4. DESCRIPTION OF THE PROPOSED DEVELOPMENT

4.1 Introduction

This section of the Environmental Impact Assessment Report (EIAR) describes the development and its component parts (the 'Proposed Development') including the works subject of a proposed application for planning permission to An Bord Pleanála (ABP), Cork County Council (CCC) and Kerry County Council (KCC). The Proposed Development comprises the provision of the following:

i. 110 kV electrical substation with 2 no. control buildings with welfare facilities, all associated electrical plant and apparatus, security fencing, underground cabling, waste water holding tank and all ancillary works;
ii. Underground electrical cabling (110kV);
iii. Underground electrical cabling (33kV);
iv. Access Roads (new and upgrade of existing)
v. Temporary access road;
vi. Upgrade of access junctions;
vii. Amendments to the Permitted Development (Ref. No. 19/4972), including extension to the borrow pit and the omission of the 38kV Electrical Substation, 38KV underground cabling and Battery Storage compound;
viii. Borrow pit;
ix. Site Drainage;
x. Forestry Felling; and
xi. All associated site development works and apparatus.

An Bord Pleanála – Planning Notice Project Description

i. 110 kV electrical substation with 2 no. control buildings with welfare facilities, all associated electrical plant and apparatus, security fencing, underground cabling, waste water holding tank and all ancillary works;
ii. Underground electrical cabling (110kV);
iii. New access roads;
iv. Borrow pit;
v. Site Drainage;
vi. Forestry Felling; and
vii. All associated site development works and apparatus.

Cork County Council – Planning Notice Project Description

i. Underground electrical cabling (33kV);
ii. Access roads (new and upgrade of existing);
iii. Amendments to the Permitted Development (Ref. No. 19/4972), including extension to the borrow pit and the omission of the 38kV Electrical Substation, 38KV underground cabling and Battery Storage compound;
iv. Site Drainage; and
v. All associated site development ancillary works and apparatus.

Kerry County Council – Planning Notice Project Description

i. Underground electrical cabling (33kV);
ii. Upgrade of access junctions;
iii. Access roads (new and upgrade of existing);
iv. Temporary access road;
v. Borrow pit;
vi. Site Drainage;
vii. Forestry Felling; and
viii. All associated site development works and apparatus.

All elements of the Proposed Development have been assessed as part of this EIAR.

4.2 Description of the Proposed Development

A description of the physical characteristics of the study area for this EIAR is provided in Section 2.1 of this EIAR.

The Proposed Development comprises the construction of a 110kV electrical substation and adjacent borrow pit located in the townlands of Cummeennabuddoge and Caherdowney. The proposed underground grid connection cabling consists of two elements, with 110kV underground electrical cabling connecting the proposed 110kV electrical substation to the existing 220kV substation at Ballyvouskill, and 33kV underground electrical cabling connecting the Permitted Development to the proposed 110kV electrical substation. The total length of underground electrical cabling routes will measure approximately 11.9 kilometres (the 110kV and 33kV cable routes are approximately 3.6km and 8.3km respectively), which will be located on existing forest/ agricultural roads (requiring upgrading), forestry land, peatland and agricultural land. Where roads do not exist along the proposed underground cabling routes, new access roads will be provided. No road will be provided across a short section (685m) of peatland habitat along the 110kV cabling route. The proposed 110kV electrical substation is intended to replace the 38kV substation (and associated 38kV underground cabling and battery storage compound) permitted under Pl. Ref. 19/4972. Upgrading of access junctions and existing roads will be required to facilitate the delivery of materials (in particular, turbine components) to the Permitted Development, a short section (209m) of new access road will connect the upgraded access road to the Permitted development, completing the Turbine Delivery Route (TDR). The borrow pit permitted under Pl. Ref. 19/4972 will be extended to facilitate the construction of the TDR. Site drainage measures, forestry felling and all associated site development works and apparatus are also included.

The proposed 33kV underground electrical cabling will consolidate all of the on-site underground cabling, from the individual turbines and solar array, into 3 no. cable circuits connecting the Permitted Development to the proposed 110kV substation.

The Proposed Development also includes for access road works associated with the turbine delivery route, a new on-site borrow pit and extension of the borrow pit permitted under Planning Permission Ref. No. 19/4972.

Of the proposed infrastructure, the 110kV electrical substation,110kV cabling and associated works represents Strategic Infrastructure Development (SID) and therefore a planning application will be submitted directly to ABP, under the provisions of the Planning and Development (Strategic Infrastructure) Act 2006. The proposed on-site borrow pit will be included in the planning application to be submitted to ABP and in the application to KCC given that it will serve the 110kV and 33kV infrastructure.

Approximately 5.6km of the access road works and approximately 5.2km of the underground electrical cabling (33kV) with associated access road connecting the Permitted Development to the proposed

110kV substation are located within the functional area of KCC. The relevant portion of the proposed on-site borrow pit will also be included in the planning application to be submitted to KCC. Approximately 707m of the access road works, approximately 3.2km of the 33kV underground electrical cabling (including approximately 450m of road upgrade) and the proposed extension to the permitted borrow pit are located in the functional area of CCC and will be included in the planning application to be submitted to CCC. A planning application will be submitted to each relevant authority with respect to the works required in areas accordance with the requirements of the Act.

The overall layout of the Proposed Development is shown on Figure 4-1. This figure shows the Proposed Development infrastructure as outlined above. Detailed site layout drawings of the Proposed Development are included in Appendix 4-1 to this EIAR.

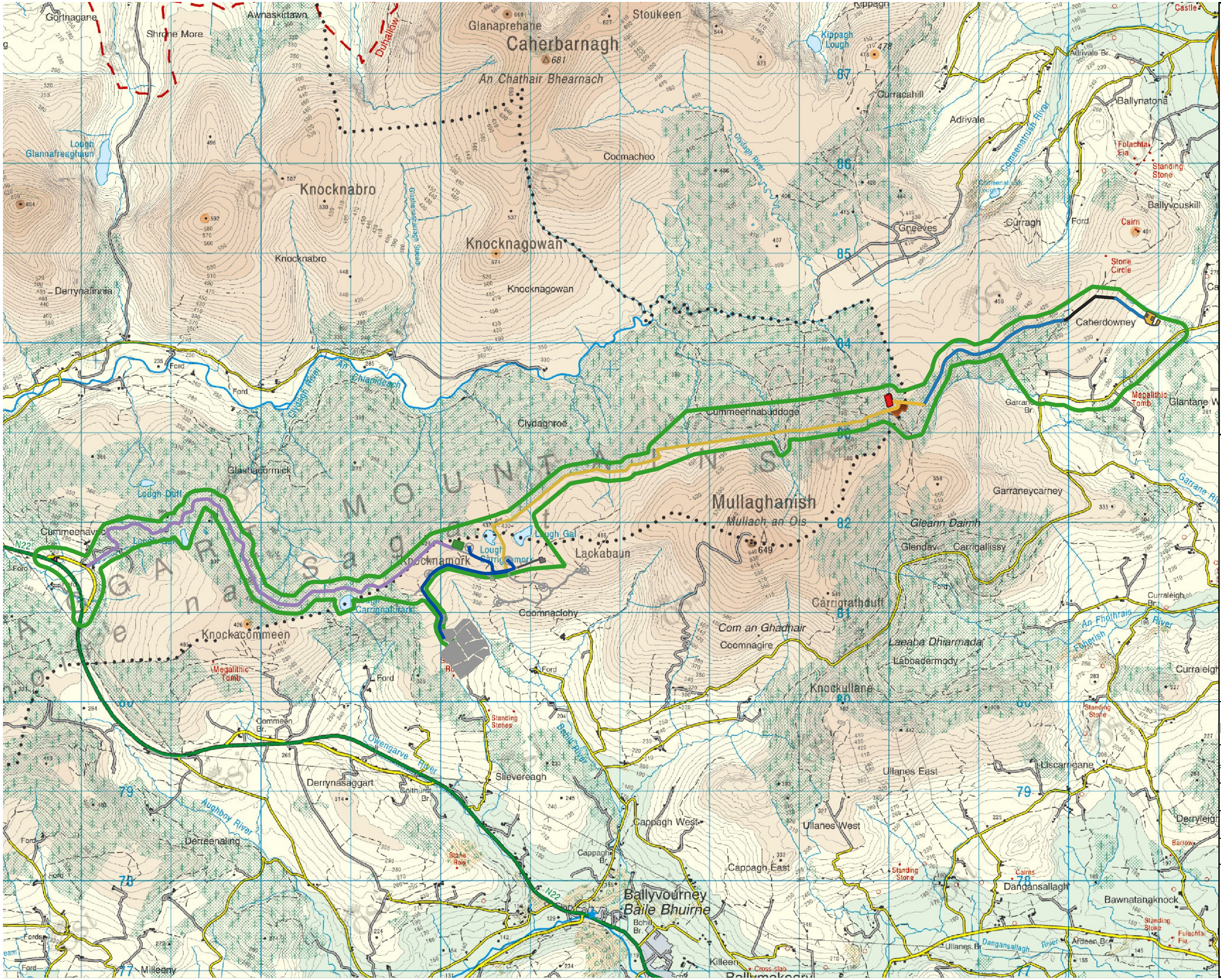
4.3 Development Components

This section of the EIAR describes the components of the Proposed Development. Further details regarding Site Drainage (Section 4.5), Construction Management (Section 4.6) and Construction Methodologies (Section 4.7) are provided subsequently in this chapter.

4.3.1 Electrical Substation

It is proposed to construct a 110 kV electrical substation to accommodate the connection of the Permitted Development to the national grid. It is intended that the 110kV substation will replace the 38kV substation, 38kV underground cabling and battery storage compound permitted under Pl. Ref. 19/4972. The footprint of the proposed electrical substation compound measures approximately 0.84 hectares. The works will consist of the construction of 2 no. control buildings with welfare facilities, all associated electrical plant and apparatus, security fencing, underground cabling, waste water holding tank and all ancillary works. The substation compound will be surrounded by an approximately 2.4-metre high steel palisade fence in line with standard ESB/ Eirgrid requirements, and internal fences will also segregate different areas within the main substation. The substation compound will serve as a site compound during the construction phase with the site facilities being removed before the final sections of the perimeter fence are erected.

The layouts and elevations of the proposed substation works are shown on Figure 4-2 and Figure 4-3. The construction and electrical components of the substation will be to Eirgrid specifications. The configuration of the substation layout is designed to cater for Eirgrid's future expansion requirements, should it be required by Eirgrid to make provision for future grid connections. Any future development associated with the proposed 110kV substation would be subject to a separate planning application process and would be assessed appropriately. Further details regarding the cabling connection between the Permitted Development and the national electricity grid are provided in Section 4.3.2 of this EIAR chapter.

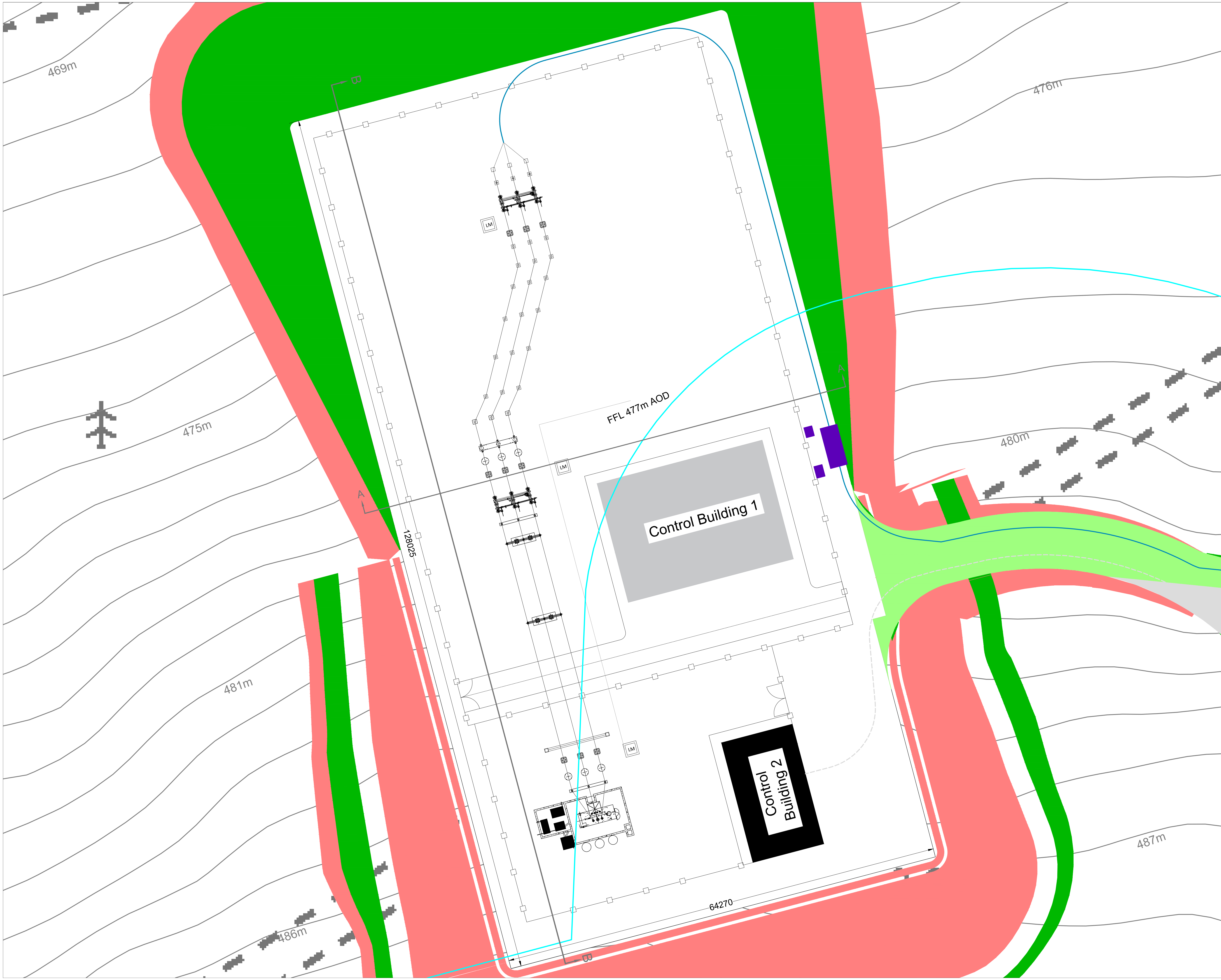


Map Legend

- EIAR Study Boundary
- Access Road (Upgrade & New)
- Temp Road
- 33kV Underground Cabling and Access Roads
- 33kV Underground Cabling in Permitted Development
- 110kV Underground Cabling
- 110kV Underground Cabling and Access Road
- Ballyvouskill 220kV Substation
- Proposed 110kV Substation Location
- Proposed Borrow Pit
- Permitted Borrow Pit Extension
- Omitted 38kV Electrical Substation and Battery Compound

Drawing Title	Proposed Development Layout
Project Title	Proposed Substation, Underground Cabling & Access Roads to Knocknamork Renewable Energy Development
Drawn By: NMcH	Checked By: EOS
Project No.: 210732	Drawing No.: Figure 4-1
Scale: 1:55000	Date: 28.06.2022

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoirelan



Drawing Legend

- Application Boundary KerryCounty Council
- Proposed 110kV Electrical Cabling
- Proposed Substation Access Track
- Joint Bay
- Cut
- Fill

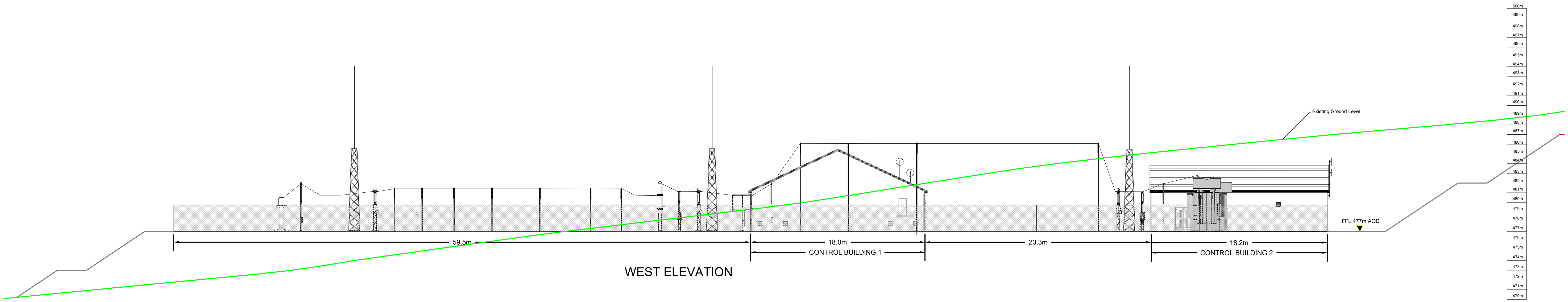
N

DRAWING TITLE:
Substation Compound Layout

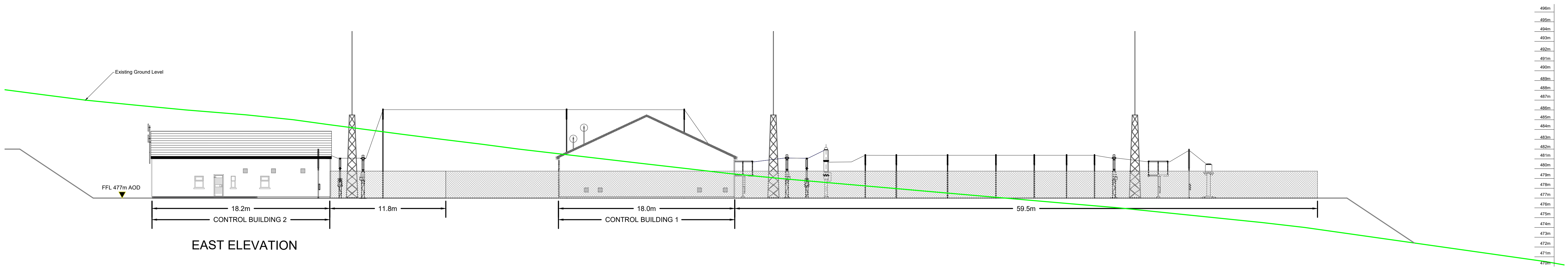
PROJECT TITLE:
Knocknamork Grid Connection Infrastructure

DRAWING BY: Joseph O Brien	CHECKED BY: Eoin O Sullivan
PROJECT No.: 210732	DRAWING No.: Fig 4-2
SCALE: 1:500 @ A3	DATE: 25.07.2022
OS SHEET No.: 6134, 6135, 6136, 6137, 6180, 6181, 6182, 6183, 6228, 6229, 6230, 6276, 6277	

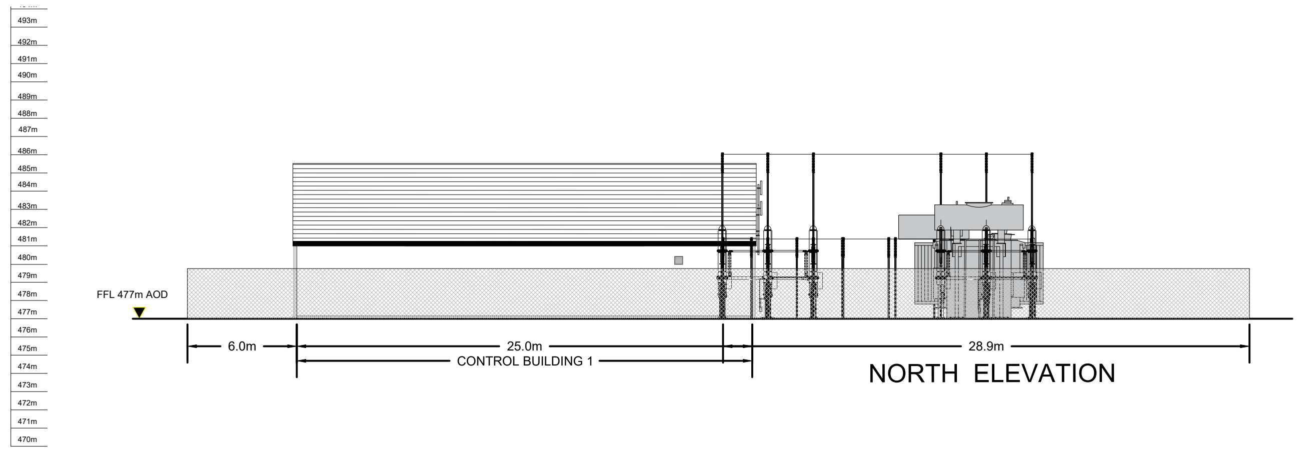
MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie



