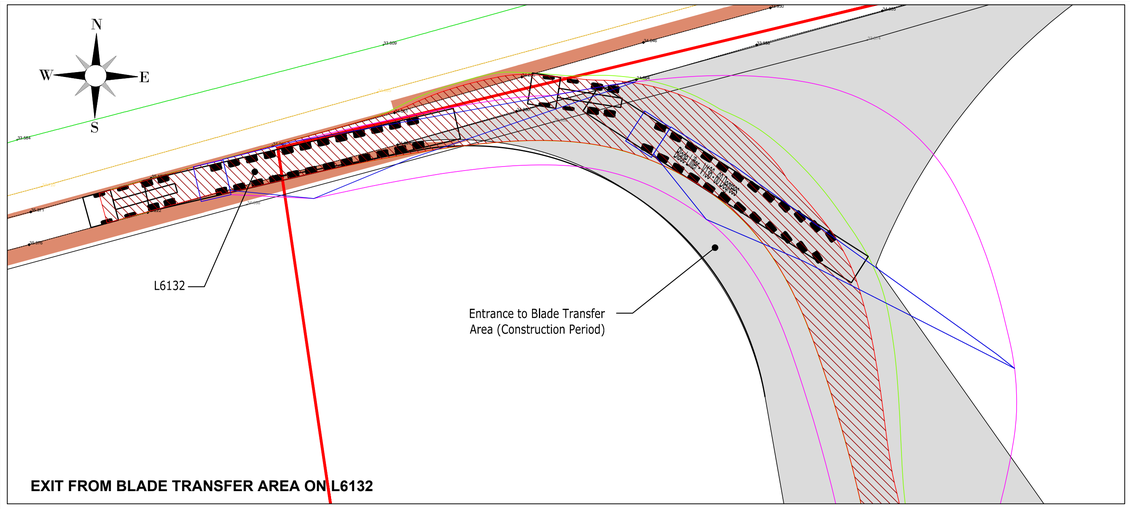
Job Ref.	Date.	Rev.
6778	26/03/2025	P00

Appendix VI:

Autotrack Drawings



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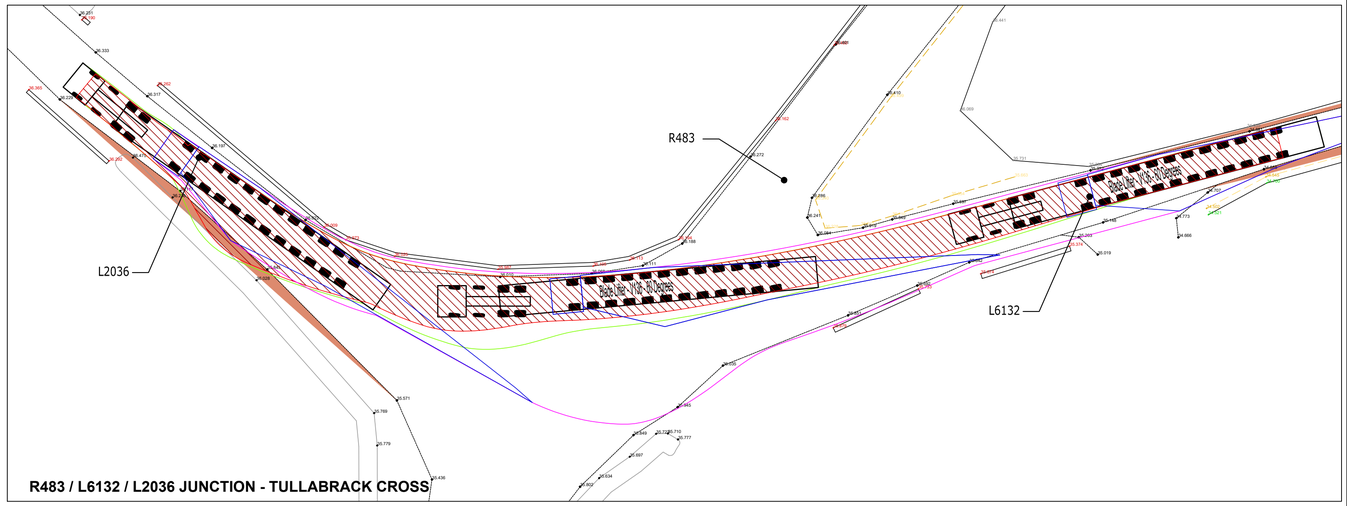
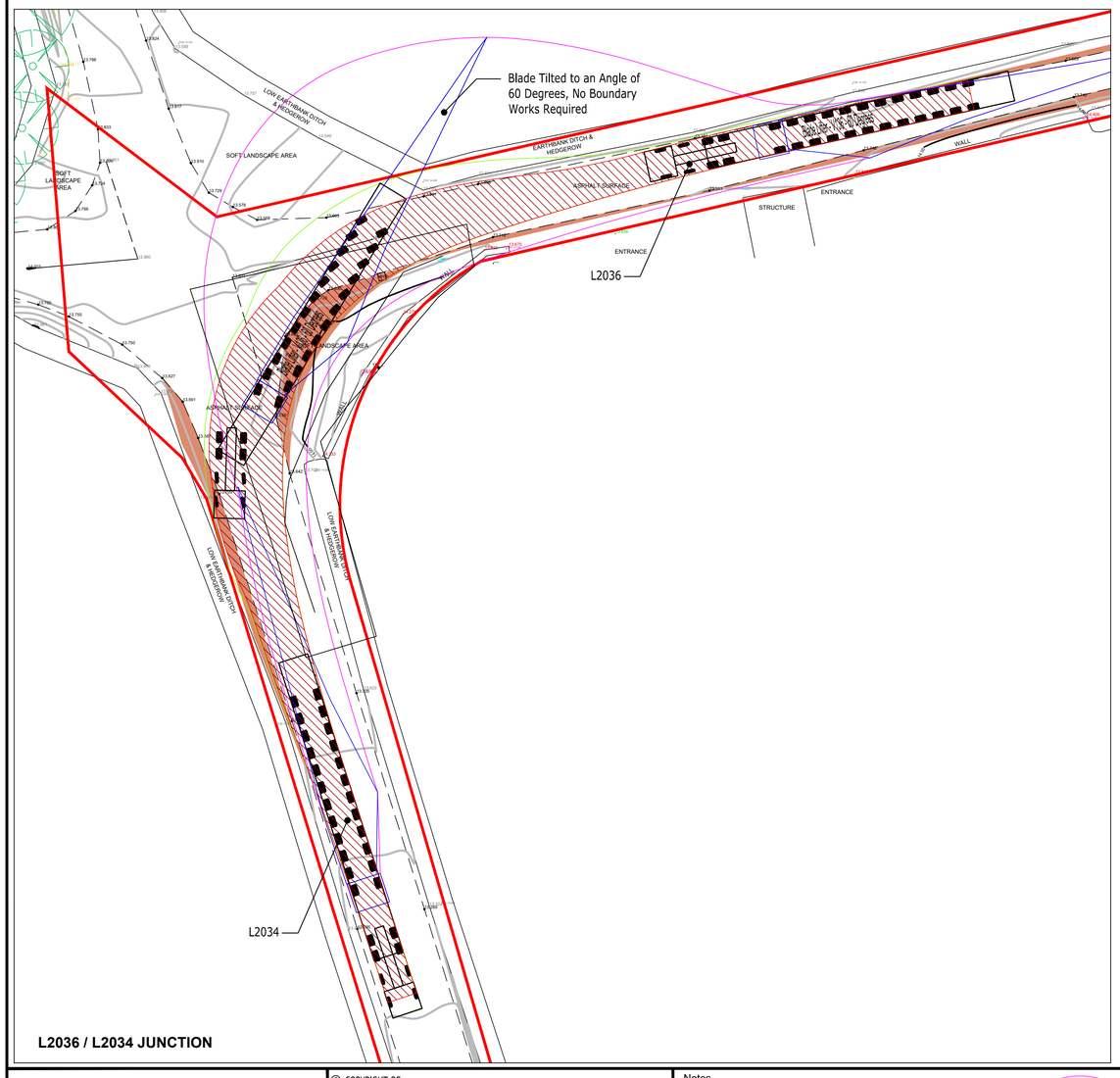