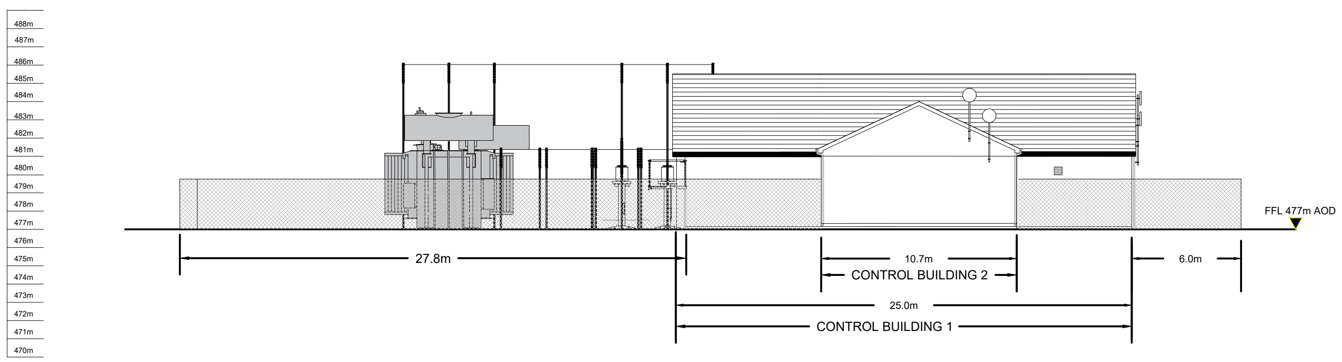
WEST ELEVATION



EAST ELEVATION



NORTH ELEVATION



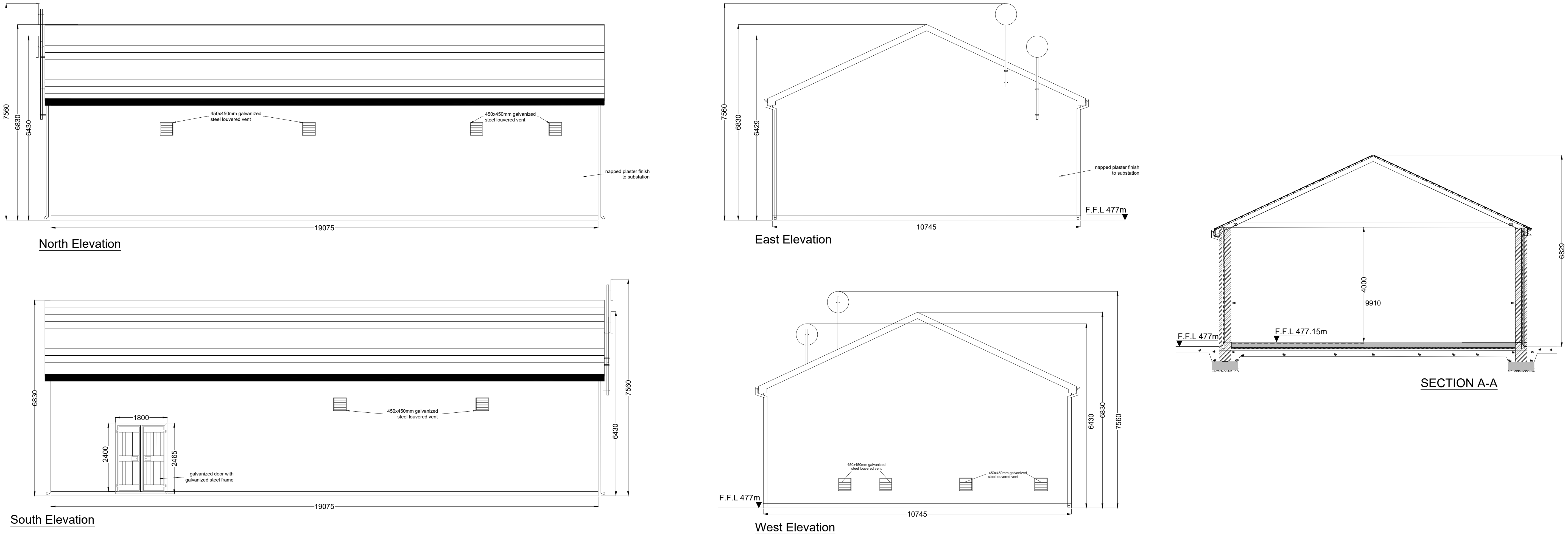
SOUTH ELEVATION

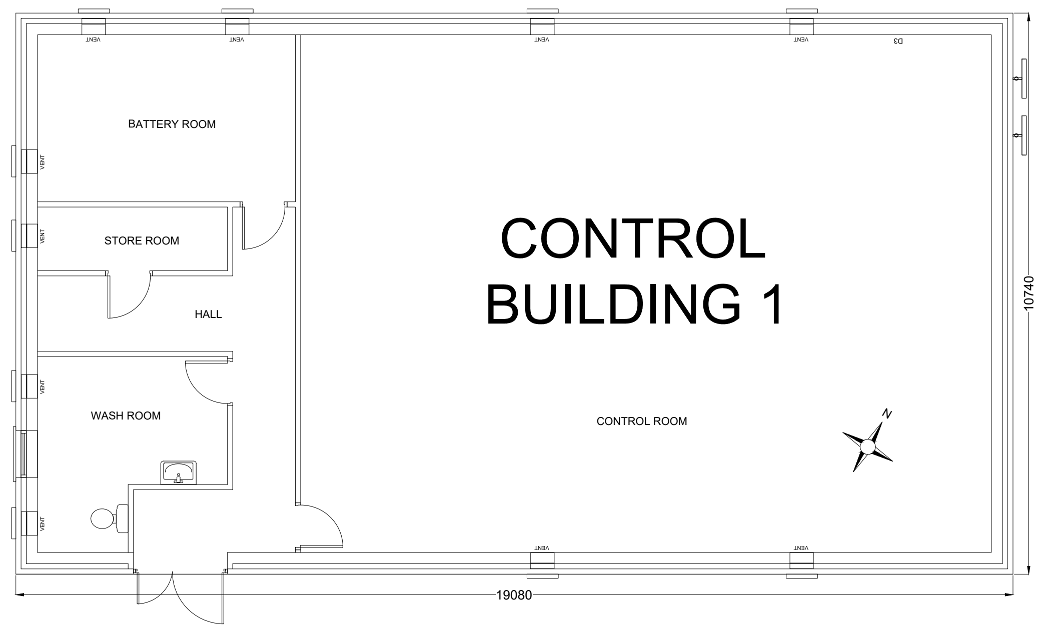
DRAWING TITLE:
Substation Compound Elevations

PROJECT TITLE:
Knocknamork Grid Connection Infrastructure, An Bord Pleanala

DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210732	DRAWING No.: Fig 4-3
SCALE: 1:200 @ A1	DATE: 25.07.2022

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie



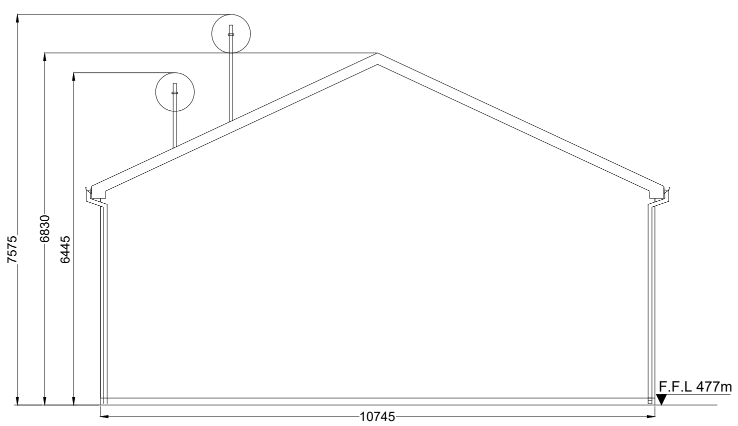


DRAWING TITLE:

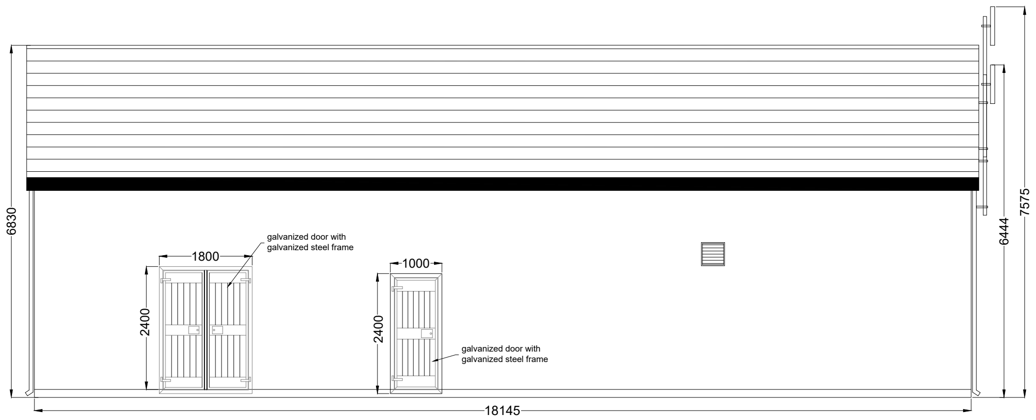
Control Building 1

PROJECT TITLE: Knocknamork Grid Connection Infrastructure, An Bord Pleanala	
DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210732	DRAWING No.: Fig 4-4
SCALE: 1:100 @ A2	DATE: 25.07.2022

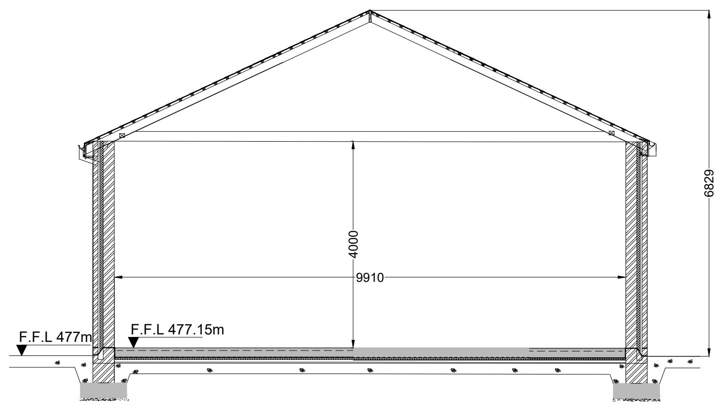
MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie



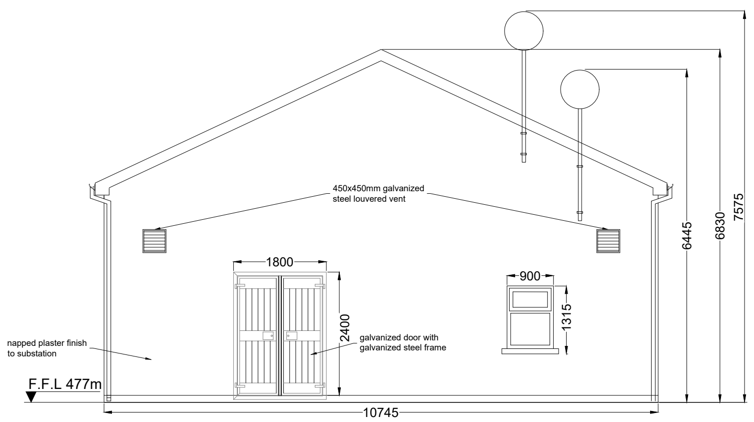
North Elevation



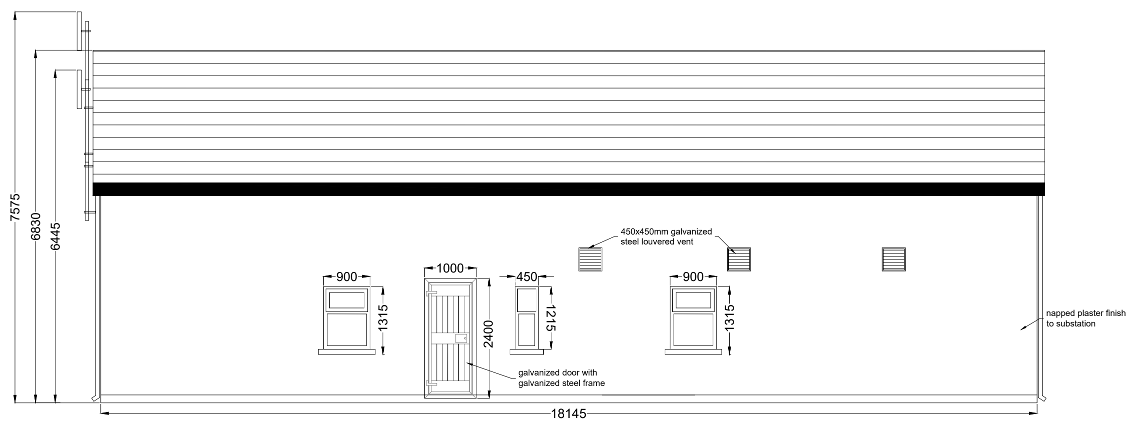
West Elevation



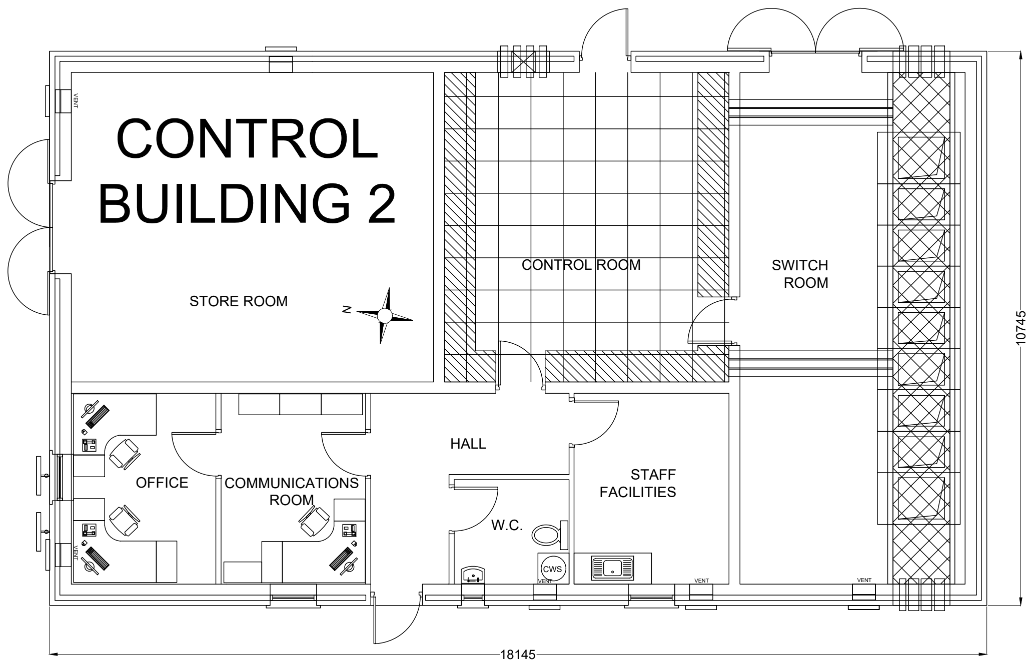
SECTION A-A



South Elevation



East Elevation



DRAWING TITLE:	
Control Building 2	
PROJECT TITLE: Knocknamork Grid Connection Infrastructure, An Bord Pleanala	
DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210732	DRAWING No.: Fig 4-5
SCALE: 1:100 @ A2	DATE: 25.07.2022

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie

4.3.1.1 Substation Control Buildings

The wind farm control buildings will be located within the substation compound. Control building 1 will measure approximately 450 square metres in area and 9 metres in height. Control building 2 will measure approximately 195 square metres in area and 7 metres in height. Layout and elevation drawings of the control buildings are included in Figure 4-4 and Figure 4-5.

The substation control buildings will include staff welfare facilities for the staff that will work on the substation during the operational phase of the project. Toilet facilities will be installed with a low-flush cistern and low-flow wash basin. There will be a very small water requirement for occasional toilet flushing and hand washing and therefore the water requirement for the substation does not necessitate a potable source. It is proposed to harvest rainwater from the roofs of the buildings, and if necessary, bottled water will be supplied for drinking.

It is proposed to manage wastewater from the staff welfare facilities in the control building by means of a sealed storage tank, with all wastewater being tankered off site by permitted waste collector to wastewater treatment plants. It is not proposed to treat wastewater on-site, and therefore the EPA's 2009 *'Code of Practice: Wastewater Treatment and Disposal Systems Serving Single Houses (p.e. 10)'* does not apply. Similarly, the EPA's 1999 manual on *'Treatment Systems for Small Communities, Business, Leisure Centres and Hotels'* also does not apply, as it too deals with scenarios where it is proposed to treat wastewater on-site.

Such a proposal for managing the wastewater arising on site has become almost standard practice on substation sites, which are often proposed in areas where finding the necessary percolation requirements for on-site treatment would be challenging and has been accepted by numerous Planning Authorities and An Bord Pleanála as an acceptable proposal.

The proposed wastewater storage tank will be fitted with an automated alarm system that will provide sufficient notice that the tank requires emptying. The wastewater storage tank alarm will be part of a continuous stream of data from the Permitted Development turbines, wind measurement devices and the proposed electrical substation that will be monitored remotely 24 hours a day, 7 days per week. Only waste collectors holding valid waste collection permits under the Waste Management (Collection Permit) Regulations, 2007 (as amended), will be employed to transport wastewater away from the site to a licensed facility.

4.3.2 Site Underground Cabling

The proposed underground electrical cabling consists of two elements: (1) 110kV underground electrical cabling connecting the proposed 110kV substation to the existing 220kV substation at Ballyvouskill; and (2) 33kV underground electrical cabling connecting the Permitted Development to the proposed 110kV substation.

4.3.2.1 110kV Underground Electrical Cabling

Approximately 3.6km of 110kV underground electrical cabling will connect the proposed 110kV substation to the existing Ballyvouskill 220kV Substation which will be installed predominantly following the alignment of existing forest roads / land and agricultural land.

The 110kV cable circuit will include power ducts, communication fibre ducts and earth wire laid in an excavation depth of approximately 1.3m as illustrated in Figure 4-6. The position of the cable trench relative to the roadways is shown in section in Figure 4-8 and Figure 4-9 below. The exact number and configuration of cable ducting may vary within the cabling trench. The exact configuration of the underground cabling will be set by the requirements of the electrical designers at detailed design stage. A methodology for these works is provided in Section 4.6.3.

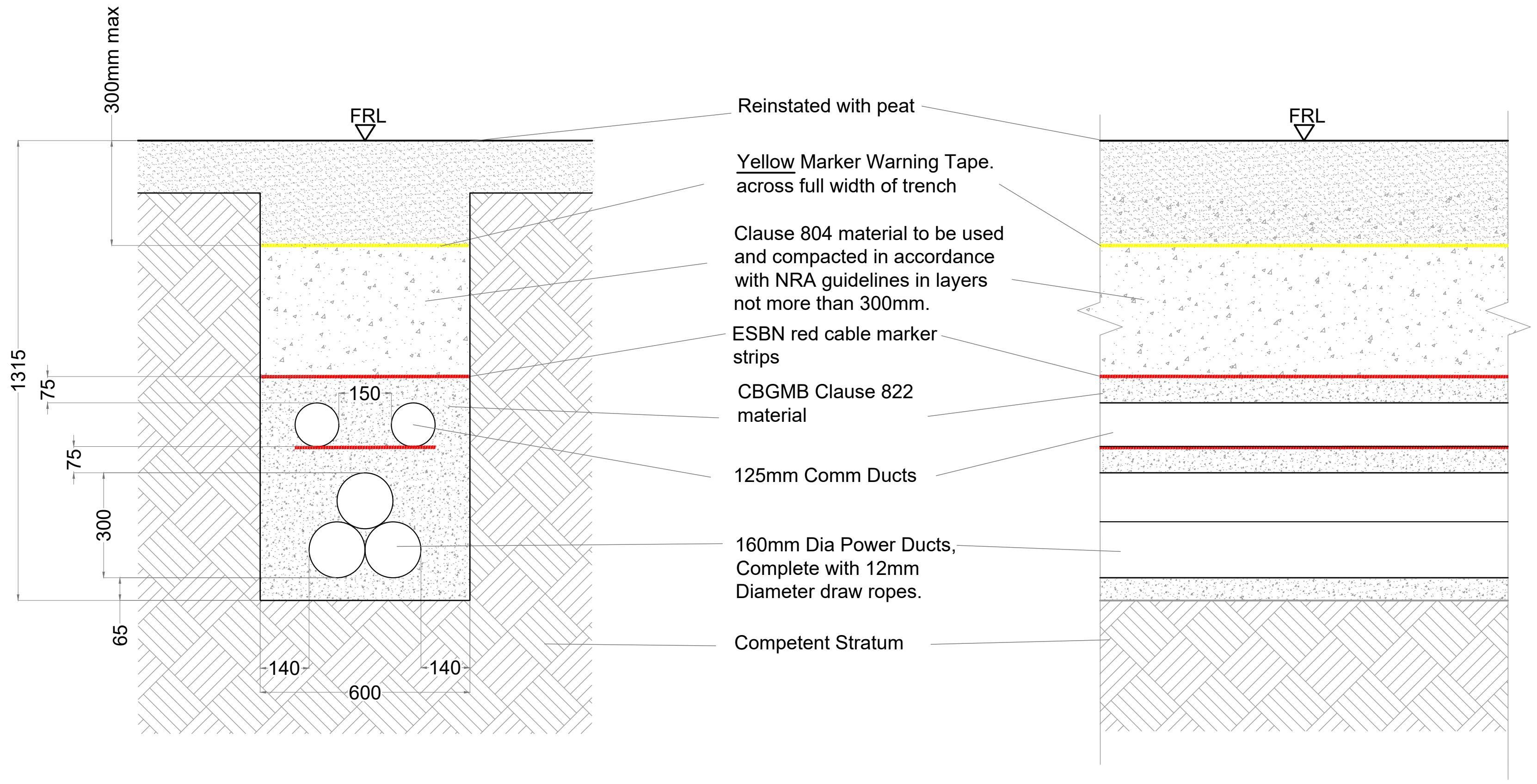
Note:

All dimensions are in millimetres, unless noted otherwise.

All dimensions to be checked on site and any discrepancy to be reported to the engineer.

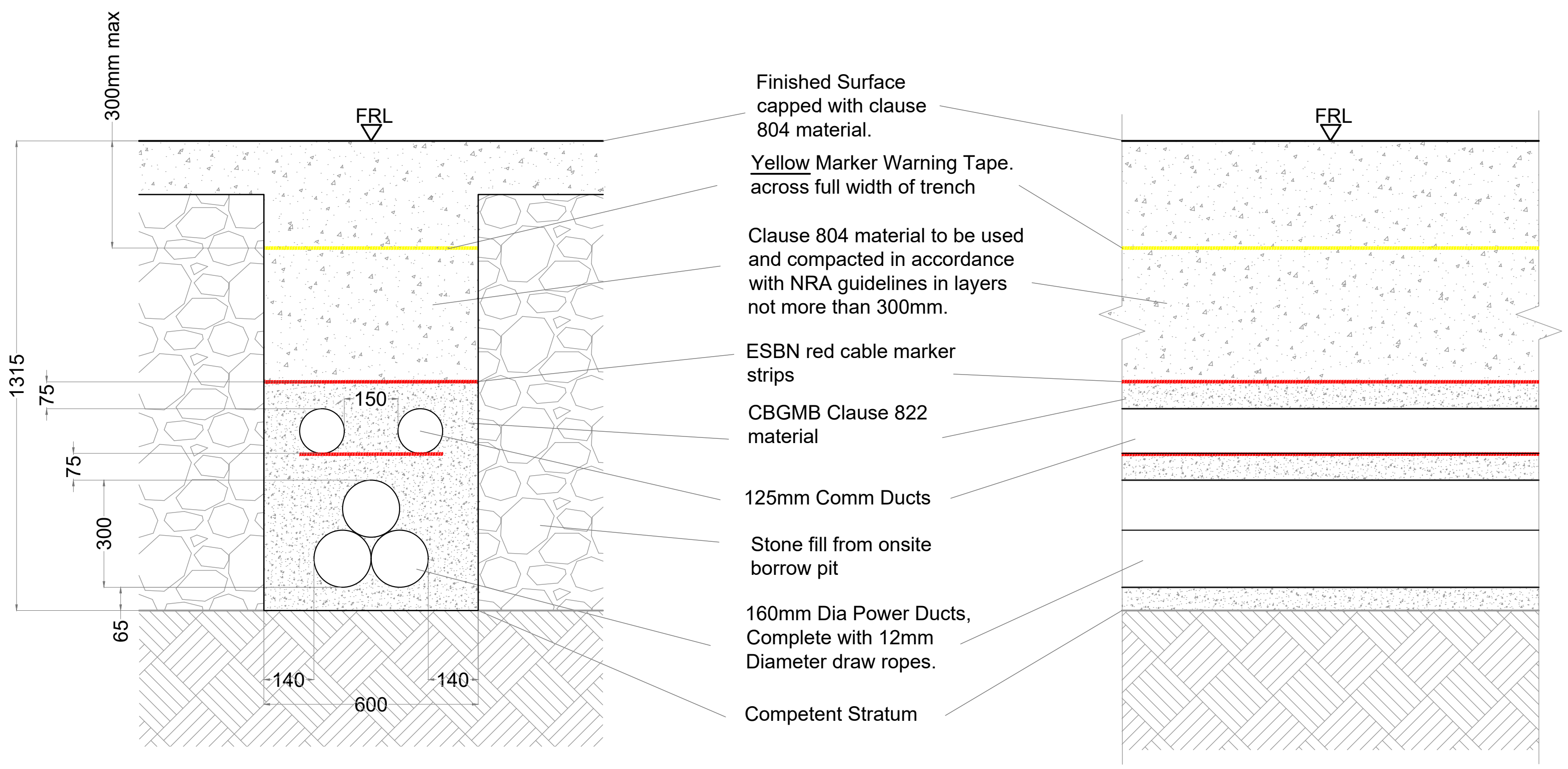
Figured dimensions only to be used, drawings not to be scaled. If in doubt ask.

For illustration purposes only. Exact size and appearance of unit subject to manufacturer selection.



Cross section - 110kV

SCALE 1:20



Cross section - 110kV

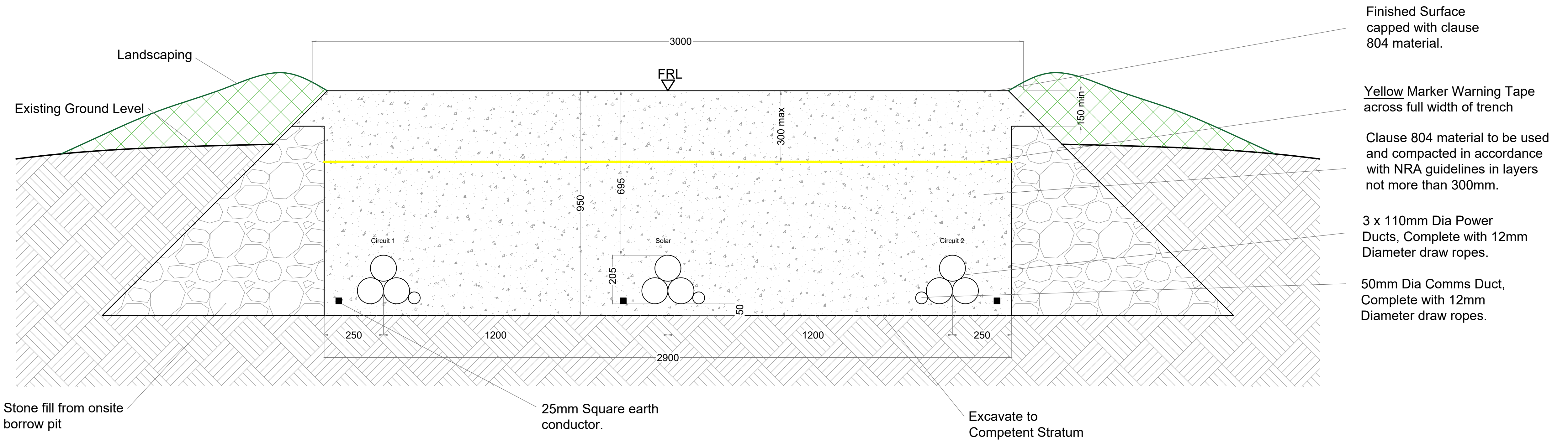
SCALE 1:20

DRAWING TITLE: Cross Section - 110kV

PROJECT TITLE: Knocknamork Grid Connection Infrastructure

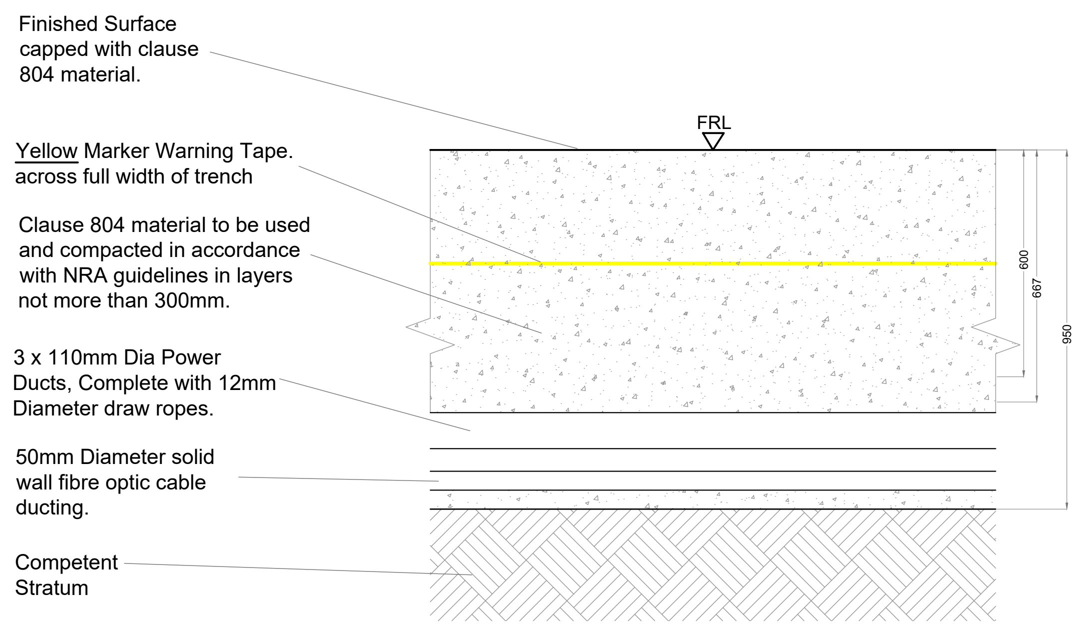
DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210732	DRAWING No.: Fig 4-6
SCALE: 1:20 @ A3	DATE: 25.07.2022

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie



Cabling Cross Section - 33kV

SCALE 1:20



Cabling Cross Section - 33kV

SCALE 1:20

Note:

All dimensions are in millimetres, unless noted otherwise.

All dimensions to be checked on site and any discrepancy to be reported to the engineer.

Figured dimensions only to be used, drawings not to be scaled. If in doubt ask.

For illustration purposes only. Exact size and appearance of unit subject to manufacturer selection.

DRAWING TITLE: **Cabling Cross Section - 33kV**	
PROJECT TITLE: Knocknamork Grid Connection Infrastructure	
DRAWING BY: **Joseph O Brien**	CHECKED BY: **Meabhann Crowe**
PROJECT No.: **210732**	DRAWING No.: **Fig 4-7**
SCALE: **1:20 @ A3**	DATE: **25.07.2022**

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie

4.3.2.2 33kV Underground Electrical Cabling

The proposed 33kV underground electrical cabling will consolidate all of the on-site underground cabling, from the individual turbines and solar array, into 3 no. cable circuits connecting the Permitted Development to the proposed 110kV substation, The cable circuits will include power ducts, communication fibre duct and earth wire laid in an excavation depth of approximately 0.95m as illustrated in Figure 4-7. The 33kV underground cabling route will be finished with an access track approximately 3m wide and will connect the Permitted Development to the proposed 110kV substation predominately following proposed and existing forestry roads/firebreaks measuring approximately 11.7km. The exact configuration of the underground cabling will be set by the requirements of the electrical designers at detailed design stage. A methodology for these works is provided in Section 4.6.3.

Clay plugs (water flow barrier) will be installed at regular intervals of not greater than 50 metres along the length of the trenches where required to prevent the trenches becoming conduits for runoff water. Backfill material will be compacted in layers with approved engineer's specified material, which may be imported onto the site should sufficient volumes of suitable material not be encountered during the excavation phase of the proposed infrastructure.

4.3.3 Watercourse / Culvert Crossing

The routes of any natural drainage features will not be altered as part of the Proposed Development. The underground electrical cabling route has been selected to avoid natural watercourses where possible. Up to 5 no. new watercourse crossings are required over streams along the proposed cable route (See Section 4.7.3.3 below). The methodologies for new crossings comprises a selection of clear span bridge or corrugated steel arch bridge, bottomless box culverts or piped culvert. These are required mainly where no crossing currently exists and where it is necessary to traverse watercourse with the cabling ducts.

The typical construction methodology for the installation of a clear-span bridge or bottomless box culverts is presented below:

- The cable track on the approach to the watercourse will be completed to a formation level which is suitable for the passing of plant and equipment required for the installation of the watercourse crossing.
- All drainage measures along the track will be installed in advance of the works.
- Safe access over the stream for this installation will be via a steel walkway & handrail which will span the stream.
- The foundation will consist of concrete footing which will be installed on a concrete lean mix foundation to provide a suitable base. The base will be excavated to rock or competent stratum with a mechanical excavator with the foundation formed in-situ using a semi-dry concrete lean mix. The base will be excavated along the stream bank with no in- stream works required.
- The concrete footing will be installed as per a design engineers specification to a height appropriate to achieve the necessary clearance above the watercourse.
- The clear span bridge structure which will essentially be a precast concrete slab will be lifted in place using a crane. Likewise, where a bottomless box culvert is used it will also be precast and lifted into place on to the footings.
- The watercourse edge will be reinforced with rock armour where necessary to avoid any erosion or deterioration of the watercourse bank. This will be carried out in dry conditions and without the use of in-stream (water) works.

All other new crossings will be completed using piped culvert system at minor channels or manmade drains, the crossing will be installed as follows:

- The access road on the approach to the channel will be completed to a formation level which is suitable for the passing of plant and equipment required for the installation of the culvert and drain crossing.
- The installation of the culvert will take place in low flow conditions.
- Where a flow exists, the water running through the channel will be pumped around the water crossing location and back into the channel downstream of the works area.
- Where over pumping is required, measures will be taken to ensure that the pumped water discharge does not disturb the stream bed with the force of water from the discharge. A steel plate to reduce the force of the flow will be used where appropriate.
- The project engineer will determine the required gradient of the culvert. The pipe must be laid at a gradient that will ensure water is contained within the pipe at all times. Where necessary a rock armour dam will be installed within the stream to reduce flow and ensure an acceptable depth of water remains within the pipe. Where a gradient of 1 – 1.5% is identified, the use of a baffle has been recommended.
- The bed of the channel will be excavated, if necessary, to achieve the correct line and to allow the pipe to be embedded 300mm into the base of the existing drain.
- The embedded section will be allowed to fill naturally with existing material within the base of the drain or with suitable drainage material such as gravel or round shingle where deemed applicable.
- The culvert will be lowered into place using an excavator with a lifting mechanism.
- Large stone boulders (approx. 400mm), sourced from the on-site borrow pits, will be placed over the culvert to create a headwall for the culvert and a suitable sub-base for road construction.
- Smaller 50mm stone, sourced on site will be placed upon the sub-base to construct the road over the water crossing.

Any watercourse crossings required will be installed outside of the salmonid spawning season, October to June in any year, in accordance with Inland Fisheries Ireland best practice (IFI, 2016). This will ensure no potential impacts on salmonid spawning habitat.

The works will be undertaken in line with NRA (TII) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes.

All of the above works will be supervised by the Environmental Clerk of Works and the Project Hydrologist.

4.3.4 Site Access Road

4.3.4.1 Road Construction Types

To provide access within the Proposed Development site and to connect the associated infrastructure existing roads will need to be upgraded and new access roads will need to be constructed. The road construction design has taken into account the following key factors:

1. *Buildability considerations;*
2. *Maximising use of existing infrastructure;*
3. *Minimising excavation arisings;*
4. *Serviceability requirements for construction and wind turbine delivery and maintenance vehicles;*
5. *Requirement to minimise disruption to peat hydrology.*

Whilst the above key factors are used to determine the road design the actual construction technique employed for a particular length of road will be determined on the prevailing ground conditions encountered along that length of road.

4.3.4.1.1 Upgrade of Existing Access Roads or Tracks

The general construction methodology for upgrading of existing sections of access roads or tracks, as presented in Fehily Timoney & Company (FT) *Peat & Spoil Management Plan* in Appendix 4-2 of this EIAR, is summarised below. This methodology includes procedures that are to be included in the construction to minimise any adverse impact on peat stability.

1. *Access road construction shall be to the line and level requirements as per design/planning conditions.*

2. *For upgrading of existing access roads the following guidelines apply:*

    a) *Excavation of the widened section of access road should take place to a competent stratum beneath the peat (as agreed with the designer) and backfilled with suitable granular fill.*
    b) *Benching of the excavation may be required between the existing section of access road and the widened section of access road depending on the depth of excavation required.*
    c) *Access roads to be finished with a layer of capping across the full width of the road.*
    d) *A layer of geogrid/geotextile may be required at the surface of the existing access road and at the base of the widened section of access road (to be confirmed by the designer).*
    e) *For excavations in peat, side slopes shall be not greater than 1 (v): 3 (h). This slope inclination should be reviewed during construction, as appropriate. Should areas of weaker peat be encountered then slacker slopes (1v:4h) will be required to ensure stability.*

3. *The finished road width will have a running width of 5m (TDR), with wider sections on bends and corners. The finished width on the sections of excavated road alongside existing roads along the 110kV underground cabling will be 2.5m and along the 33kV underground cabling will be 3m.*

4. *On side long sloping ground any road widening works required will be done on the upslope side of the existing access road, where possible.*

Sections of existing road for upgrade are shown in Figure 4-8.

4.3.4.1.2 Construction of New Excavated Roads

Excavate and replace type access roads are the conventional method for construction of access roads on peatland sites and the preferred construction technique in shallow peat provided sufficient placement/reinstatement capacity is available on site for the excavated peat.

The construction methodology for the construction of excavated roads, as presented in FT's *Peat & Spoil Management Plan* in Appendix 4-2 of this EIAR, is summarised below. This methodology includes the following procedures.

1. *Prior to commencing the construction of the excavated roads movement monitoring posts will be installed in areas where the peat depth is greater than 2.0m.*

2. *Interceptor drains will be installed upslope of the access road alignment to divert any surface water away from the construction area.*

3. *Excavation of roads will be to the line and level given in the design requirements. Excavation will take place to a competent stratum beneath the peat.*

4. *Road construction will be carried out in sections of approximately 50m lengths i.e. no more than 50m of access road should be excavated without re-placement with stone fill.*

5. *Once excavated, peat will be temporarily stored in localised areas adjacent to excavations for roads before being placed into the permanent peat storage areas within the borrow pits or reused for landscaping purposes. All temporary storage areas will be upslope of founded roads and will be inspected by a suitably qualified person before material is stored in the area.*

6. *Excavation of materials with respect to control of peat stability:*

    a) *Acrotelm (to about 0.3 to 0.4m of peat) is generally required for landscaping and will be stripped and temporarily stockpiled for re-use as required. Acrotelm stripping will be undertaken prior to main excavations.*
    b) *Where possible, the acrotelm shall be placed with the vegetation part of the sod facing the right way up to encourage growth of plants and vegetation.*
    c) *All catotelm peat (peat below about 0.3 to 0.4m depth) shall be transported immediately on excavation to the designated placement areas, unless required for landscaping purposes, such as along the 33kV cable route.*

7. *Side slopes in peat shall be not greater than 1 (v): 3 (h). This slope inclination will be reviewed during construction, as appropriate. Where areas of weaker peat are encountered then slacker slopes will be required. Battering of the side slopes of the excavations will be carried out as the excavation progresses.*

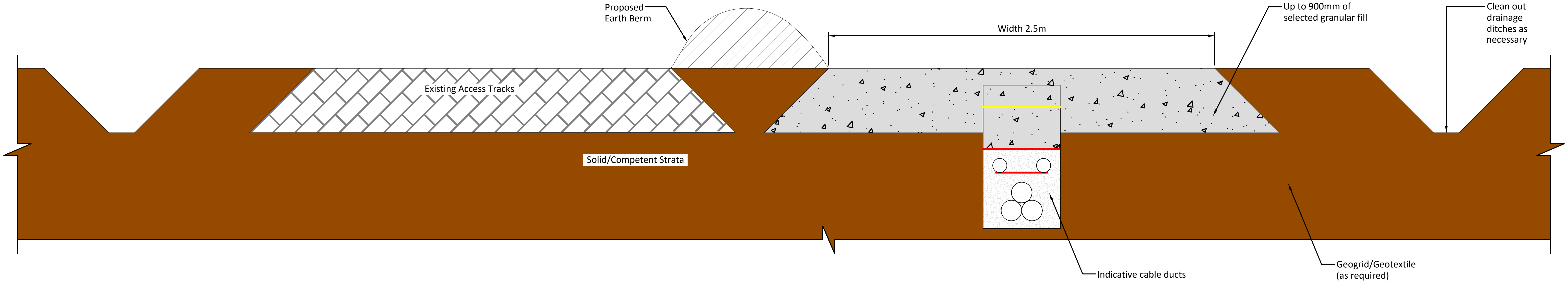
8. *The excavated access road will be constructed with up to 1200mm of selected granular fill, depending on the section of road. Granular fill to be placed and compacted in layers in accordance with the TII Specification for Road Works.*

9. *Access roads to be finished with a layer of capping across the full width of the road.*

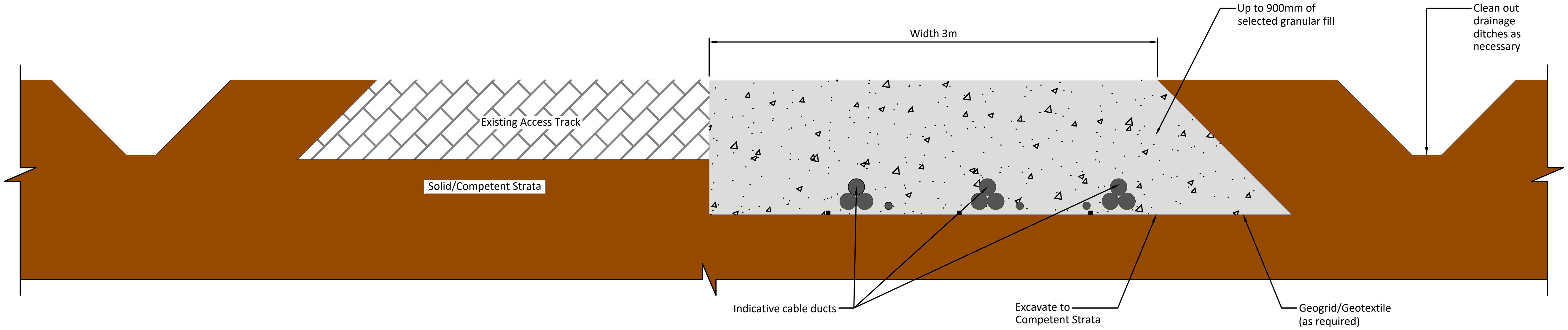
10. *A layer of geogrid/geotextile may be required at the surface of the competent stratum.*

11. *A final surface layer shall be placed over the excavated road and graded to accommodate construction and delivery traffic.*

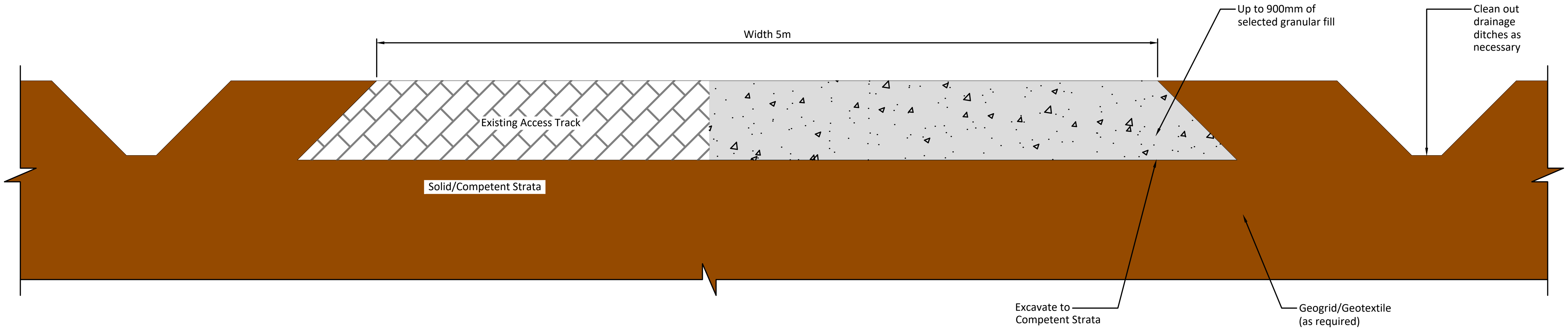
Section of a new excavated road is shown in Figure 4-9.