R483 / L6132 / L2036 JUNCTION - TULLABRACK CROSS



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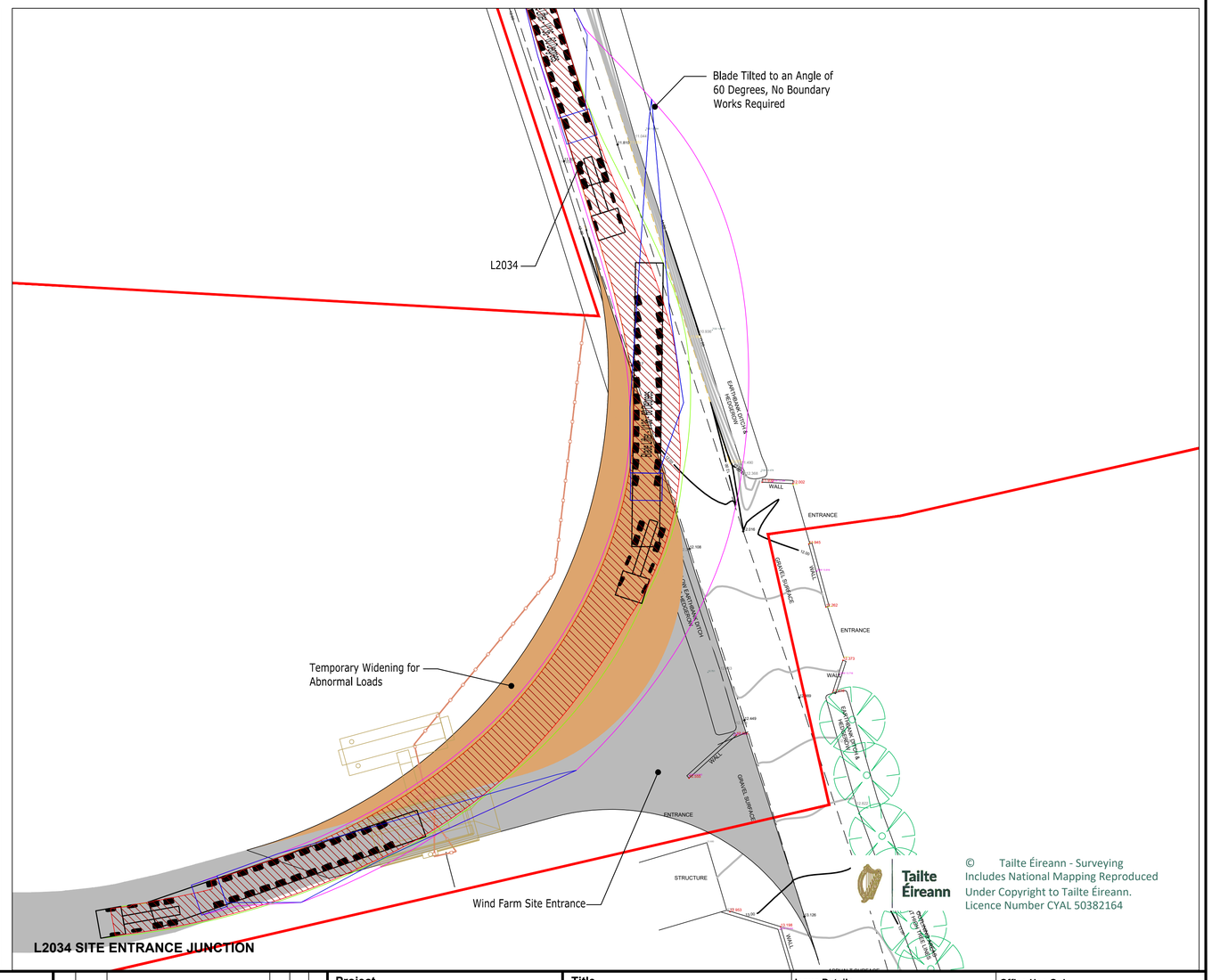