110 kV underground cabling route



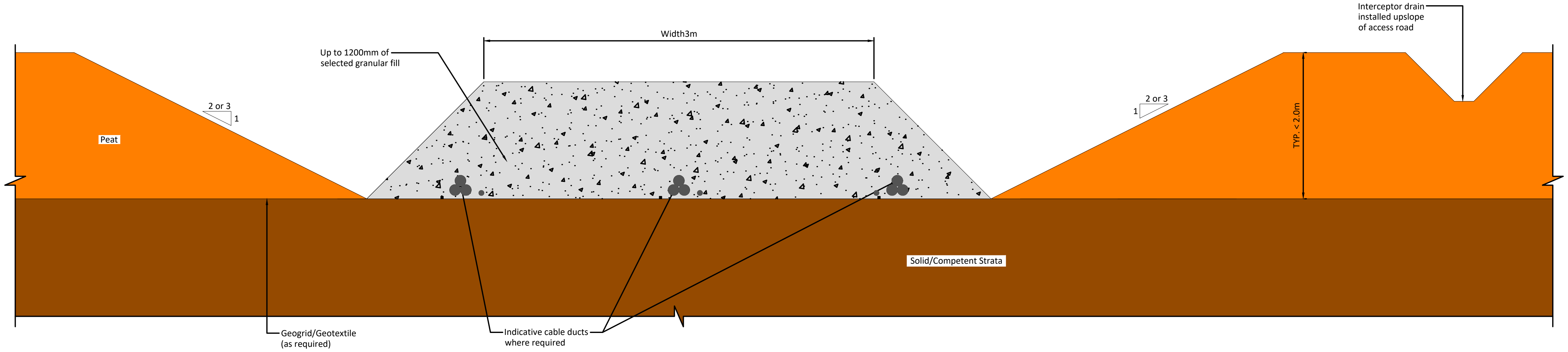
33kV underground cabling route.



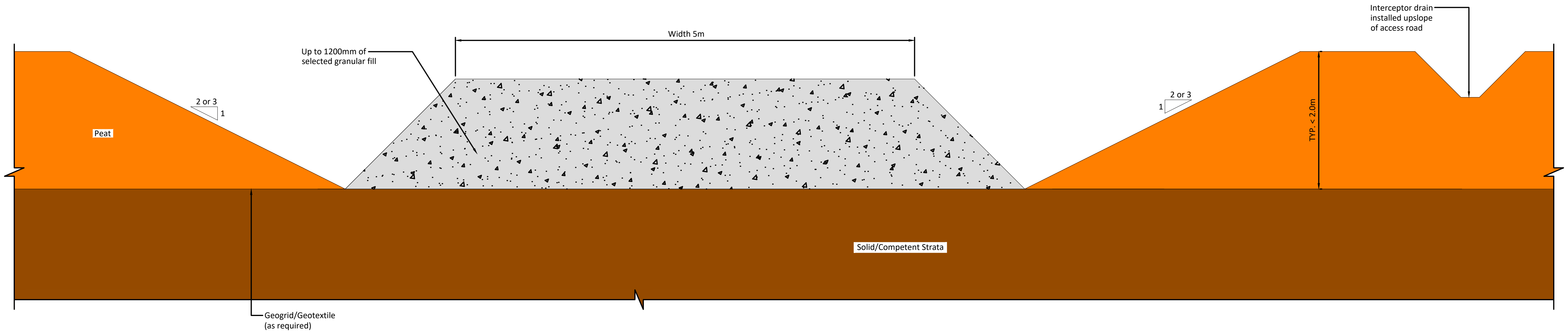
Existing access for upgrade

DRAWING TITLE: Upgrade of Existing Excavated Access Roads
PROJECT TITLE: Knocknamork Grid Connection Infrastructure
DRAWING BY: POR
CHECKED BY: IH
PROJECT No.: 210732
DRAWING No.: Fig 4-8
SCALE: 1:30 @ A3
DATE: 25.07.2022
OS SHEET No.:

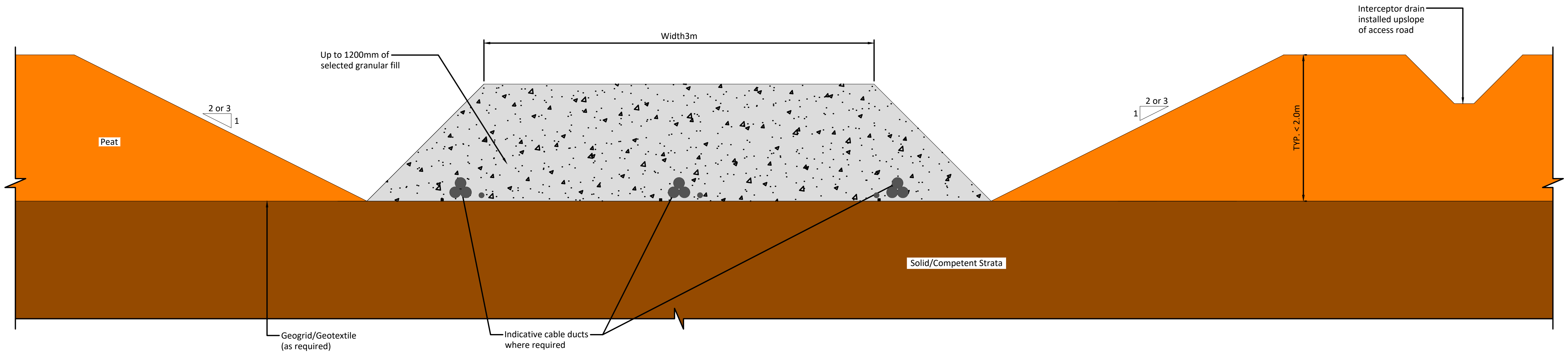
FEHILY TIMONEY
Cork | Dublin | Carlow
www.fehilytimoney.ie



33kV underground cabling route .



Proposed New Access Track



33kV underground cabling route .

DRAWING TITLE: New Excavate and Replace Access Road	
PROJECT TITLE: Knocknamork Grid Connection Infrastructure	
DRAWING BY: POR	CHECKED BY: IH
PROJECT No.: 210732	DRAWING No.: Fig 4-9
SCALE: 1:50 @ A3	DATE: 25.07.2022
OS SHEET No.:	

FEHILY TIMONEY
Cork | Dublin | Carlow
www.fehilytimoney.ie

4.3.5 Borrow Pits

4.3.5.1 Description

It is proposed to develop a new borrow pit as part of the Proposed Development and extend the borrow pit as permitted under Planning Permission Ref. No. 19/4972. It is proposed to obtain the majority of all rock and hardcore material that will be required during the construction of the Proposed Development from the borrow pit and the permitted borrow pit extension. Usable rock may also be won from other infrastructure excavations (such as the substation platform excavation).

The location of the borrow pits are shown on Figure 4-1 and on the detailed site layout drawings included as Appendix 4-1 to this EIAR.

The new borrow pit is located approximately 50 metres southeast of the proposed 110kV substation and measures approximately 13,094 m^2 in area. The new borrow pit will be formed in two main cells stepped to align with the natural topography. The northern cell covers an area of 6,249 m^2 and the southern cell covers an area of 6,845 m^2. The borrow pit will cater for the construction of the 110kV substation and 110kV underground electrical cabling route and access roads. The southern cell will cater for the construction of the 33kV underground electrical cabling route and access roads in County Kerry.

The permitted borrow pit will be extended laterally to cover a total area of approximately 9,900 m^2. The extension will cover an area of approximately 3,321 m^2.

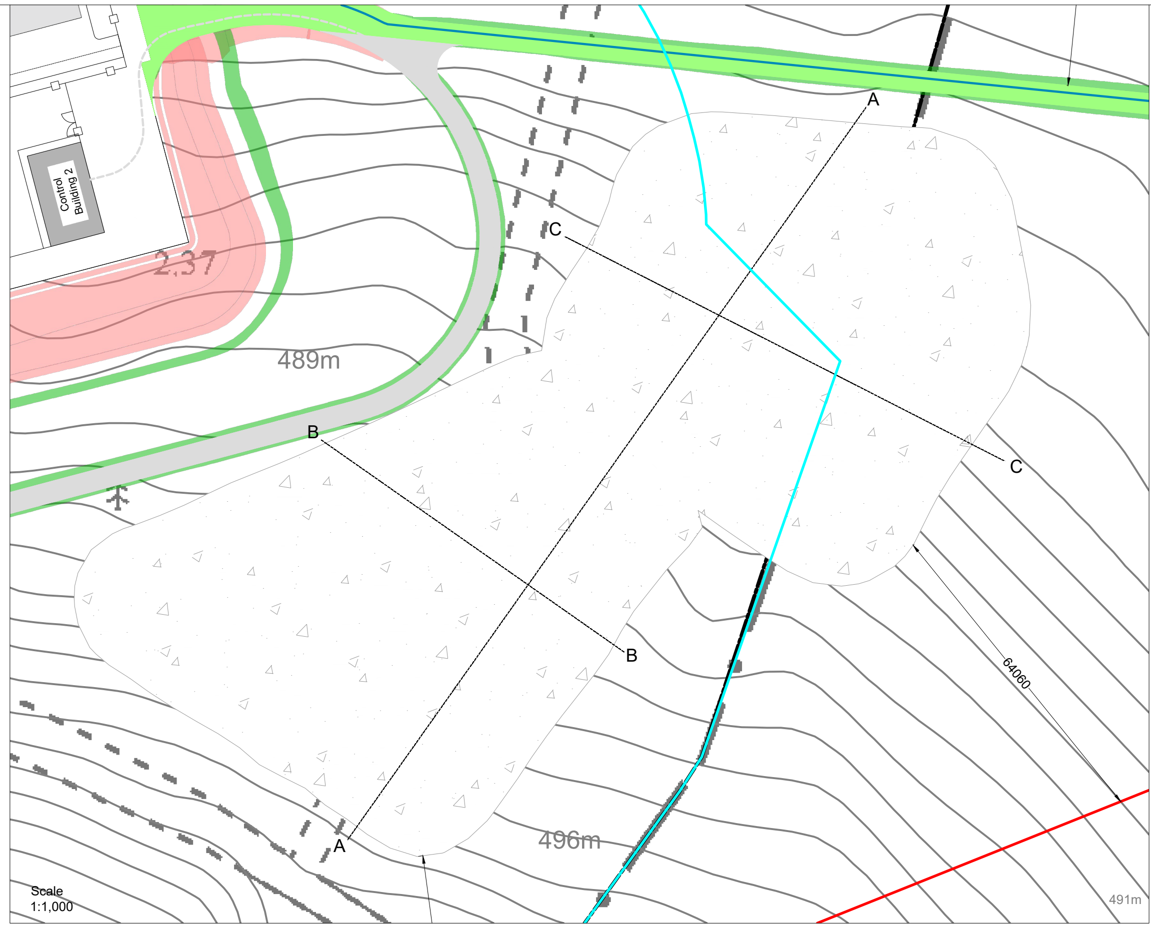
It is intended that all hardcore materials required for the construction of the Proposed Development will be won on-site.

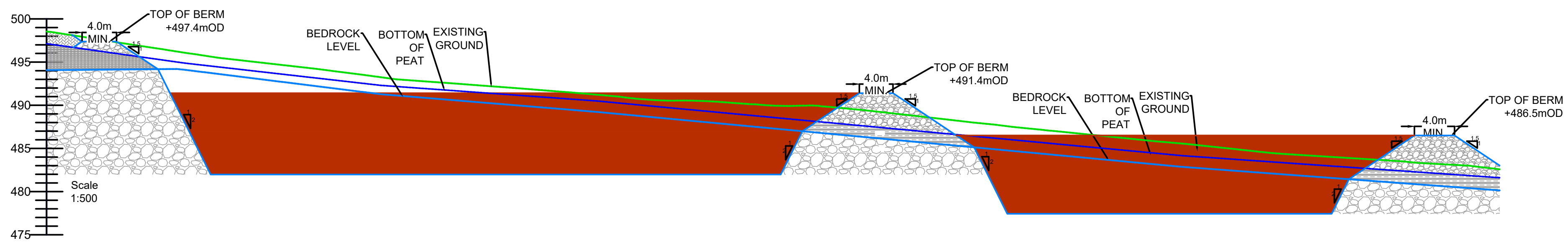
Figure 4-10 and Figure 4-11 below shows detailed sections through the proposed borrow pit and borrow pit extension respectively. The borrow pits will, on removal of all necessary and useful rock, be reinstated with excavated peat and subsoils as described in Section 4.3.6.2 below.

Post-construction, any unsafe areas around the borrow pit areas will be permanently secured and a stock-proof fence will be erected around the borrow pit area to prevent access to these areas. Appropriate health and safety signage will also be erected on this fencing and at locations around the fenced area.

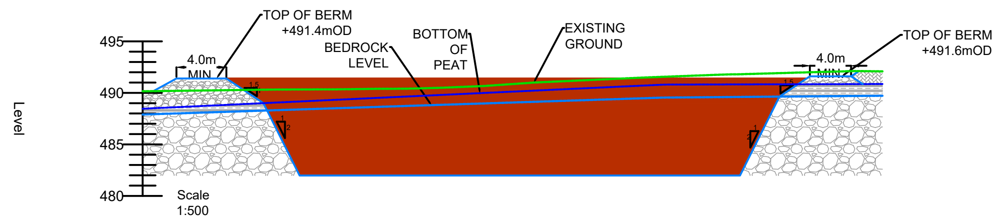
Hardcore materials will be extracted from the borrow pits (and other infrastructure locations, if necessary), principally by means of rock breaking. Depending on the hardcore volume requirements, blasting may also be used as a more effective rock extraction method, capable of producing significant volumes of rock in a matter of milliseconds. Blasting will only be carried out after notifying any potentially sensitive local residents. The developer is committed to notifying all properties within 1km of any proposed blast location which is greater than the distance stated in in the quarry guidance of 500m, *Quarries and Ancillary Activities Guidelines for Planning Authorities April 2004* (DoEHG). The potential noise and vibration impact on sensitive receptors associated with the rock extraction measures, detailed below, are assessed in Chapter 10 of this EIAR.

The two proposed extraction methods are detailed below.

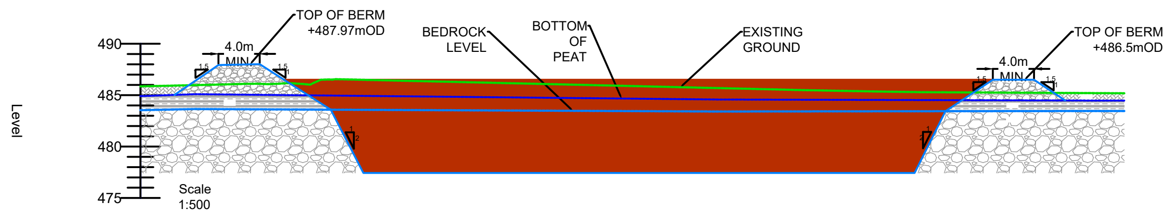




SECTION A-A



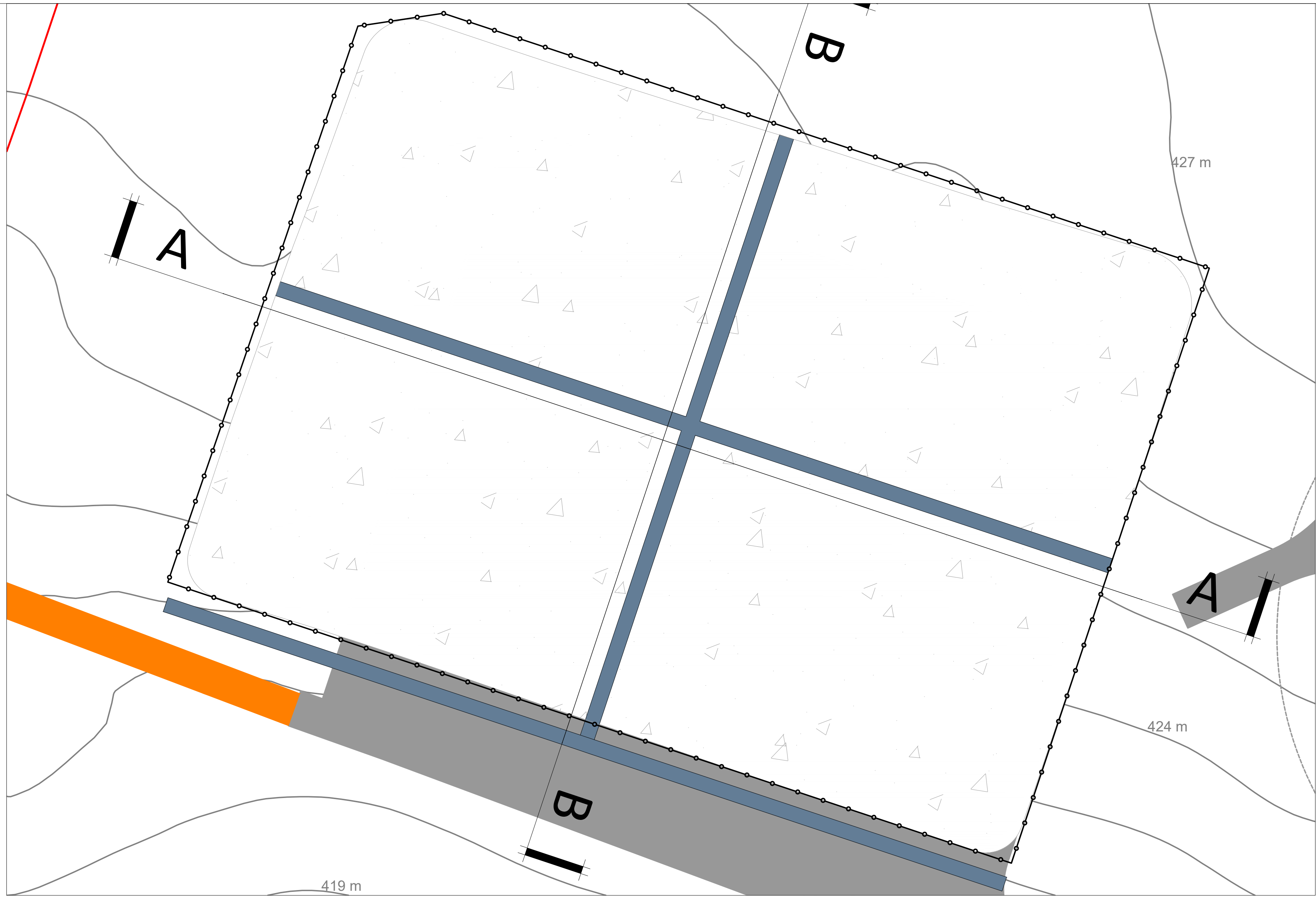
SECTION B-B

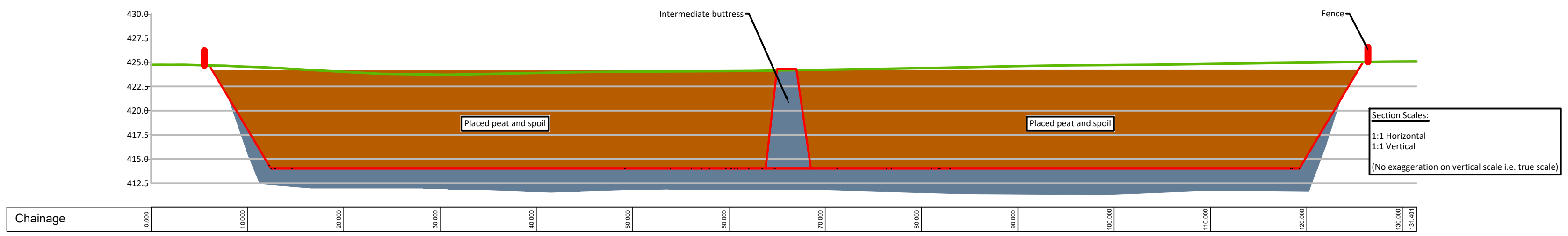


SECTION C-C

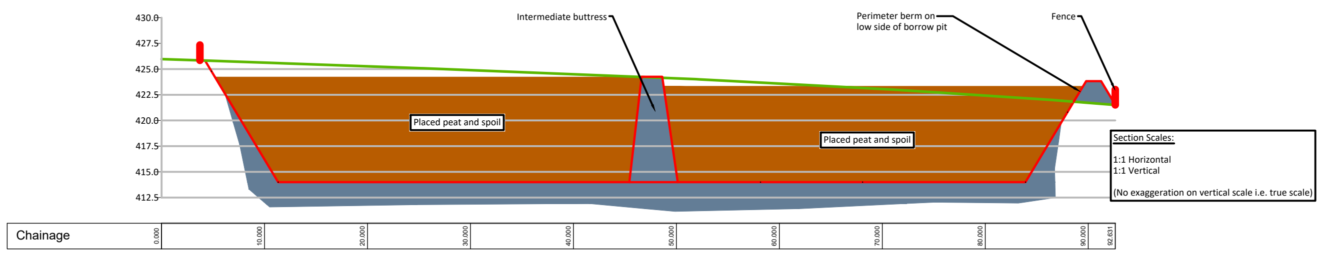
DRAWING TITLE: **Borrow Pit Plan & Section**	
PROJECT TITLE: **Knocknamork Grid Connection Infrastructure**	
DRAWING BY: **Joseph O Brien**	CHECKED BY: **Meabhann Crowe**
PROJECT No.: **210732**	DRAWING No.: **Fig 4-10**
SCALE: **As Shown @ A2**	DATE: **25.07.2022**

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie





SECTION A-A



SECTION B-B

DRAWING TITLE: **Borrow Pit Extension Plan & Section**	
PROJECT TITLE: **Knocknamork Grid Connection Infrastructure**	
DRAWING BY: **Joseph O Brien**	CHECKED BY: **Meabhann Crowe**
PROJECT No.: **210732**	DRAWING No.: **Fig 4-11**
SCALE: **1:500 @ A2**	DATE: **25.07.2022**

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie

4.3.5.2 Rock Extraction Methods

The extraction of rock is a work stage of the Proposed Development which will be a temporary operation run over a short period of time relative to the duration of the entire project. Where there is a layer of overburden present within the area to be excavated, it will be stripped back and stockpiled using standard track mounted excavators. Two extraction methods have been assessed for breaking out the useful rock below; rock breaking and blasting.

4.3.5.2.1 *Rock Breaking*

Weathered or brittle rock can be extracted by means of a hydraulic excavator and a ripper attachment. This is a common extraction methodology where fragmented rock is encountered as it can be carefully excavated in layers by a competent operator. In areas where rock of a much higher strength is encountered and cannot be removed by means of excavating then a rock breaking methodology may be used. Where rock breaking is required, a large hydraulic 360-degree excavator with a rock breaker attachment is typically used. Given the power required to break out tight and compact stone at depth, the machines are generally large and in the 40-60 tonne size range. Even where rock might appear weathered or brittle at the surface, the extent of weathering can quickly diminish with depth resulting in strong rock requiring significant force to extract it at depths of only a few metres.

A large rock breaking excavator progressively breaks out the solid rock from the ground in the borrow pit area. The large rock breaker is typically supported by a smaller rock breaker which can often be in the 30-40 tonne size range and works to break the rocks down to a size that they can be fed into a crusher.

The extracted broken rock is typically loaded into a mobile crusher using a wheeled loading shovel and crushed down to the necessary size of graded stone required for the on-site civil works. The same wheeled loader takes the stone from the crusher conveyor stockpile and stockpiles it elsewhere away from the immediate area of the crusher until it is required elsewhere on the site of the Proposed Development. The potential impacts associated with noise are assessed in Chapter 10 Noise.

4.3.5.2.2 *Rock Blasting*

Where blasting is used as an extraction method, a mobile drilling rig is used to drill vertical boreholes into the area of rock that is to be blasted. The drilling rigs used are normally purpose built, self-propelled machines, designed specifically for drilling blast boreholes. A drilling rig working for 3-4 days would typically drill the necessary number of boreholes required for a single blast. The locations, depth and number of boreholes are determined by the blast engineer, a specialist role fulfilled by the blasting contractor that would be employed to undertake the duties. Where blasting is employed as the extraction method, it is more efficient to increase the depth of the excavation and thus minimise the excavation footprint.

The blast engineer would arrange for the necessary quantity of explosive to be brought to site to undertake a single blast. The management of explosives onsite and the actual blasting operation would be agreed in advance with and supervised by An Gardaí Siochána. The blast engineer sets the explosives in place in the boreholes, sets the charges, and fires the blast. The blast takes only a matter of milliseconds.

A properly designed blast should generate rock of a size that can be loaded directly into a mobile crusher, using the same wheeled loader description outlined above. From that point on, the same method is used for processing the rock generated from a blast, as would be used to process rock generated by rock breaking. It would be likely that a drilling rig would recommence drilling blast holes for the next blast as soon one blast finished. Rock blasting will be undertaken in line with the Safety and Health Commission for the Mining and other Extractive Industries report on *Guidance on the Safe*

Use of Explosives in Quarries to ensure the safe use of explosives on-site. Only authorised people will handle explosives for rock blasting at the site. Given the small quantities of explosives to be used on site, it is considered that there is negligible risk of a major accident occurring from the use of explosives on site. The potential impacts associated with noise are assessed in Chapter 10 Noise.

4.3.6 Peat and Spoil Management Plan

4.3.6.1 Quantities

The quantity of peat and non-peat material (spoil), requiring management on the site of the Proposed Development has been calculated, as presented in Table 4-1 below. These quantities were calculated by FT) as part of the *Peat and Spoil Management Plan* in Appendix 4-2 of this EIAR.

Table 4-1 Peat and Spoil Volumes requiring management

Development Component	Area (m2) (approx.)	Peat Volume (m^3) (approx.)	Spoil Volume(m3) (approx.)
Turbine Delivery Route (TDR) plus Site Entrance works	Widening of existing access road to 5m running surface. Construction of new 5m access road. Widening of existing entrance and construction of temporary track from N22..	17,000	2,200
Access road for 33kV cabling	Assumed 3m (33kV) and 2.5m (110kV) running surface with 4-5m wide development footprint.	18,000	6,000
Access road for 110kV cabling		10,500	2,500
Substation Platform	130 x 65m hardstanding area	19,000	12,000
Proposed Borrow Pit	1 no. borrow pit at substation.	3,500	4,800
Extension to permitted borrow pit	120m x 85m footprint	1,000	2,000
Total		**69,000**	**29,500**
Total Peat & Spoil to be managed		**98,500**	

Note: A bulking factor of 10% has been applied to the excavated peat and spoil volumes to allow for expected increase in volume upon excavation and to allow for a variation in ground conditions across the site.

It should be noted that the excavated rock volume is not included in the total volume quoted above in Table 4-1 above. It is assumed that the excavated rock volume will be re-used on site as part of the construction works for the development and hence will not require reinstatement on site.

4.3.6.2 Peat and Spoil Usage in Restoration of Borrow Pits

Once excavated, peat will be temporarily stored in localised areas adjacent to excavations for roads before being placed into the permanent peat storage areas within the borrow pits or reused for landscaping purposes. All excavated peat along the proposed 33kV underground cabling route will be temporarily placed/spread alongside the proposed access road, where possible, and then reused as landscaping on either side of the proposed road. All temporary storage areas will be upslope of founded roads/hardstand areas and will be inspected by a suitably qualified person before material is stored in the area.

Once the required volume of rock has been extracted from the borrow pit area, it is intended to reinstate this area with any surplus peat and overburden excavated from the works areas of the Proposed Development.

The general construction methodology for the construction of the borrow pit, as presented in FTs *Peat & Spoil Management Plan* in Appendix 4-2 of this EIAR, is summarised below. This methodology includes procedures that are to be included in the construction to minimise any adverse impact on peat stability.

As rock is being extracted from the borrow pit, upstands of rock will be left in place, depending on the type of rock, to act as intermediate retaining buttresses. Where this is not achievable, stone buttresses will be constructed within the borrow pit. The upstands or buttresses will form individual restoration areas within the borrow pit which will be filled once the required volume of rock has been extracted from each individual area. The buttresses will be wide enough to allow construction traffic access for the tipping of peat and spoil into the individual cells.

The placement of peat and spoil within the borrow pit will likely require the use of long reach excavators, low ground pressure machinery and possibly bog mats in particular for drainage works.

The following particular recommendations/best practice guidelines for the placement of peat & in the borrow pit should be considered and taken into account during construction.

- The borrow pit will be an enclosed depression and drainage from this area will be managed effectively using temporary pumping arrangements and settlement ponds.
- Where possible, the surface of the placed peat & spoil should be shaped to allow efficient run-off of surface water from borrow pit area.
- Silting ponds (settlement ponds) may be required at the lower side/outfall location of the borrow pit.
- The settlement ponds at the borrow pit will be designed to allow 24hr retention.
- A layer of geogrid to strengthen the surface of the placed peat & spoil within the borrow pit may be required.
- Infilling of the peat & spoil should commence at the back edge of the borrow pit and progress towards the borrow pit entrance/rock buttress. The contractor excavating the rock will be required to develop the borrow pits in a way which will allow the excavated peat & spoil to be placed safely.
- The height of the rock buttresses constructed should be greater than the height of the placed peat & spoil to prevent any surface peat & spoil run-off. Buttresses up to 5m in height are likely to be required.

4.3.6.2.1 Placement of Peat & Spoil alongside Proposed Infrastructure Elements

In some areas of the site of the Proposed Development excavated materials will be placed alongside the proposed infrastructure elements. The following recommendations/best practice guidelines for the placement of peat and spoil alongside the proposed infrastructure elements will be adhered to during the construction of the Proposed Development:

1. *All excavated peat along the proposed 33kV underground cabling route will be temporarily placed/spread alongside the proposed access road, where possible, and then reused as landscaping on either side of the proposed road.*

2. *The placement of excavated peat should be restricted to areas where the peat depth is less than 2m.*

3. *The peat placed adjacent to the proposed infrastructure elements should be restricted to a maximum height of 1m over a up to 10m wide corridor on the upslope side of the proposed infrastructure elements. It should be noted that the designer should define/confirm the maximum restricted height for the placed peat and spoil.*

4. *The placement of excavated peat is to be avoided without first establishing the adequacy of the ground to support the load. The placement of peat within the placement areas will likely require the use of long reach excavators, low ground pressure machinery and possibly bog mats.*

5. *Where there is any doubt as to the stability of the peat surface then no material shall be placed on to the peat surface. The risk of peat instability is reduced by not placing any loading onto the peat surface.*

6. *Where practical, it should be ensured that the surface of the placed peat and spoil is shaped to allow efficient run-off of surface water. Where possible, shaping of the surface of the peat and spoil should be carried out as placement of peat and spoil within the placement area progresses. This will reduce the likelihood of debris run-off and ensure stability of the placed peat and spoil.*

7. *Finished/shaped side slopes in the placed peat and spoil shall be not greater than 1 (v): 2 or 3 (h). This slope inclination will be reviewed during construction, as appropriate. Where areas of weaker peat and spoil are encountered then slacker slopes will be required.*

8. *Where possible, the acrotelm shall be placed with the vegetation part of the sod facing the right way up to encourage growth of plants and vegetation at the surface of the placed peat and spoil within the placement areas.*

9. *Movement monitoring instrumentation may be required adjacent to the access road where peat has been placed. The locations where monitoring is required will be identified by the designer on site.*

10. *Supervision by a geotechnical engineer or appropriately competent person is recommended for the works.*

11. *An interceptor drain will be installed upslope of the designated peat placement areas to divert any surface water away from these areas. This will help ensure stability of the placed peat and reduce the likelihood of debris run-off.*

12. *All the above mentioned general guidelines and requirements should be confirmed by the designer prior to construction.*

The management of excavated peat and overburden and the methods of placement and/or reinstatement are described in detail in FT's *Peat and Spoil Management Plan* in Appendix 4-2 of this EIAR.

4.3.7 Tree Felling

4.3.7.1 Tree Felling

Some of the Proposed Development site is located on commercial forestry. As part of the Proposed Development, tree felling will be required within and around the development footprint to allow the construction of the underground cabling, substation, borrow pit and the other ancillary infrastructure. It should be noted that forestry on the site of the Proposed Development was originally planted as a commercial crop and will be felled in the future should the Proposed Development proceed or not.

A total of 21.7 hectares of forestry will be permanently felled within and around the footprint of the Proposed Development. Figure 4-12 shows the extent of the areas to be permanently felled as part of the Proposed Development.

The tree felling activities required as part of the Proposed Development will be the subject of a Limited Felling Licence (LFL) application to the Forest Service, as per the Forest Service's policy on granting felling licenses for wind farm developments. The policy requires that a copy of the planning permission for the Proposed Development be submitted with the felling licence application; therefore the felling licence cannot be applied for until such time as planning permission is obtained for the Proposed Development.

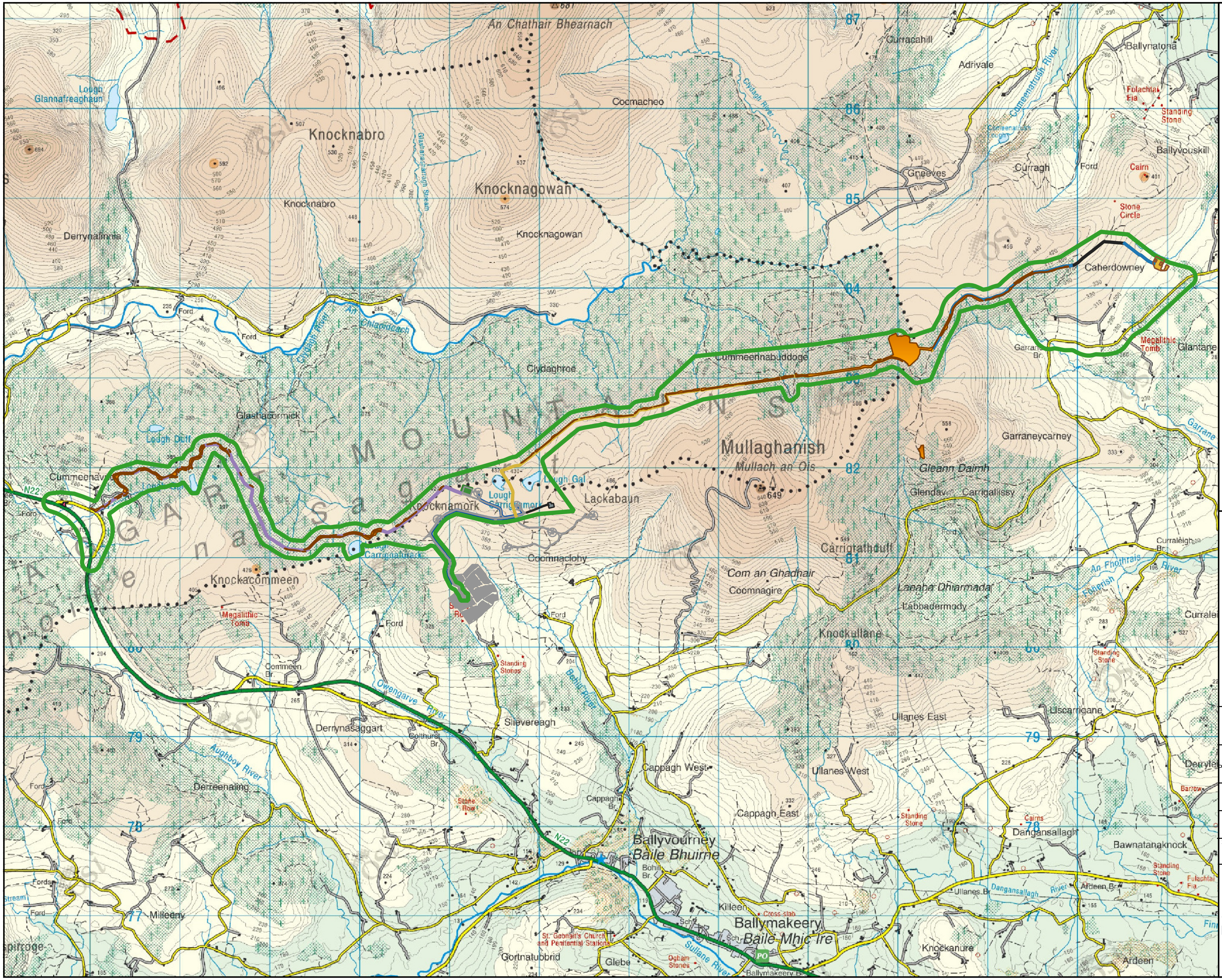
4.3.7.2 Forestry Replanting

In line with the Forest Service's published policy on granting felling licences for wind farm developments, areas cleared of forestry for access roads, and any other wind farm-related uses will have to be replaced by replanting at an alternative site or sites. The Forest Service policy requires replacement or replanting on a hectare for hectare basis for the footprint of the infrastructure developments.

The estimated 21.7 hectares that will be permanently felled for the footprint of the Proposed Development infrastructure will be replaced or replanted on a hectare for hectare basis as a condition of any felling licence that will be issued in respect of the Proposed Development. Replanting is a requirement of the Forestry Act and is primarily a matter for the statutory licensing processes that are under the control of the Forest service.

The replacement of the 21.7 hectares of forestry can occur anywhere in the State subject to licence. The replacement of forestry, felled as part of the Proposed Development, may occur on any lands, within the state, benefitting from Forest Service Technical Approval[1] for afforestation, should the Proposed Development receive planning permission. Under the Forestry Regulations 2017, all applications for licences for afforestation require the prior written approval (technical approval) of the Minister for Agriculture, Food and the Marine. Before the Minister can grant approval, he/she must first determine if the project is likely to have significant effects on the environment (for EIA purposes) and assess if the development, individually or in combination with other plans or projects is likely to have a significant effect on a European site (for Habitats purposes).

[1] *All proposed forestry developments where the area involved is greater than 0.1 hectare must receive the prior written approval of the Forest Service. The application for approval is known as Pre-Planting Approval – Form 1.*



Map Legend

- EIAR Study Boundary
- Proposed Felling Area
- Access Road (Upgrade & New)
- Temp Road
- 33kV Underground Cabling and Access Roads
- 33kV Underground Cabling in the Permitted Development
- 110kV Underground Cabling
- 110kV Cabling and Access Road
- Ballyvouskill 220kV Substation
- Proposed 110kV Substation Location
- Proposed Borrow Pit
- Permitted Borrow Pit Extension
- Omitted 38kV Electrical Substation and Battery Compound

N

Drawing Title

Proposed Felling Area

Project Title

Proposed Substation, Underground Cabling & Access Roads to Knocknamork Renewable Energy Development

Drawn By	Checked By
NMcH	EOS
Project No.	Drawing No.
210732	Figure 4-12
Scale	Date
1:55000	2022-07-25

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: www.mkoireland.ie

4.3.8 Habitat Enhancement Areas

A short section of the proposed 110kV underground electrical cable is located in a highly disturbed area of peatland habitat. The proposed 110kV underground electrical cable will be located immediately adjacent to an existing track and will follow disturbed ground along its edge and will closely follow degraded habitats that lie adjacent to the existing cable and the degraded peatland that surrounds it. The works will be located within these peatland habitats for a distance of approximately 600m and will involve the disturbance of a strip of habitat approximately 5 metres in width. Whilst the peatlands will be replaced following the works, this has the potential to result in the further degradation of approximately 2,950m^2 of degraded wet heath and upland blanket bog habitat. In acknowledgement of the potential degradation of the habitat, the enhancement of 5,900m^2 of peatland habitat is proposed by felling coniferous forestry that was planted on peatland habitats. This will ensure that there is no potential for net loss of degraded Annex I habitat and will result in an overall net gain in peatland habitat area resulting from the proposed works.

It is proposed to fell and remove approximately 0.6 hectares of non-Annex I Sitka spruce (*P. sitchensis)* dominated conifer plantation that is located on a peat substrate. The removal of conifer trees will enable the reversion of the area back to Annex I Wet Heath over time. In its current state, lands within the proposed compensation site are classified as conifer plantation.

Management prescriptions to be implemented by the applicant include:

- Trees shall be removed from the enhancement area along with all brash.
- Dry forestry drains located within the area will be blocked to assist in restoring peatland hydrological conditions.
- All areas of restored vegetation will be monitored post-restoration. Monitoring results will be reported within an Annual Environmental Report with any criteria failures identified and corrective actions implemented.
- Following the felling of the trees and blocking of the forestry drains, permanent vegetation monitoring plots will be established within the enhancement area. The monitoring plot locations will be selected using stratified random sampling. This will allow the monitoring plots to be representative of microtopography and vegetation cover.
- Monitoring plots will be surveyed and classified using the relevé method as per the National Survey of Upland Habitats (Perrin et al., 2014) with plot sizes being 2m x 2m. Biotic and abiotic parameters that form baseline indicators of ecological and hydrological condition of the bog will be recorded.
- Monitoring plots will be marked out permanently using fencing posts and their location recorded using GIS. The number of monitoring plots will be determined by the level of plant community heterogeneity identified during the baseline survey. However, it is envisaged that a minimum of three 2m x 2m monitoring plots will be established across the enhancement area.
- Vegetation monitoring will be carried out in years 1, 3, 5 and 10 after restoration. Results will be analysed and a report of the findings will be produced. The enhancement plan will be regularly updated and amended where necessary to improve the efficacy of the enhancement work.

Full details of the peatland enhancement proposals are provided in Section 6.7.3.1 of Chapter 6 Biodiversity.

4.3.9 Site Activities

4.3.9.1 Environmental Management

All proposed activities on the site of the Proposed Development will be provided for in an environmental management plan. A Construction and Environmental Management Plan (CEMP) has been prepared for the Proposed Development and is included in Appendix 4-3 of this EIAR. The CEMP includes details of drainage, peat and overburden management and waste management and outlines clearly the mitigation measures and monitoring proposals that are required to be adhered to in order to complete the works in an appropriate manner . In the event that planning permission is granted for the Proposed Development, the CEMP will be updated prior to the commencement of the development, to address the requirements of any relevant planning conditions, including any additional mitigation measures which are conditioned and will be submitted to the Planning Authority for approval.

4.3.9.2 Refuelling

Wherever possible, vehicles will be refuelled off-site. This will be the case for regular, road-going vehicles. However, for construction machinery that will be based on-site continuously, a limited amount of fuel will have to be stored on site in designated areas and bunded appropriately.

On-site refuelling of machinery will be carried out at dedicated refuelling locations using a mobile double skinned fuel bowser. The fuel bowser, a double-axle custom-built refuelling trailer will be re-filled off site and will be towed around the site by a 4x4 jeep to where machinery is located. It is not practical for all vehicles to travel back to a single refuelling point, given the size of the cranes, excavators, etc. that will be used during the construction of the Proposed Development. The 4x4 jeep will also carry fuel absorbent material and pads in the event of any accidental spillages. The fuel bowser will be parked on the level substation platform when not in use.