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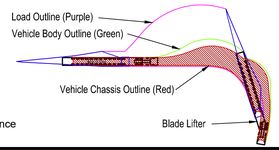
Notes

- Site Boundary
- Temporary Road Widening
- Blade Transfer Area
- Site Entrance
- Temporary Widening at Entrance



Rev.	Date	Amendments	D	C	A

Project

MOANMORE LOWER WIND FARM, COUNTY CLARE.

Title

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L6132 BLADE TRANSFER AREA TO 2034 SITE ENTRANCE

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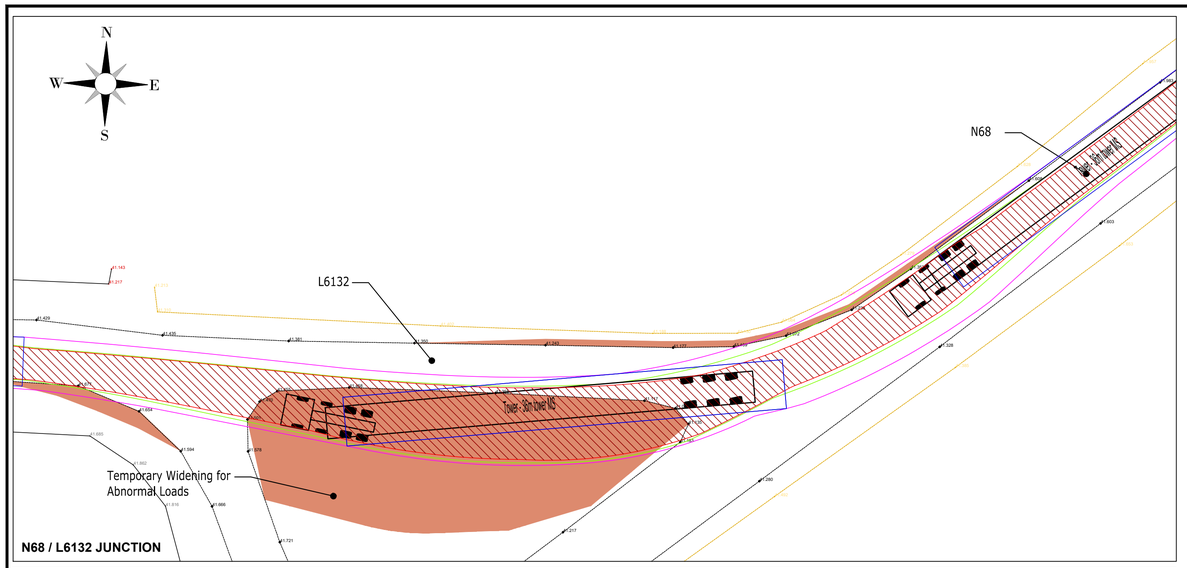

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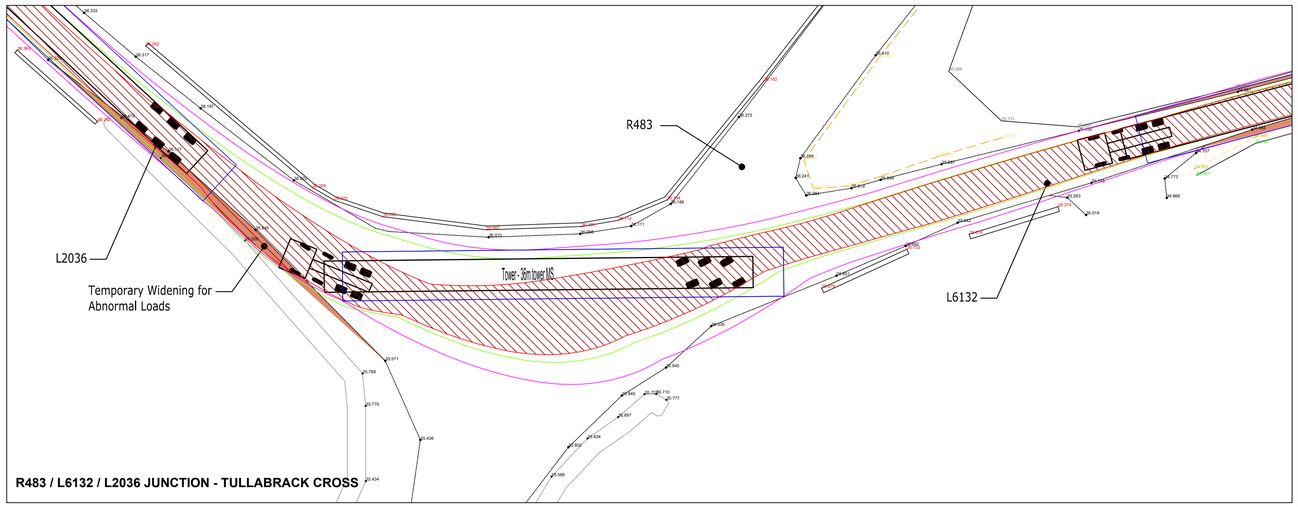

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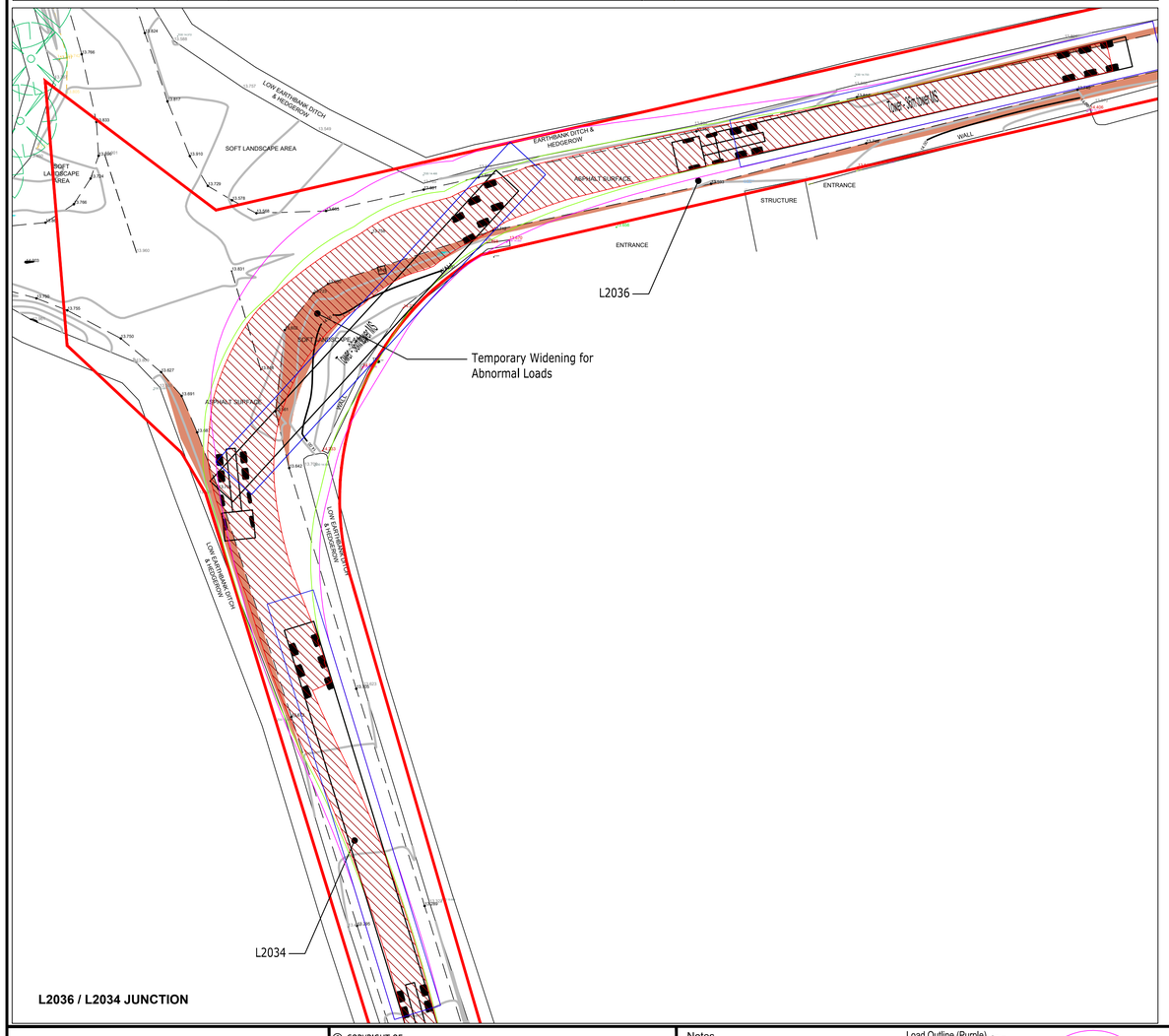

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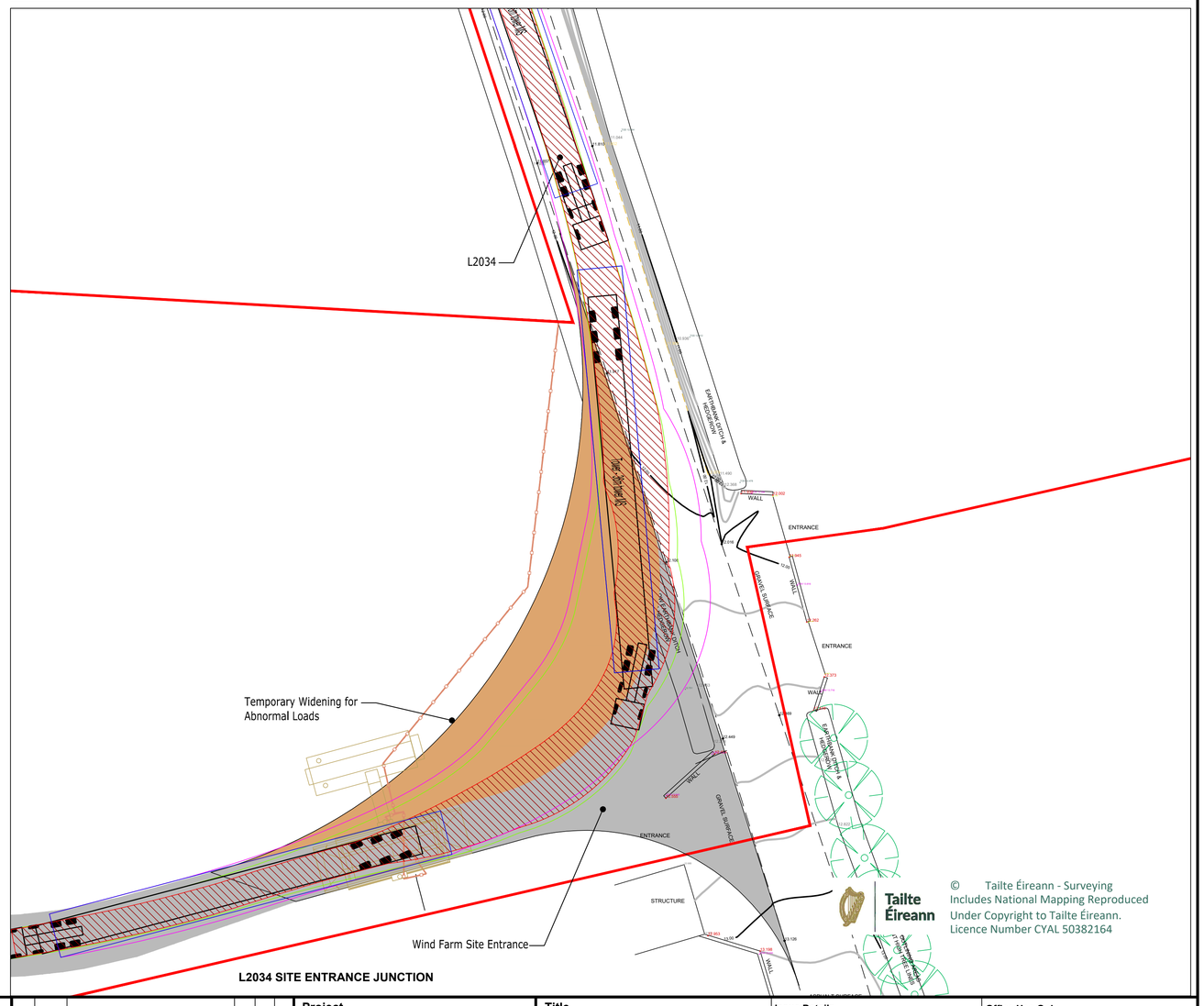