Only designated trained and competent operatives will be authorised to refuel plant on site. Mobile measures such as drip trays, spill kits and fuel absorbent mats will be available if necessary, during all refuelling operations.

4.3.9.3 Concrete Deliveries

Only ready-mixed concrete will be used during the construction phase, with all concrete being delivered from local batching plants in sealed concrete delivery trucks.

The use of ready-mixed concrete deliveries will eliminate any potential environmental risks of on-site batching. When concrete is delivered to site, only the chute of the delivery truck will be cleaned, using the smallest volume of water necessary, before leaving the site. Concrete trucks will be washed out fully at the batching plant, where facilities are already in place.

The small volume of water that will be generated from washing of the concrete lorry's chute will be directed into a temporary lined impermeable containment area. Where temporary lined impermeable containment areas are used, such containment areas are typically built using straw bales and lined with an impermeable membrane. Two examples are shown in Plate 4-3 and Plate 4-4 below.

The areas are generally covered when not in use to prevent rainwater collecting. In periods of dry weather, the areas can be uncovered to allow much of the water to be lost to evaporation. At the end of the concrete pours, any of the remaining liquid contents will be tankered off-site. Any solid contents that will have been cleaned down from the chute will have solidified and can be broken up and disposed of along with other construction waste.

Plate 4-1 Concrete washout area

Plate 4-2 Concrete washout area

Alternatively, a Siltbuster-type concrete wash unit or equivalent (https://www.siltbuster.co.uk/sb_prod/siltbuster-roadside-concrete-washout-rcw/) may be used. This type of Siltbuster unit catches the solid concrete and filters and holds wash liquid for pH adjustment and further solids separation. The residual liquids and solids can be disposed of off-site at an appropriate waste facility.

The risks of pollution arising from concrete deliveries will be further reduced by the following:

- Concrete trucks will not be washed out on the site but will be directed back to their batching plant for washout.
- Site roads will initially be constructed with a subgrade and compacted with the use of a roller to allow concrete delivery trucks access all areas where the concrete will be needed. The final wearing course for the site roads will not be provided until all bases have been poured. No concrete will be transported around the site in open trailers or dumpers so as to avoid spillage while in transport.
- The arrangements for concrete deliveries to the site will be discussed with suppliers before work starts, agreeing routes, prohibiting on-site washout and discussing emergency procedures.
- Clearly visible signage will be placed in prominent locations close to concrete pour areas specifically stating washout of concrete lorries is not permitted on the site.

4.3.9.4 Concrete Pouring

The concrete pours that will be required to construct the Proposed Development, will be planned days or weeks in advance. Special procedures will be adopted in advance of and during all concrete pours to minimise the risk of pollution. These may include:

- Using weather forecasting to assist in planning large concrete pours and avoiding large pours where prolonged periods of heavy rain is forecast.
- Restricting concrete pumps and machine buckets from slewing over watercourses while placing concrete.
- Ensuring that excavations are sufficiently dewatered before concreting begins and that dewatering continues while concrete sets.
- Ensuring that covers are available for freshly placed concrete to avoid the surface washing away in heavy rain.
- The small volume of water that will be generated from washing of the concrete lorry's chute will be directed into a temporary lined impermeable containment area, or a Siltbuster-type concrete wash unit (https://www.siltbuster.co.uk/sb_prod/siltbuster-roadside-concrete-washout-rcw/) or equivalent.
- Disposing of surplus concrete after completion of a pour in agreed suitable locations away from any watercourse or sensitive habitats.

4.3.9.5 Dust Suppression

In periods of extended dry weather, dust suppression may be necessary along haul roads to ensure dust does not cause a nuisance. If necessary, water will be taken from stilling ponds in the site's drainage system and will be pumped into a bowser or water spreader to dampen down haul roads and site compounds to prevent the generation of dust. Silty or oily water will not be used for dust suppression, because this would transfer the pollutants to the haul roads and generate polluted runoff or more dust. Water bowser movements will be carefully monitored, as the application of too much water may lead to increased runoff.

4.3.9.6 Vehicle Washing

Wheels or vehicle underbodies are often washed before leaving sites to prevent the build-up of mud on public (and site) roads. It is not anticipated that vehicle or wheel washing facilities will be required as part of the construction phase of the Proposed Development because site roads will be formed using on-site materials before other road-going trucks begin to make regular or frequent deliveries to the site (e.g. with steel or concrete). The site roads will be well finished with compacted hardcore, and so the public road-going vehicles will not be travelling over soft or muddy ground where they might pick up mud or dirt.

A road sweeper will be available if any section of the public roads requires cleaning due to construction traffic associated with the Proposed Development.

4.3.9.7 Waste Management

The CEMP, Appendix 4-3 of this EIAR, provides a waste management plan (WMP) which outlines the best practice procedures during the construction phase of the project. The WMP outlines the methods of waste prevention and minimisation by recycling, recovery and reuse at each stage of construction of the Proposed Development. Disposal of waste will be a last resort.

The Waste Management Act 1996 and its subsequent amendments provide for measures to improve performance in relation to waste management, recycling and recovery. The Act also provides a regulatory framework for meeting higher environmental standards set out by other national and EU legislation.

The Act requires that any waste related activity must have all necessary licenses and authorisations. It will be the duty of the Waste Manager on the site of the development to ensure that all contractors hired to remove waste from the site have valid Waste Collection Permits to ensure that the waste is delivered to a licensed or permitted waste facility. The hired waste contractors and subsequent receiving facilities must adhere to the conditions set out in their respective permits and authorisations.

Prior to the commencement of the development, a Construction Waste Manager will be appointed by the Contractor. The Construction Waste Manager will be in charge of the implementation of the objectives of the plan, ensuring that all hired waste contractors have the necessary authorisations and that the waste management hierarchy is adhered to. The person nominated must have sufficient authority so that they can ensure everyone working on the development adheres to the management plan.

The WMP will provide systems that will enable all arisings, movements and treatments of construction waste to be recorded. This system will enable the contractor to measure and record the quantity of waste being generated. It will highlight the areas from which most waste occurs and allows the measurement of arisings against performance targets. The WMP can then be adapted with changes that are seen through record keeping.

4.4 Access and Transportation

4.4.1 Site Entrance

It is proposed to access the site of the Proposed Development via an existing access track off the remaining section of the old N22 alignment to the southwest of the site. This entrance will be widened to facilitate the delivery of the construction materials and turbine components to the Permitted Development. A temporary access road will also be required from the N22 to the old N22 alignment to facilitate the delivery of abnormally large wind turbine vehicle loads. The use of this temporary access road will be carefully managed and the route will be blocked with traffic bollards when not in use for turbine deliveries. It is also proposed that general HGV construction traffic will access the east of the site via the L5226 Local Road.

The site entrance to the southwest of the site was subject to Autotrack assessment to identify the turning area required, as described in Section 14.1 of the Traffic and Transport Assessment. Appropriate sightlines will be established to the north and south of the proposed site entrance for the safe egress of traffic. The Proposed Development will result in a permanent upgrade of this current site access road from the old N22 road, which will also form the entrance to the Permitted Development during the operational phase.

The locations of the site access is shown on the site layout drawing in Figure 4-1 A Traffic Management Plan is included in Chapter 13 Material Assets and the CEMP in Appendix 4-3 of this EIAR. In the event planning permission is granted for the Proposed Development, the final Traffic Management Plan will address the requirements of any relevant planning conditions, including any additional mitigation measures which are conditioned.

4.5 Site Drainage

4.5.1 Introduction

The drainage design for the Proposed Development has been prepared by Hydro Environmental Services Ltd. (HES). The drainage design has been prepared based on experience of the project team of other wind farm sites in peat-dominated environments, and the number of best practice guidance documents referred to in the References section of the EIAR.

The protection of the watercourses within and surrounding the site, and downstream catchments that they feed is of utmost importance in considering the most appropriate drainage proposals for the site of the Proposed Development. The Proposed Development's drainage design has therefore been proposed specifically with the intention of having no negative impact on the water quality of the site and its associated rivers and lakes, and consequently no impact on downstream catchments and ecological ecosystems. No routes of any natural drainage features will be altered as part of the Proposed Development. There will be no direct discharges to any natural watercourses, with all drainage waters being dispersed as overland flows. All discharges from the proposed works areas will be made over vegetation filters at an appropriate distance from natural watercourses. Buffer zones around the existing natural drainage features have been used to inform the layout of the Proposed Development.

4.5.2 Existing Drainage Features

The routes of any natural drainage features will not be altered as part of the Proposed Development. There will be no direct discharges to natural watercourses. All discharges from the proposed works areas or from interceptor drains will be made over vegetated ground at an appropriate distance from natural watercourse and lakes. Buffer zones around the existing natural drainage features have informed the layout of the Proposed Development and are indicated on the drainage design drawings.

Where artificial drains are currently in place in the vicinity of proposed works areas, these drains may have to be diverted around the proposed works areas to minimise the amount of water in the vicinity of works areas. Where it may not be possible to divert artificial drains around proposed work areas, the drains will be blocked to ensure sediment laden water from the works areas has no direct route to other watercourses. Where drains have to be blocked, the blocking will only take place after an alternative drainage system to handle the same water has been put in place.

Existing artificial drains in the vicinity of existing site roads will be maintained in their present location where possible. If it is expected that these artificial drains will receive drainage water from works areas, check dams will be added (as specified below) to control flows and sediment loads in these existing artificial drains. If road widening or improvement works are necessary along the existing roads, where possible, the works will take place on the opposite side of the road to the drain.

4.5.3 Drainage Design Principles

The key principles of drainage design that will be implemented and adhered to as part of the Proposed Development are as follows:

- Keep clean water clean by intercepting it where possible, upgradient of works areas, and divert it around the works areas for discharge as diffuse overland flow or for rewetting of land.
- Collect potentially silt-laden runoff from works areas via downgradient collector drains and manage via series of avoidance, source, in-line, treatment and outfall controls prior to controlled diffuse release as overland flow or for rewetting of land.
- No direct hydraulic connectivity from construction areas to watercourses, or drains connecting to watercourses.
- No alteration of natural watercourses.
- Maintain the existing hydrology of the site.
- Blocking of existing manmade forestry drainage as appropriate.
- Daily inspection and recording of surface water management system by on-site clerk of works and immediate remedial measures to be carried out as required and works temporarily ceased if a retained stormwater/sediment load is identified to have the potential to migrate from the site.
- Use of siltbuster if required.

Drainage water from any works areas of the site of the Proposed Development will not be directed to any natural watercourses within the site. Two distinct methods will be employed to manage drainage water within the site. The first method involves keeping clean water clean by avoiding disturbance to natural drainage features, minimising any works in or around artificial drainage features, and diverting clean surface water flow around excavations and construction areas. The second method involves collecting any drainage waters from works areas within the site that might carry silt or sediment, to allow attenuation and settlement prior to controlled diffuse release.

The drainage design is intended to maximise erosion control, which is more effective than having to control sediment during high rainfall. Such a system also requires less maintenance. The area of exposed ground will be minimised. The drainage measures will prevent runoff from entering the works areas of the site from adjacent ground, to minimise the volume of sediment-laden water that has to be managed. Discoloured run-off from any construction area will be isolated from natural clean run-off.

A schematic line drawing of the proposed drainage design is presented in Figure 4-13 below.

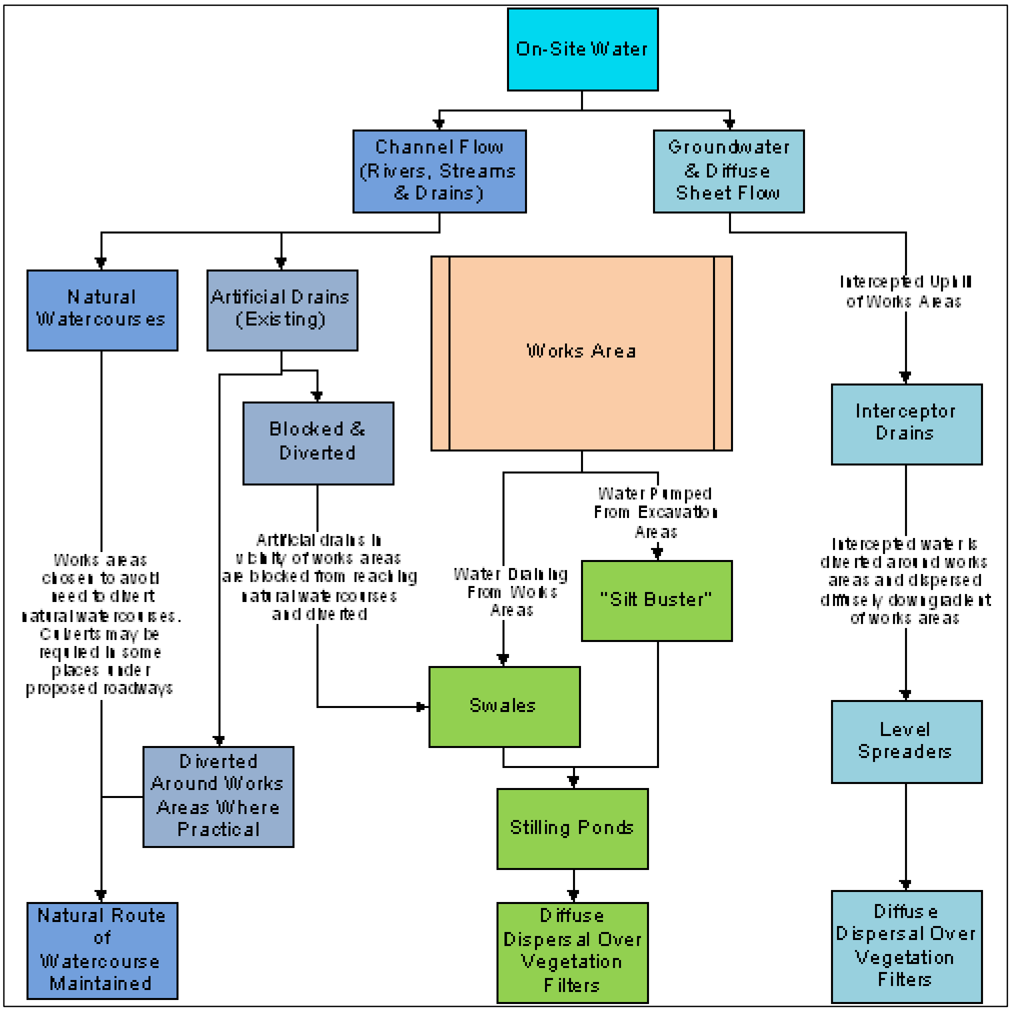


Figure 4-13 Proposed Development Drainage Process Flow

4.5.4 Drainage Design

A drainage design for the Proposed Development, incorporating all principles and measures outlined in this drainage design description, has been prepared, and is included in Appendix 4-4 to this EIAR. The drainage design employs the various measures further described below and is cognisant of the following guidance documents:

- Forestry Commission (2004): Forests and Water Guidelines, Fourth Edition. Publ. Forestry Commission, Edinburgh;
- Coillte (2009): Forest Operations & Water Protection Guidelines;
- Forest Services (Draft) Forestry and Freshwater Pearl Mussel Requirements – Site Assessment and Mitigation Measures;
- Forest Service (2000): Forestry and Water Quality Guidelines. Forest Service, DAF, Johnstown Castle Estate, Co. Wexford;
- COFORD (2004): Forest Road Manual – Guidelines for the Design, Construction and Management of Forest Roads;
- Inland Fisheries Ireland (2016): Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Watercourses;
- Good Practice During Wind Farm Construction (Scottish Natural Heritage, 2010);
- PPG1 - General Guide to Prevention of Pollution (UK Guidance Note);
- PPG5 – Works or Maintenance in or Near Watercourses (UK Guidance Note);

- CIRIA (Construction Industry Research and Information Association) 2006: Guidance on 'Control of Water Pollution from Linear Construction Projects' (CIRIA Report No. C648, 2006); and,
- CIRIA 2006: Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors. CIRIA C532. London, 2006.

4.5.4.1 Interceptor Drains

Interceptor drains will be installed upgradient of any works areas to collect surface flow runoff and prevent it reaching excavations and construction areas of the site where it might otherwise have come into contact with exposed surfaces and picked up silt and sediment. The drains will be used to divert upslope runoff around the works area to a location where it can be redistributed over the ground surface as sheet flow. This will minimise the volume of potentially silty runoff to be managed within the construction area.

The interceptor drains will be installed in advance of any main construction works commencing. The material excavated to make the drain will be compacted on the downslope edge of the drain to form a diversion dike. On completion of the construction phase works, it is envisaged that the majority of the interceptor drains could be removed. At that stage, there will be no open excavations or large areas of exposed ground that are likely to give rise to large volumes of potentially silt-laden run off. Any areas in which works were carried out to construct roads, substations, will have been built up with large grade hardcore, which even when compacted in place, will retain sufficient void space to allow water infiltrate the subsurface of these constructed areas. It is not anticipated that roadways or other installed site infrastructure will intercept ground-conveyed surface water runoff to any significant extent that would result in scouring or over-topping or spill over. Where the drains are to be removed, they will be backfilled with the material from the diversion dike. Interceptor drains may have to be retained in certain locations, for example where roadways are to be installed on slopes, to prevent the roadways acting of conduits for water that might infiltrate the roadway sub-base. In these cases, interceptor drains would be maintained in localised areas along the roadway with culverts under the roadway, which would allow the intercepted water to be discharged to vegetation filters downgradient of the roadway. Similarly, in localised hollows where water is likely to be funnelled at greater concentrations than on broader slopes, interceptor drains and culverts may be left in situ following construction. Figure 4-14 below shows an illustrative drawing of an interceptor drain.

The velocity of flow in the interceptor will be controlled by check dams (see Section 4.5.4.3 below), which will be installed at regular intervals along the drains to ensure flow in the channel is non-erosive. On steeper sections where erosion risks are greater, a geotextile membrane will be added to the channel.

Interceptor drains will be installed horizontally across slopes to run in parallel with the natural contour line of the slope. Intercepted water will travel along the interceptor drains to areas downgradient of works areas, where the drain will terminate at a level spreader (see Section 4.6.4.4 below). Across the entire length of the interceptor drains, the design elevation of the water surface along the route of the drains will not be lower than the design elevation of the water surface in the outlet at the level spreader.

4.5.4.2 Swales

Drainage swales are shallow drains that will be used to intercept and collect run off from construction areas of the site during the construction phase. Drainage swales will remain in place to collect runoff from roads and hardstanding areas of the Proposed Development during the operational phase. A swale is an excavated drainage channel located along the downgradient perimeter of construction areas, used to collect and carry any sediment-laden runoff to a sediment-trapping facility and stabilised outlet. Swales are proven to be most effective when a dike is installed on the downhill side. They are similar in design to interceptor drains and collector drains described above. Figure 4-14 below, shows an illustrative example of a drainage swale.

Drainage swales will be installed downgradient of any works areas to collect surface flow runoff where it might have come into contact with exposed surfaces and picked up silt and sediment. Swales will intercept the potentially silt-laden water from the excavations and construction areas of the site and prevent it reaching natural watercourses.

Drainage swales will be installed in advance of any main construction works commencing. The material excavated to make the swale will be compacted on the downslope edge of the drain to form a diversion dike.

4.5.4.3 Check Dams

The velocity of flow in the interceptor drains and drainage swales, particularly on sloped sections of the channel, will be controlled by check dams, which will be installed at regular intervals along the drains to ensure flow in the swale is non-erosive.

Check dams will restrict flow velocity, minimise channel erosion and promote sedimentation behind the dam. The check dams will be installed as the interceptor drains are being excavated. Check dams may also be installed in some of the existing artificial drainage channels on the site, downstream of where drainage swales connect in.

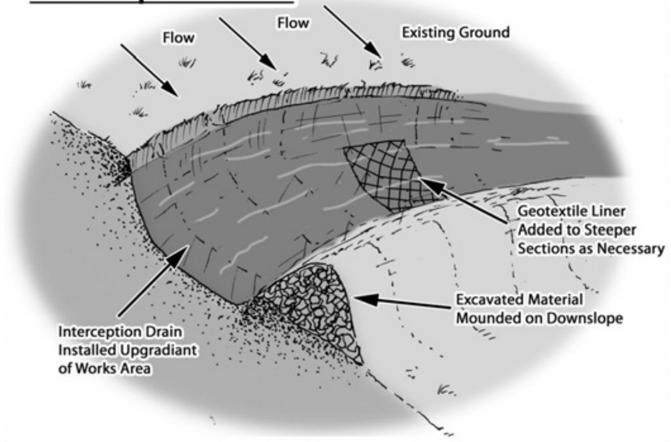
The proposed check dams will be made up of straw bales or stone, or a combination of both depending on the size of the drainage swale it is being installed in. Where straw bales are to be used, they will be secured to the bottom of the drainage swale with stakes. Clean 4-6 inch stone will be built up on either side and over the straw bale to a maximum height of 600mm over the bottom of the interceptor drain. In smaller channels, a stone check dam will be installed and pressed down into place in the bottom of the drainage swale with the bucket of an excavator. Figure 4-14, below, shows illustrative examples of check dams.

The check dams will be installed at regular intervals along the interceptor drains to ensure the bottom elevation of the upper check dam is at the same level as the top elevation of the next down-gradient check dam in the drain. The centre of the check dam will be approximately 150mm lower than the edges to allow excess water to overtop the dam in flood conditions rather than cause upstream flooding or scouring around the dams.

Check dams will not be used in any natural watercourses, only artificial drainage channels and interceptor drains. The check dams will be left in place at the end of the construction phase to limit erosive linear flow in the drainage swales during extreme rainfall events.