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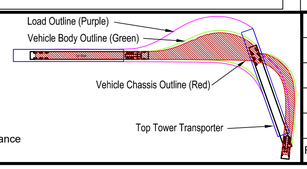
Notes

- Site Boundary
- Temporary Road Widening
- Blade Transfer Area
- Site Entrance
- Temporary Widening at Entrance



Rev.	Date	Amendments	D	C	A

Project

MOANMORE LOWER WIND FARM, COUNTY CLARE.

Title

AUTOTRACK ANALYSIS - TOP TOWER

N68 TO L2034 SITE ENTRANCE

Issue Details

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Checked:	SM	Tender	
Approved:	DK	Construction	
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Job Ref.	Date.	Rev.
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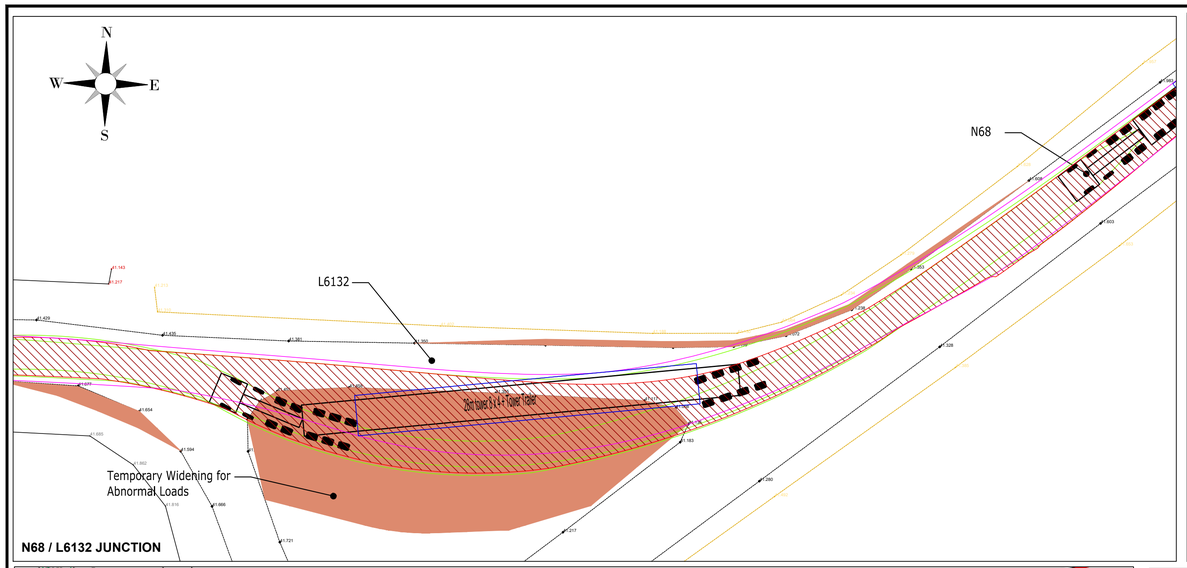

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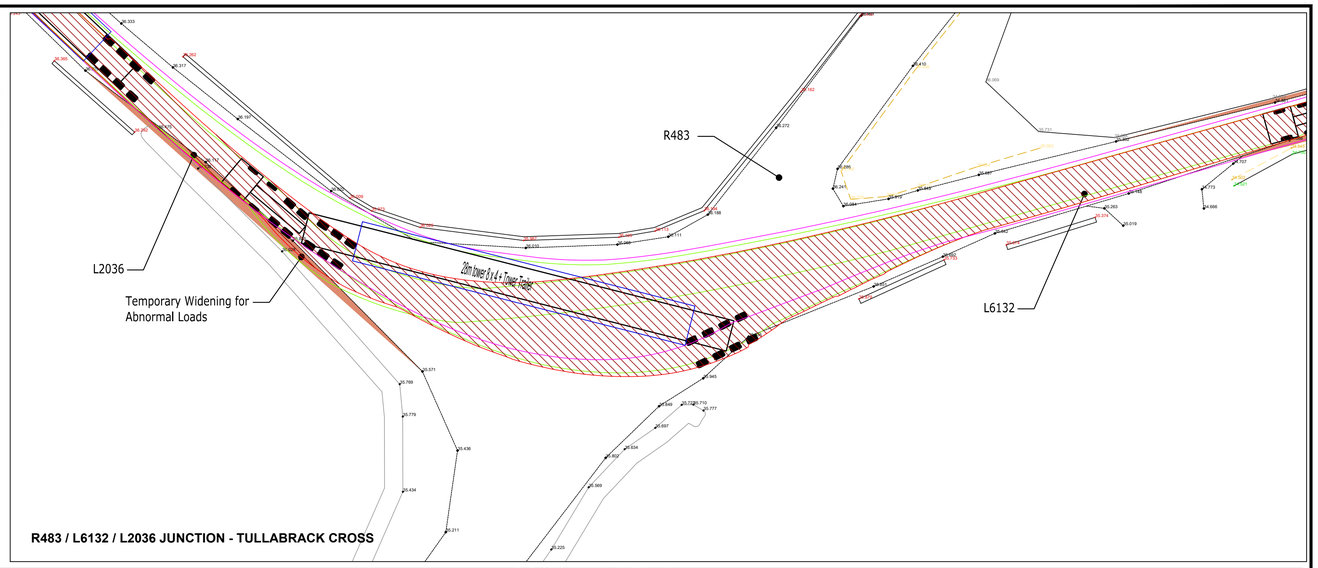

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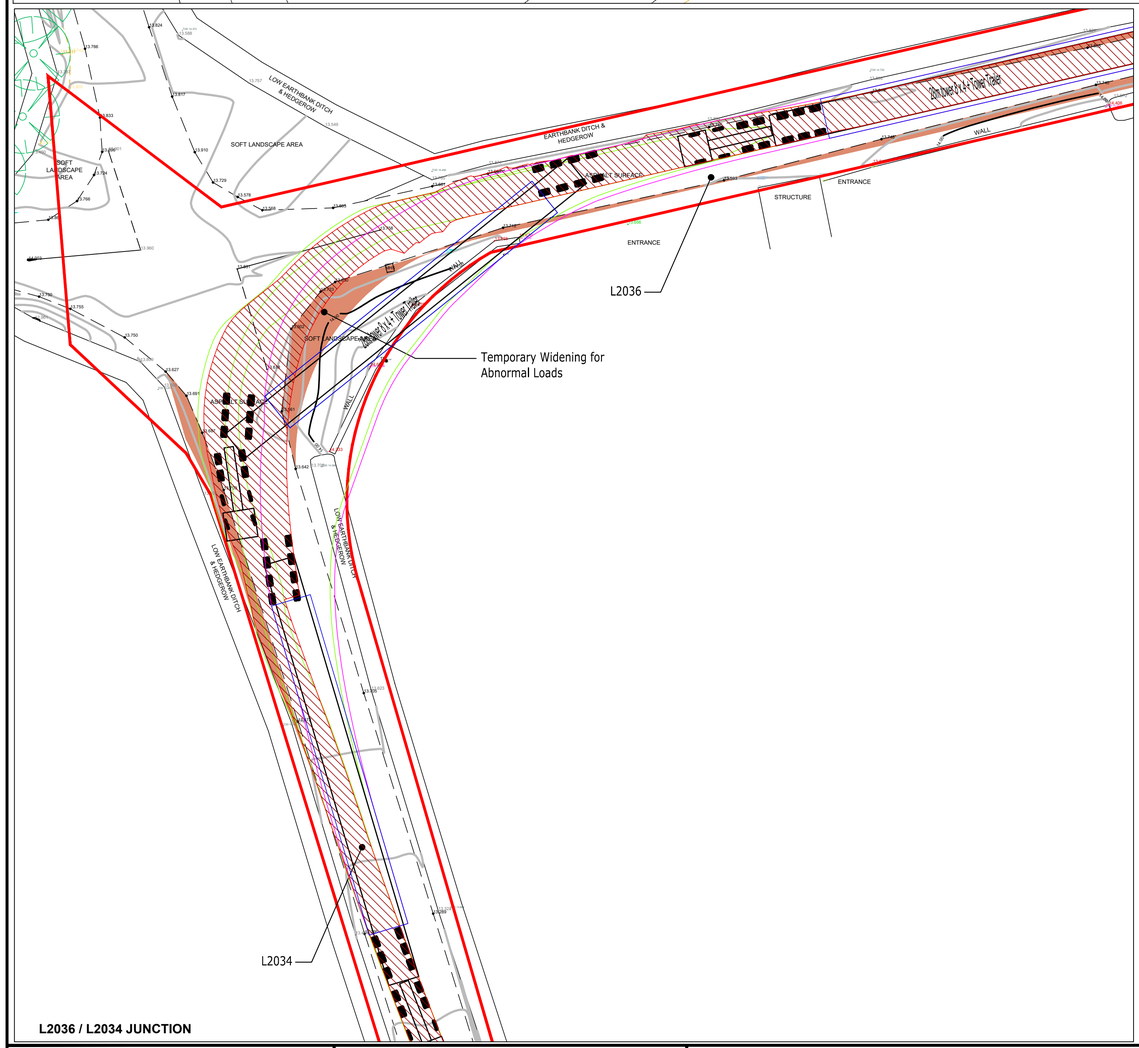