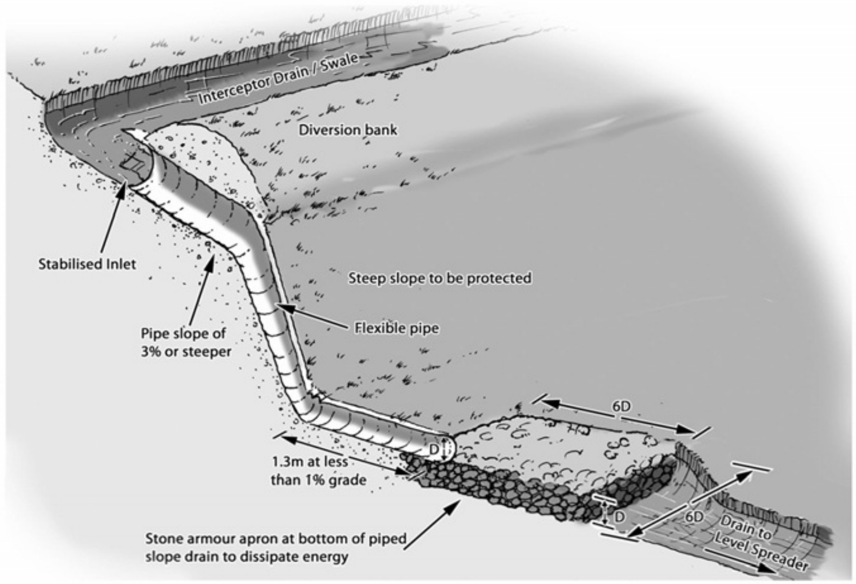
Check dams are designed to reduce velocity and control erosion and are not specifically designed or intended to trap sediment, although sediment is likely to build up. If necessary, any excess sediment build up behind the dams will be removed. For this reason, check dams will be inspected and maintained regularly to insure adequate performance. Maintenance checks will also ensure the centre elevation of the dam remains lower than the sides of the dam.

Interceptor Drain

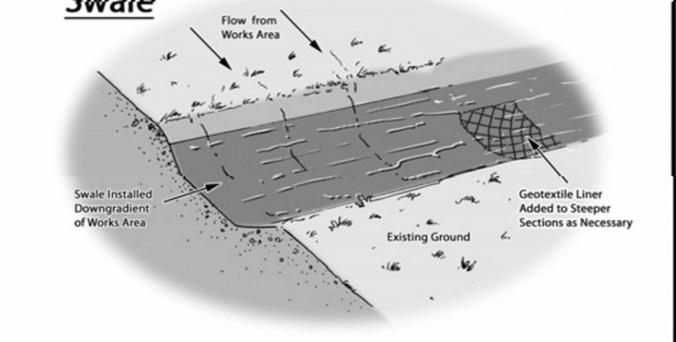


Check Dam (Stone Dam in Drain)

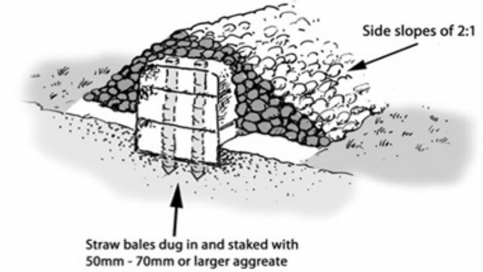
Slope Pipe Drain



Swale

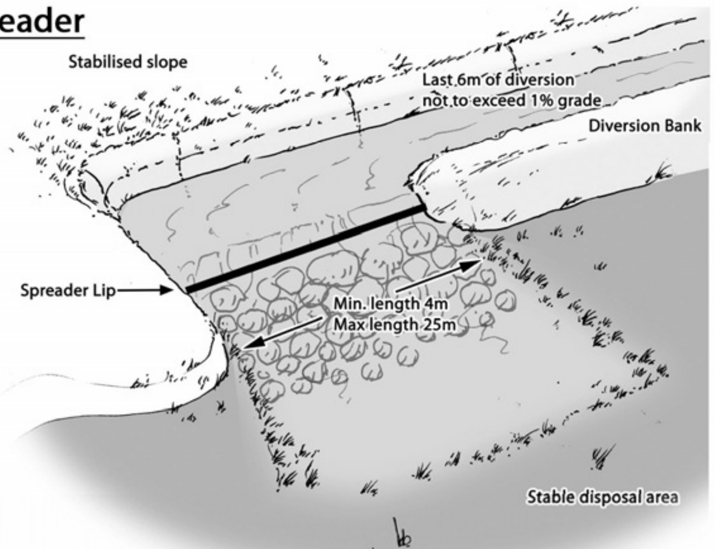


Check Dam
(Straw Bale & Stone Dam - Cross Section)

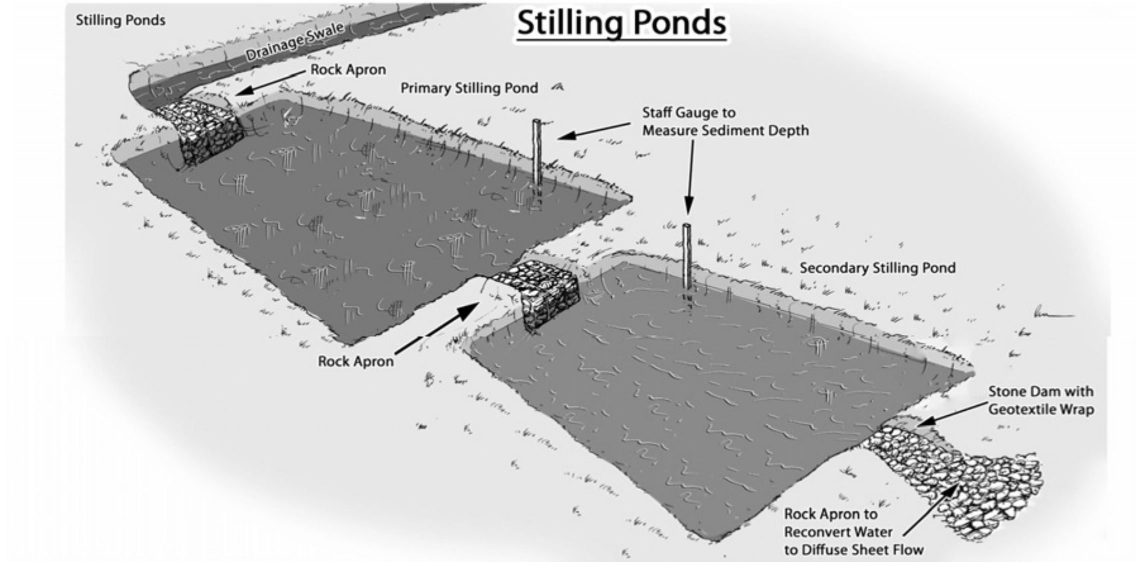


Drainage Design Measures

Level Spreader



Stilling Ponds



Drawing Title	Drainage Design Measures	Drawing No.	Figure 4-14	Scale	NTS
Project Title	Proposed Substation, Underground Cabling & Access Roads to Knocknamork Renewable Energy Development			Date	25.07.2022
Drawn By	NMcH	Checked By	EOS	Project No.	210732

MKO Planning and Environmental Consultants Tuam Road, Galway Ireland, H91 VW84 +353 (0) 91 735611 email:info@mkoireland.ie Website: www.mkoireland.ie

4.5.4.4 Level Spreaders

A level spreader will be constructed at the end of each interceptor drain to convert concentrated flows in the drain, into diffuse sheet flow on areas of vegetated ground. The levels spreaders will be located downgradient of any proposed works areas in locations where they are not likely to contribute further to water ingress to construction areas of the site.

The water carried in interceptor drains will not have come in contact with works areas of the site, and therefore should be free of silt and sediment. The level spreaders will distribute clean drainage water onto vegetated areas where the water will not be reconcentrated into a flow channel immediately below the point of discharge. The discharge point will be on level or only very gently sloping ground rather than on a steep slope so as to prevent erosion. Figure 4-14, above, shows an illustrative example of a level spreader.

The slope in the channel leading into the spreader will be less than or equal to 1%. The slope downgradient of the spreader onto which the water will dissipate will have a grade of less than 6%. The availability of slopes with a grade of 6% or less will determine the locations of level spreaders. If a slope grade of less than 6% is not available in the immediate area downgradient of a works area at the end of a diversion drain, a piped slope drain (see Section 4.5.4.5 below) will be used to transfer the water to a suitable location.

The spreader lip over which the water will spill will be made of a concrete kerb, wooden board, pipe, or other similar piece of material that can create a level edge similar in effect to a weir. The spreader will be level across the top and bottom to prevent channelised flow leaving the spreader or ponding occurring behind the spreader. The top of the spreader lip will be 150mm above the ground behind it. The length of the spreader will be a minimum of four metres and a maximum length of 25 metres, with the actual length of each spreader to be determined by the size of the contributing catchment, slope and ground conditions.

Clean four-inch stone can be placed on the outside of the spreader lip and pressed into the ground mechanically to further dissipate the flow leaving the level spreader over a larger area.

4.5.4.5 Piped Slope Drains

Piped slope drains will be used to convey surface runoff from diversion drains safely down slopes to flat areas without causing erosion. Once the runoff reaches the flat areas it will be reconverted to diffuse sheet flow. Level spreaders will only be established on slopes of less than 6% in grade. Piped slope drains will be used to transfer water away from areas where slopes are too steep to use level spreaders.

The piped slope drains will be semi-rigid corrugated pipes with a stabilised entrance and a rock apron at the outlet to trap sediment and dissipate the energy of the water. The base of drains leading into the top of the piped slope drain will be compacted and concavely formed to channel the water into the corrugated pipe. The entrance at the top of the pipe will be stabilised with sandbags if necessary. The pipe will be anchored in place by staking at approximately 3-4 metre intervals or by weighing down with compacted soil. The bottom of the pipe will be placed on a slope with a grade of less than 1% for a length of 1.5 metres, before outflowing onto a rock apron.

The rock apron at the outlet will consist of 6-inch stone to a depth equal to the diameter of the pipe, a length six times the diameter of the pipe. The width of the rock apron will be three times the diameter of the pipe where the pipe opens onto the apron and will fan out to six times the diameter of the pipe over its length. Figure 4-14, above, shows a diagrammatic example of a piped slope drain and rock apron.

Piped slope drains will only remain in place for the duration of the construction phase of the Proposed Development. on completion of the works, the pipes and rock aprons will be removed and all channels backfilled with the material that was originally excavated from them.

Piped slope drains will be inspected weekly and following rainfall events. Inlet and outlets will be checked for sediment accumulation and blockages. Stake anchors or fill over the pipe will be checked for settlement, cracking and stability. Any seepage holes where pipe emerges from drain at the top of the pipe will be repaired promptly.

4.5.4.6 Vegetation Filters

Vegetation filters are the existing vegetated areas of land that will be used to accept surface water runoff from upgradient areas. The selection of suitable areas to use as vegetation filters will be determined by the size of the contributing catchment, slope and ground conditions.

Vegetation filters will carry outflow from the level spreaders as overland sheet flow, removing any suspended solids and discharging to the groundwater system by diffuse infiltration.

Vegetation filters will not be used in isolation for waters that are likely to have higher silt loadings. In such cases, silt-bearing water will already have passed through stilling ponds prior to diffuse discharge to the vegetation filters via a level spreader.

4.5.4.7 Stilling Ponds (Settlement Ponds)

Stilling ponds will be used to attenuate runoff from works areas of the site of the Proposed Development during the construction phase and will remain in place to handle runoff from roads and hardstanding areas of the Proposed Development during the operational phase. The purpose of the stilling ponds is to intercept runoff potentially laden with sediment and to reduce the amount of sediment leaving the disturbed area by reducing runoff velocity. Reducing runoff velocity will allow larger particles to settle out in the stilling ponds, before the run-off water is redistributed as diffuse sheet flow in filter strips downgradient of any works areas.

Stilling ponds will be excavated/constructed at each required location as two separate ponds in sequence, a primary pond and a secondary pond. The points at which water enters and exits the stilling ponds will be stabilised with rock aprons, which will trap sediment, dissipate the energy of the water flowing through the stilling pond system, and prevent erosion. The primary stilling pond will reduce the velocity of flows to less than 0.5 metres per second to allow settlement of silt to occur. Water will then pass from the primary pond to the secondary pond via another rock apron. The secondary stilling pond will reduce the velocity of flows to less than 0.3 metres per second. Water will flow out of the secondary stilling pond through a stone dam, partially wrapped in geo-textile membrane, which will control flow velocities and trap any sediment that has not settled out. Figure 4-14, above, shows an illustrative example of a stilling pond system.

Water will flow by gravity through the stilling pond system. The stilling ponds will be sized according to the size of the area they will be receiving water from, but will be sufficiently large to accommodate peak flows storm events. The stilling ponds will be dimensioned so that the length to width ratio will be greater than 2:1, where the length is the distance between the inlet and the outlet. Where ground conditions allow, stilling ponds will be constructed in a wedge shape, with the inlet located at the narrow end of the wedge. Each stilling pond will be a minimum of 1-1.5 metres in depth. Deeper ponds will be used to minimise the excavation area needed for the required volume.

The embankment that forms the sloped sides of the stilling ponds will be stabilised with vegetated turves, which will have been removed during the excavation of the stilling ponds area. All material excavated during pond construction will be used locally for landscaping and berm construction around these ponds.

Stilling ponds will be located towards the end of swales, close to where the water will be reconverted to diffuse sheet flow. Upon exiting the stilling pond system, water will be immediately reconverted to diffuse flow via a fan-shaped rock apron if there is adequate space and ground conditions allow. Otherwise, a swale will be used to carry water exiting the stilling pond system to a level spreader to reconvert the flow to diffuse sheet flow.

Stilling ponds will be inspected weekly and following rainfall events. Inlet and outlets will be checked for sediment accumulation and anything else that might interfere with flows.

4.5.4.8 Siltbuster

A "siltbuster" or similar equivalent piece of equipment will be available to filter any water pumped out of excavation areas if necessary, prior to its discharge to stilling ponds or swales.

Siltbusters are mobile silt traps that can remove fine particles from water using a proven technology and hydraulic design in a rugged unit. The mobile units are specifically designed for use on construction sites.

The unit stills the incoming water/solids mix and routes it upwards between a set of inclined plates for separation. Fine particles settle onto the plates and slide down to the base for collection, whilst treated water flows to an outlet weir after passing below a scum board to retain any floating material. The inclined plates dramatically increase the effective settling area of the unit giving it a very small footprint on site and making it highly mobile. Figure 4-15 below shows an illustrative diagram of the Siltbuster.

The Siltbuster units are now considered best practice for the management of dirty water pumped from construction sites. The UK Environment Agency and the Scottish Environmental Protection Agency have all recommended/specified the use of Siltbuster units on construction projects.

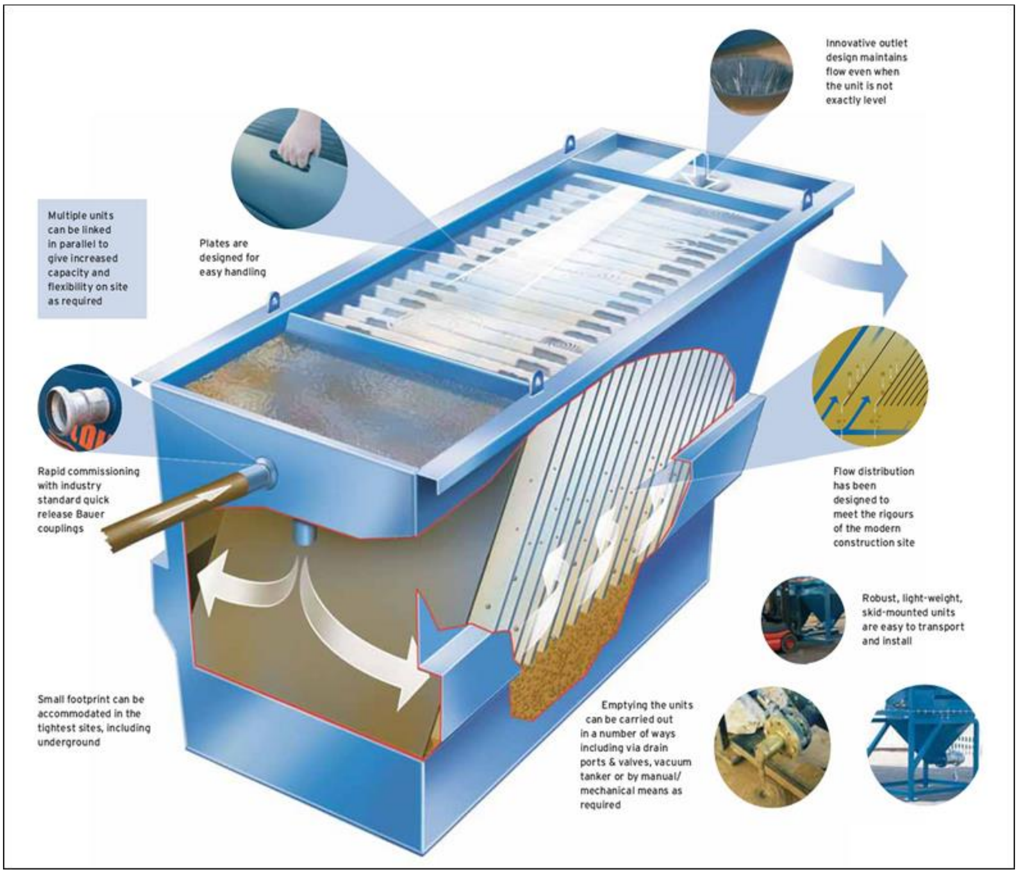


Figure 4-15 Siltbuster (Source: https://www.siltbuster.co.uk/sb_prod/siltbuster-fb50-settlement-unit/)

4.5.4.9 Silt Bags

Dewatering silt bags allow the flow of water through them while trapping any silt or sediment suspended in the water. The silt bags provide a passive non-mechanical method of removing any remaining silt contained in the potentially silt-laden water collected from works areas within the site.

Dewatering silt bags are an additional drainage measure that can be used downgradient of the stilling ponds at the end of the drainage swale channels and will be located, wherever it is deemed appropriate, throughout the site. The water will flow, via a pipe, from the stilling ponds into the silt bag. The silt bag will allow the water to flow through the geotextile fabric and will trap any of the finer silt and sediment remaining in the water after it has gone through the previous drainage measures. The dewatering silt bags will ensure that there will be no loss of peaty silt into the stream.

The dewatering silt bag that will be used will be approximately 3 metres in width by 4.5 metres (see Plate 4-3 and Plate 4-4 below) in length and will be capable of trapping approximately four tonnes of silt. The dewatering silt bag, when full, will be removed from site by a waste contractor with the necessary waste collection permit, who will then transport the silt bag to an appropriate, fully licensed waste facility.

Plate 4-3 Silt Bag with water being pumped through

Plate 4-4 Silt bag under inspection

4.5.4.10 Sedimats

Sediment entrapment mats, consisting of coir or jute matting, will be placed at the outlet of the silt bag to provide further treatment of the water outfall from the silt bag. Sedimats will be secured to the ground surface using stakes/pegs. The sedimat will extend to the full width of the outfall to ensure all water passes through this additional treatment measure.

4.5.4.11 Culverts

All new proposed culverts and proposed culvert upgrades will be suitably sized for the expected peak flows in the watercourse.

Some culverts may be installed to manage drainage waters from works areas of the Proposed Development, particularly where the waters have to be taken from one side of an existing roadway to the other for discharge. The size of culverts will be influenced by the depth of the track or road sub-base. In some cases, two or more smaller diameter culverts may be used where this depth is limited, though this will be avoided as they will have a higher associated risk of blockage than a single, larger pipe. In all cases, culverts will be oversized to allow mammals to pass through the culvert.

Culverts will be installed with a minimum internal gradient of 1% (1 in 100). Smaller culverts will have a smooth internal surface. Larger culverts may have corrugated surfaces which will trap silt and contribute to the stream ecosystem. Depending on the management of water on the downstream side of the culvert, large stone may be used to interrupt the flow of water. This will help dissipate its energy and help prevent problems of erosion. Smaller water crossings will simply consist of an appropriately sized pipe buried in the sub-base of the road at the necessary invert level to ensure ponding or pooling does not occur above or below the culvert and water can continue to flow as necessary.

All culverts will be inspected regularly to ensure they are not blocked by debris, vegetation or any other material that may impede conveyance.

4.5.4.12 Silt Fences

Silt fences will be installed as an additional water protection measure around existing watercourses in certain locations, particularly where works are proposed within the 50-metre buffer zone of a stream or 100m buffer zone of a lake, which is inevitable where existing roads in proximity to watercourses are to be upgraded as part of the Proposed Development. These areas include around existing culverts, around the headwaters of watercourses, and the proposed locations are indicated on the drainage design drawings included in Appendix 4-4.

Silt fences will be installed as single, double or a series of triple silt fences, depending on the space available and the anticipated sediment loading. The silt fence designs follow the technical guidance document '*Control of Water Pollution from Linear Construction Projects'* published by Construction Industry Research and Information Association (CIRIA, No. C648, 1996). Up to three silt fences may be deployed in series.

All silt fencing will be formed using Terrastop Premium or equivalent silt fence product.

Silt fences will be inspected regularly to ensure water is continuing to flow through the fabric, and the fence is not coming under strain from water backing up behind it.

4.5.4.13 Forestry Felling Drainage

Tree felling to facilitate the Proposed Development will not be undertaken simultaneously with construction groundworks. Felling to facilitate construction works will take place prior to groundworks commencing. A Harvest Management Plan is included in Appendix 4-5.

During tree felling there is a potential to generate peat particles and silts in surface water runoff due to tracking of machinery and disturbance of the peat surface etc, however mitigation is provided in Section 8.5.2.1 of Chapter 8 Hydrology and Hydrogeology with regard surface water quality protection for this activity which is summarised below. Also, prior to the commencement of tree felling for subsequent road construction the following key temporary drainage measures will be installed:

- All existing dry forestry drains that intercept the proposed works area will be temporarily blocked down-gradient of the works using forestry check dams/silt traps;
- Clean water interceptor drains will be installed upgradient of the works areas;
- Check dams/silt fence arrangements (silt traps) will be placed in all existing forestry drains that have surface water flows and also along existing forestry roadside drains; and,
- A double silt fence perimeter will be placed down-slope of works areas that are located inside the watercourse 50m buffer zone.