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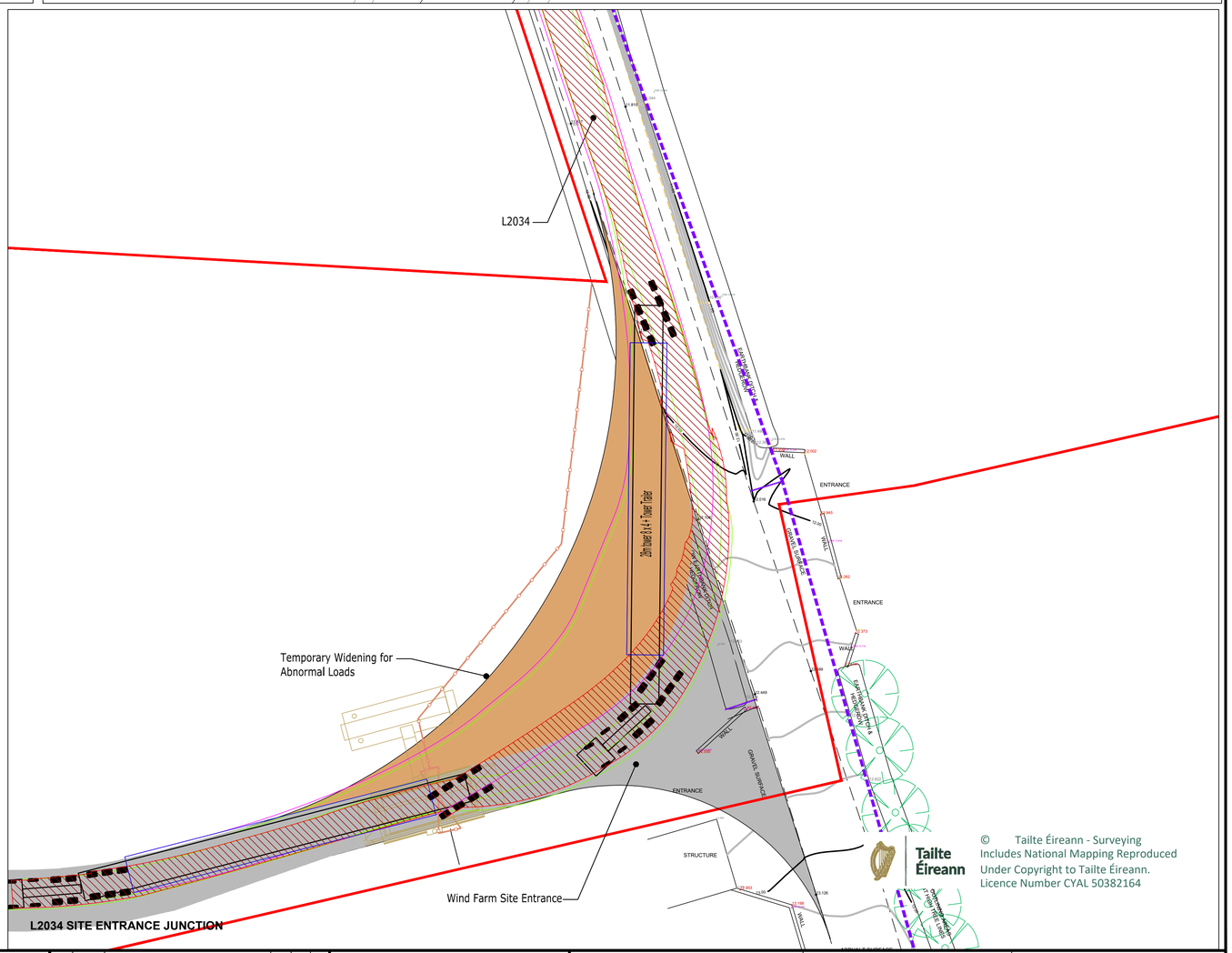

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Notes

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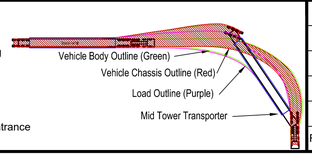
- Blade Transfer Area
- Site Entrance
- Temporary Widening at Entrance



Rev.	Date	Amendments	D	C	A

Project

MOANMORE LOWER WIND FARM,
COUNTY CLARE.

Title

AUTOTRACK ANALYSIS - MID TOWER

N68 TO L2034 SITE ENTRANCE

Issue Details

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Scale:	1:200 (A1)	Record	

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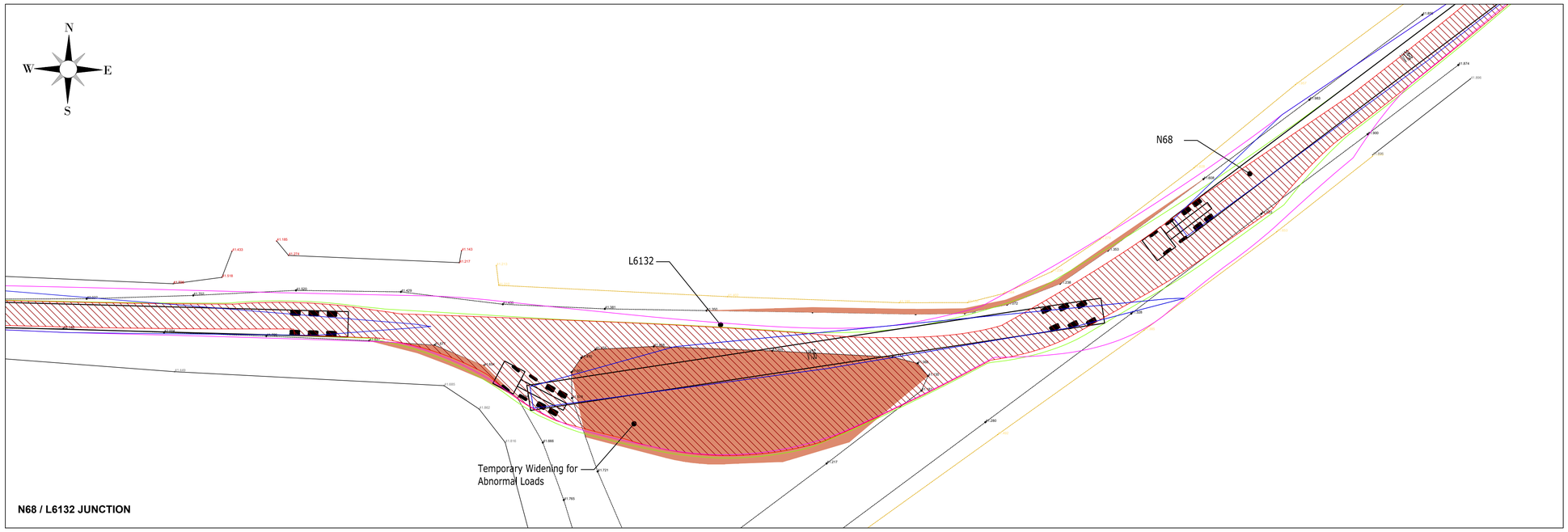
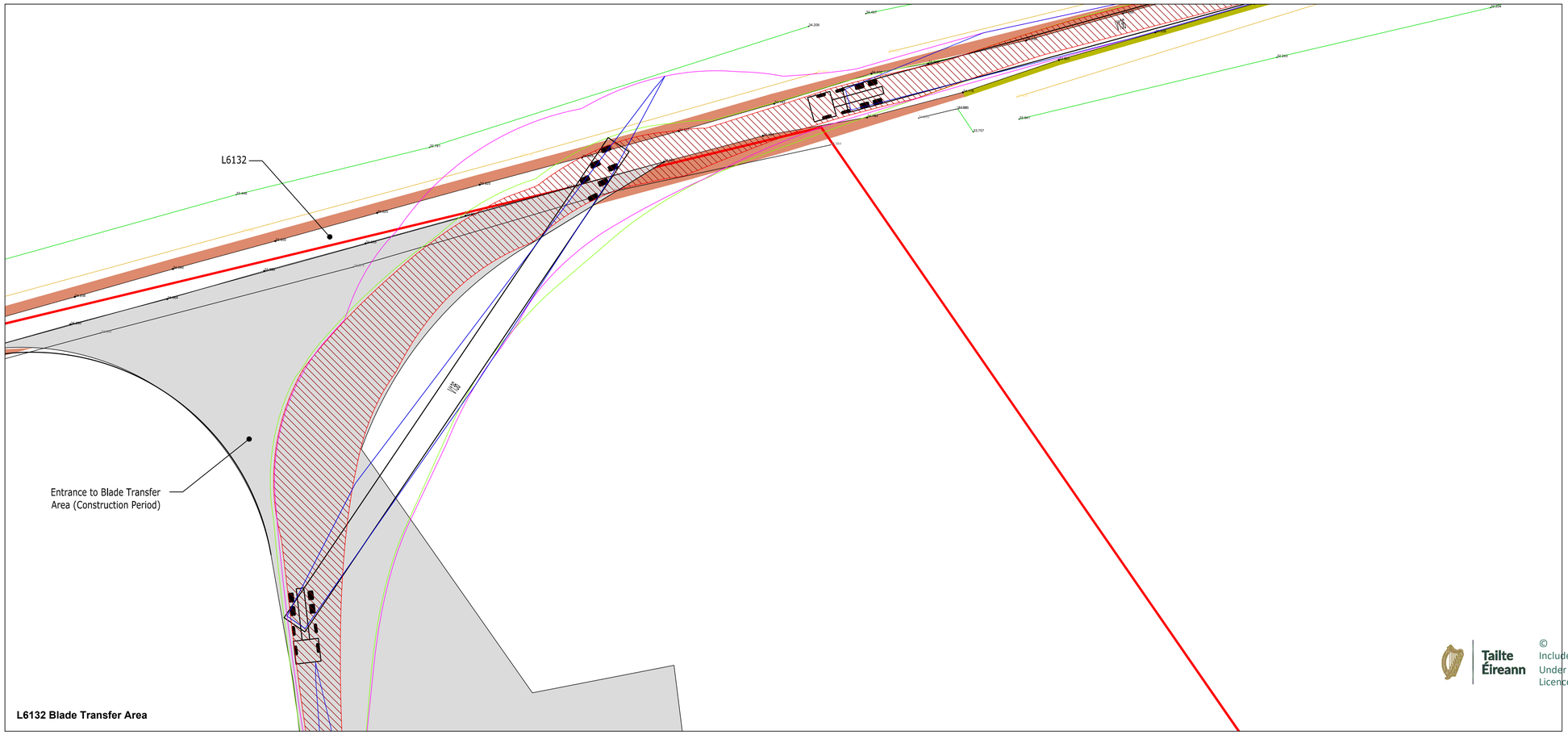
Drawing Number: 6778-JOD-MM-XX-DR-C-F05-212

Job Ref.	Date.	Rev.
6778	10/06/2026	P00



N68 / L6132 JUNCTION



L6132 Blade Transfer Area

L2036 / L2034 JUNCTION

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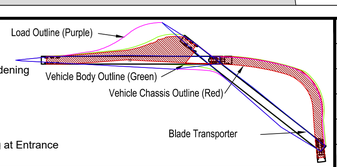
Notes

- Site Boundary
- Temporary Road Widening
- Blade Transfer Area
- Site Entrance
- Temporary Widening at Entrance



Rev.	Date	Amendments	D	C	A

Project

MOANMORE LOWER WIND FARM,
COUNTY CLARE.

Title

AUTOTRACK ANALYSIS - BLADE TRANSPORTER

N68 TO L6132 BLADE TRANSFER AREA

Issue Details			
Surveyed: 0SI	Information		
Drawn: JD	Planning	X	
Checked: SM	Tender		
Approved: DK	Construction		
Scale: 1:200 (A1)	Record		

Office Use Only

Drawing Number: 6778-JOD-MM-XX-DR-C-F05-213

Job Ref.	Date.	Rev.
6778	10/06/2026	P00