Before the commencement of any felling works, an Environmental Clerk of Works (ECoW) shall be appointed to oversee the felling works. The ECoW shall be experienced and competent, and shall have the following functions and operate their record using a Schedule of Works Operation Record (SOWOR), as proposed in the planning application:

- Attend the site for the setup period when drainage protection works are being installed and be present on site during the remainder of the forestry felling works.

- Prior to the commencement of works, review and agree the positioning by the Operator of the required Aquatic Buffer Zones (ABZs), silt traps, silt fencing (see below), water crossings and onsite storage facilities for fuel, oil and chemicals (see further below).
- Be responsible for preparing and delivering the Environmental Tool Box Talk (TBT) to all relevant parties involved in site operations, prior to the commencement of the works.
- Conduct daily and weekly inspections of all water protection measures and visually assess their integrity and effectiveness in accordance with Section 3.4 (Monitoring and Recording) and Appendix 3 (Site Monitoring Form (Visual Inspections)) of the Forestry & Freshwater Pearl Mussel Requirements.
- Take representative photographs showing the progress of operation onsite, and the integrity and effectiveness of the water protection measures.
- Collect water samples for analysis by a 3rd party accredited laboratory, adhering to the following requirements:
    - Surface water samples shall be collected upstream and downstream of the keyhole felling site at suitable sampling locations.
    - Sampling shall be taken from the stream / river bank, with no in-stream access permitted.
    - The following minimum analytical suite shall be used: pH, EC, TSS, BOD, Total P, Ortho-P, Total N, and Ammonia.
- Review of operator's records for plant inspections, evidence of contamination and leaks, and drainage checks made after extreme weather conditions.
- Prepare and maintain a contingency plan.
- Suspend work where potential risk to water from siltation and pollution is identified, or where operational methods and mitigation measures are not specified or agreed.
- Prepare and maintain a Water Protection Measure Register. This document is to be updated weekly by the ECoW.

All relevant measures set out in the *Forestry & Freshwater Pearl Mussel Requirements, Forestry & Water Quality Guidelines, Forest Harvesting & the Environment Guidelines and the Forest Protection Guidelines* will apply. To protect watercourses, the following measures will be adhered to during all keyhole/tree felling activities.

- Works will be overseen by an ECoW as described above.
- Machine combinations (i.e. handheld or mechanical) will be chosen which are most suitable for ground conditions and which will minimise soils disturbance;
- Checking and maintenance of roads and culverts will be on-going through any felling operation. No tracking of vehicle through watercourses will occur, as vehicles will use road infrastructure and existing watercourse crossing points. Where possible, existing drains will not be disturbed during felling works;
- Ditches which drain from the proposed area to be felled towards existing surface watercourses will be blocked, and temporary silt traps will be constructed. No direct discharge of such ditches to watercourses will occur. Drains and sediment traps will be installed during ground preparation. Collector drains will be excavated at an acute angle to the contour (~0.3%-3% gradient), to minimise flow velocities. Main drains to take the discharge from collector drains will include water drops and rock armour, as required, where there are steep gradients, and avoid being placed at right angles to the contour;
- Sediment traps will be sited in drains downstream of felling areas. Machine access will be maintained to enable the accumulated sediment to be excavated. Sediment will be carefully disposed of in the borrow pits All new silt traps will be constructed on even ground and not on sloping ground;
- In areas particularly sensitive to erosion or where felling inside the 50 metre buffer is required, it will be necessary to install double or triple silt fencing;

- All drainage channels will taper out before entering the 50m buffer zone. This ensures that discharged water gently fans out over the buffer zone before entering the aquatic zone, with sediment filtered out from the flow by ground vegetation within the zone. On erodible soils, silt traps will be installed at the end of the drainage channels, to the outside of the buffer zone;
- Drains and silt traps will be maintained throughout all felling works, ensuring that they are clear of sediment build-up and are not severely eroded. Correct drain alignment, spacing and depth will ensure that erosion and sediment build-up are minimized and controlled;
- Brash mats will be used to support vehicles on soft ground, reducing peat and mineral soils erosion and avoiding the formation of rutted areas, in which surface water ponding can occur. Brash mat renewal will take place before they become heavily used and worn. Provision will be made for brash mats along all off-road routes, to protect the soil from compaction and rutting. Where there is risk of severe erosion occurring, extraction will be suspended during periods of high rainfall;
- Timber will be stacked in dry areas, and outside a local 50 metre watercourse buffer. Straw bales and check dams will be emplaced on the down gradient side of timber storage/processing sites;
- Works will be carried out during periods of no, or low rainfall, in order to minimise entrainment of exposed sediment in surface water run-off;
- Checking and maintenance of roads and culverts will be on-going through the felling operation;
- Refuelling or maintenance of machinery will not occur within 100m of a watercourse. Mobile bowser, drip kits, qualified personnel will be used where refuelling is required;
- A permit to refuel system will be adopted:
- Trees will be cut manually from along streams and using machinery to extract whole trees;
- Travel only perpendicular to and away from stream; and
- Please refer to Harvest Management Plan included in Appendix 4-5.

4.5.5 Borrow Pit Drainage

While surface water will be contained in the borrow pit areas, the design proposal is to control the level of water in the borrow pit area by creating a single point outlet from the basin-like area that will ensure the water does not overtop the pit area. Run-off from the proposed borrow pit areas will be controlled via a single outlet that will be installed at the edge of the borrow pit. The single outfall point will be constructed to control runoff from the borrow pit and its immediate surrounds. Interceptor drains will already have been installed upgradient of the borrow pit area before any extraction begins.

During the construction phase of the project, it will be necessary to keep the borrow pit area free of standing water while rock is still being extracted. This will be achieved by using a mobile pump, which will pump water into the same series of drains, settlement ponds with a level spreader, siltbuster or equivalent, which will receive the water from the single outlet.

4.5.6 Cable Trench Drainage

Cable trenches are developed in short sections, thereby minimising the amount of ground disturbed at any one time and minimising the potential for drainage runoff to pick up silt or suspended solids. Each short section of trench is excavated, ducting installed and bedded, and backfilled with the appropriate materials, before work on the next section commences.

To efficiently control drainage runoff from cable trench works areas, excavated material is stored on the upgradient side of the trench. Should any rainfall cause runoff from the excavated material, the material is contained in the downgradient cable trench. Excess subsoil is removed from the cable trench works area immediately upon excavation, and in the case of the Proposed Development, would be transported to the on-site borrow pit, used for landscaping and reinstatements of other areas elsewhere on site or disposed off-site at an appropriate licensed soil recovery facility.

On steeper slopes, silt fences, as detailed in Section 4.4.4.12, above, will be installed temporarily downgradient of the cable trench works area, or on the downhill slope below where excavated material is being temporarily stored to control run-off.

4.5.7 Site and Drainage Management

4.5.7.1 Preparative Site Drainage Management

All materials and equipment necessary to implement the drainage measures outlined above, will be brought on-site in advance of any works commencing. An adequate amount of straw bales, clean stone, terram, stakes, etc will be kept on site at all times to implement the drainage design measures as necessary. The drainage measures outlined in the above will be installed prior to, or at the same time as the works they are intended to drain.

4.5.7.2 Pre-emptive Site Drainage Management

The works programme for the groundworks part of the construction phase of the Proposed Development will also take account of weather forecasts, and predicted rainfall in particular, working under a schedule of works operation system (SOWOR) system as proposed in the planning application. Large excavations, large movements of overburden or large scale overburden or soil stripping will be suspended or scaled back if heavy rain is forecast. The extent to which works will be scaled back or suspended will relate directly to the amount of rainfall forecast.

4.5.7.3 Reactive Site Drainage Management

The final drainage design prepared for the Proposed Development prior to commencement of construction will provide for reactive management of drainage measures. The effectiveness of drainage measures designed to minimise runoff entering works areas and capture and treat silt-laden water from the works areas, will be monitored continuously by the ECoW or supervising hydrologist on-site. The ECoW or supervising hydrologist will respond to changing weather, ground or drainage conditions on the ground as the project proceeds, to ensure the effectiveness of the drainage design is maintained in so far as is possible. This may require the installation of additional check dams, interceptor drains or swales as deemed necessary on-site. The drainage design may have to be modified on the ground as necessary, and the modifications will draw on the various features outlined above in whatever combinations are deemed to be most appropriate to situation on the ground as a particular time.

In the event that works are giving rise to siltation of watercourses, the ECoW or supervising hydrologist will stop all works in the immediate area around where the siltation is evident. The source of the siltation will be identified and additional drainage measures such as those outlined above will be installed in advance of works recommencing.

4.5.8 Drainage Maintenance

An inspection and maintenance plan for the drainage system onsite will be prepared in advance of commencement of any works on the Proposed Development. Regular inspections of all installed drainage features will be necessary, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water at parts of the systems where it is not intended. The inspection of the drainage system will be the responsibility of the ECoW or the supervising hydrologist.

If necessary, any excess sediment build up behind check dams will be removed. For this reason, check dams will be inspected and maintained weekly during the construction phase of the project to insure adequate performance. Maintenance checks will also ensure the centre elevation of the dam remains lower than the sides of the dam.

Check dams will also be inspected weekly during the construction phase of the Proposed Development and following rainfall events to ensure the structure of the dam is still effective in controlling flow. Any scouring around the edges of the check dams or overtopping of the dam in normal flow conditions will be rectified be reinforcement of the check dam.

Drainage swales will be regularly inspected for evidence of erosion along the length of the swale. If any evidence of erosion is detected, additional check dams will be installed to limit the velocity of flow in the channel and reduce the likelihood of erosion occurring in the future.

Silt traps will be inspected weekly during the construction phase of the Proposed Development and following rainfall events. Inlet and outlets will be checked for sediment accumulation and anything else that might interfere with flows.

The frequency of drainage system inspections will be reduced following completion of the construction phase of the Proposed Development. The project hydrologist will inspect and review the drainage system after construction has been completed to provide guidance on the requirements of an operational phase drainage system.

4.6 Construction Management

4.6.1 Construction Phasing and Timing

It is estimated that the construction phase of the entire renewable energy development (i.e. the Permitted Development and the Proposed Development) will take approximately 18 months. In the interest of breeding birds, construction will not commence during the bird breeding season which runs from the 1st of March to the 31st of August inclusive. Construction may commence at any stage from September onwards to the end of February, so that construction activities are ongoing by the time the next breeding bird season comes around, and can continue throughout the next breeding season.

4.6.2 Construction Sequencing

The construction phase for the entire renewable energy development can be broken down into three main phases, 1) civil engineering works - 10 months, 2) electrical works - 6 months, and 3) turbine erection, solar panel installation and commissioning - 8 months. The main task items under each of the three phases are outlined below.

Civil Engineering Works

- Clear and hardcore area for temporary site offices. Install same.
- Provide bunded area for oil tanks.
- Construct new site roads and hard-standings and crane pads, and level substation platform.
- Construct drainage ditches, culverts etc. integral to road construction.
- Excavate for turbine bases. Place blinding concrete to turbine bases. Fix reinforcing steel and anchorage system for tower section. Construct shuttering. Fix any ducts etc. to be cast in. Pour concrete bases. Cure concrete. Remove shutters after 1-2 days.
- Construct bases/plinths for transformer.
- Excavate trenches for site cables, lay cables and backfill. Provide ducts at road crossings.

- Erect fencing at transformer compound.
- Erection of fencing around solar array site.
- Backfill tower foundations and cover with previously stored topsoil.

Electrical Works

- Construct bases/plinths for substation compound.
- Install external electrical equipment at substation.
- Install transformer at compound.
- Installation of solar array structures including control cabins and solar array support/mounting structures.
- Erect stock proof and palisade fencing around substation area.
- Install electrical and communication cabling.

Turbine and Meteorological Mast Erection, Solar Panel Installation and Commissioning

- Erect towers, nacelles and blades.
- Install solar panels.
- Complete electrical installation.
- Grid connection.
- Install meteorological mast.
- Commission and test turbines.
- Complete site works, reinstate site.
- Remove temporary site offices. Provide any gates, landscaping, signs etc. which may be required.

The phasing and scheduling of the main construction task items are outlined in Figure 4-16 below, where the 1st January has been selected as an arbitrary start date for construction activities.

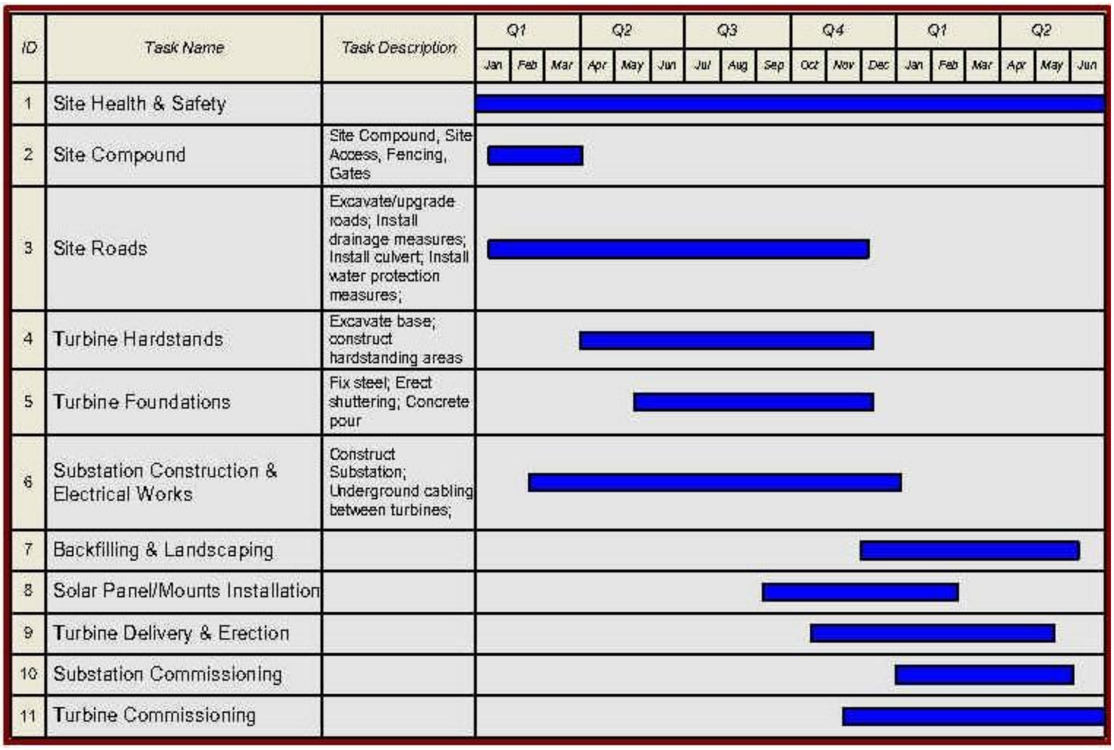


Figure 4-16 Indicative Construction Schedule

4.6.3 Construction Phase Monitoring and Oversight

The requirement for a Construction and Environmental Management Plan (CEMP) to be prepared in advance of any construction works commencing on any development site and submitted for agreement to the Planning Authority is now well-established. The proposed procedures for the implementation of the mitigation measures outlined in such a CEMP and their effectiveness and completion is typically audited by way of a Construction and Environmental Management Plan Audit Report. The CEMP Audit Report effectively lists all mitigation measures prescribed in any of the planning documentation and all conditions attached to the grant of planning permission and allows them to be audited on a systematic and regular basis. The first assessment is a simply Yes/No question, has the mitigation measure been employed on-site or not? Following confirmation that the mitigation measure has been implemented, the effectiveness of the mitigation measures has to be the subject of regular review and audit during the full construction stage of the project. If some remedial actions are needed to improve the effectiveness of the mitigation measure, then these are notified to the site staff immediately during the audit site visit, and in writing by way of the circulation of the audit report. Depending on the importance and urgency of rectifying the issue, the construction site manager is given a timeframe by when the remedial works need to be completed.

A CEMP has been prepared for the Proposed Development, and is included in Appendix 4-3 of this EIAR. The CEMP includes details of drainage, peat and overburden management, waste management etc, and describes how the above-mentioned Audit Report will function and be presented.

In the event planning permission is granted for the Proposed Development, the CEMP will be updated prior to the commencement of the development, to address the requirements of any relevant planning conditions, including any additional mitigation measures which are conditioned and will be submitted to the Planning Authority for written approval.

The on-site construction staff will be responsible for implementing the mitigation measures specified in the EIAR and compiled in the Audit Report. Their implementation will be overseen by the ECoW or supervising hydrogeologists, environmental scientists, ecologists or geotechnical engineers, depending on who is best placed to advise on the implementation. The system of auditing referred to above ensures that the mitigation measures are maintained for the duration of the construction phase, and into the operational phase where necessary.

4.7 Construction Methodologies

This section describes the construction methodologies that will be used for the proposed electrical substation, underground cabling works and access roads (new and upgraded). Further details are also provided in the Construction and Environmental Management Plan (CEMP) included as Appendix 4-3 of this EIAR.

4.7.1 Site Roads

4.7.1.1 New Site Access Road

The construction methodology for the proposed new access roads is outlined as follows:

- Establish alignment of the new site road from the construction drawings and mark out the centrelines with ranging rods or timber posts;
- All drainage measures prescribed in the detailed drainage design for the project will be implemented around the works area;
- The road layout has been designed to avoid crossings of natural watercourses where possible;

- Where existing culverts are to be upgraded or extended, the works will be carried out to follow a method statement to be prepared in consultation with Inland Fisheries Ireland;
- The access tracks will be of single-track design with an overall width of between 2.5 and 6m (depending on the location within the Proposed Development site);
- Peat will be stripped and temporarily stockpiled for re-use as required. Where possible, the acrotelm shall be placed with the vegetation part of the sod facing the right way up to encourage growth of plants and vegetation.
- All peat excavated will be used as part of the borrow pit restoration or in reinstatement areas. Topsoil will be temporarily stockpiled locally for reuse for landscaping;
- The subsoil will be excavated down to a suitable formation layer of either firm clay or bedrock;
- The road will be constructed using well-graded granular fill, spread and compacted in layers typically of 200mm and a suitable capping layer to provide a homogeneous running surface. The thickness of layers and amount of compaction required will be subject to detailed design by Project Engineer in consultation with the Construction Manager based on the characteristics of the material and the compaction plant to be used;
- The new access roads will be constructed with a camber to aid drainage of surface water;
- For excavations in overburden and peat, side slopes shall not generally be greater than 1(V): 2 or 3(H), respectively. Slacker slopes may be required if localised areas of weaker peat are encountered Design slopes will be informed by the Geotechnical Engineer;
- At bends or steep inclines from the road, reflective snow poles will be erected to warn traffic on dark mornings and evenings that there is a turn in the road or a sharp incline beyond the site road.

4.7.1.2 Upgrading of Existing Site Access Road

Approximately 5km of the existing roads will require upgrading which will comprise widening of the roadway to a total running width of approximately five metres, with wider sections at corners and the laying of a new surface dressing on the existing section of roadway where necessary. The road widening will be undertaken as follows:

- If it is considered that the current road formation level is adequate to support required bearing, then no upgrade or widening works will be completed;
- Otherwise, where required, the subsoil in the existing road verge will be excavated down to a suitable formation layer and the spoil used for the restoration of borrow pits or in reinstatement areas and landscaping;
- All drainage measures prescribed in the detailed drainage design for the project will be implemented around the works area;
- Well-graded imported granular fill will be spread and compacted in layers up to 200mm to provide a homogeneous running surface. The thickness of layers and amount of compaction required will be decided by the Construction Manager based on the characteristics of the material and the compaction plant to be used. These layers of granular fill will be brought to the same level as the top of the existing road surface;
- A layer of geogrid will be installed directly onto the top of the granular fill layer and the existing road surface where required;
- A layer of finer well graded stone for the running surface will be laid on the geogrid and compacted; and

- Prior to any works commencing on the upgrade of existing roads, the requirement for additional roadside drainage will be considered by the Project Hydrologist in line with the proposals outlined in Section 4 of the CEMP.

4.7.2 Electrical Substation and Control Buildings

The proposed substation will be constructed by the following methodology:

- The area of the onsite substation will be marked out using ranging rods or wooden posts and the soil and overburden stripped and removed to nearby temporary storage area for later use in landscaping. Any excess material will be sent to the proposed borrow pit, for reinstatement purposes;
- The dimensions of the substation area have been designed to meet the current requirements of the ESB/ Eirgrid;
- The required level platform will be established and finished with well-graded imported granular fill, compacted in layers and finished with a suitable capping layer to the desired level;
- The substation platform will serve as a construction compound containing welfare facilities, car parking and site offices. Temporary port-a-loo toilets will be used during the construction phase. Wastewater from staff toilets will be directed to a sealed storage tank, with all wastewater being tankered off site by permitted waste collector to wastewater treatment plants. Upon completion of the substation compound the welfare facilities will be removed off-site;
- The electrical substation compound will be bunded appropriately to the volume of oils likely to be stored, and to prevent leakage to groundwater or surface water. The bunded area will be fitted with a storm drainage system and an appropriate oil interceptor;
- Two control buildings will be built within the substation compound;
- The foundations will be excavated down to the level indicated by the designer and appropriately shuttered reinforced concrete will be laid over it. An anti-bleeding admixture will be included in the concrete mix;
- The block work walls will be built up from the footings to damp proof course level and the floor slab constructed, having first located any ducts or trenches required by the follow on mechanical and electrical contractors;
- The block work will then be raised to wall plate level and the gables & internal partition walls formed. Scaffold will be erected around the outside of the buildings for this operation;
- The concrete roof slabs will be lifted into position using an adequately sized mobile crane;
- The timber roof trusses will then be lifted into position using a telescopic load all or mobile crane depending on site conditions. The roof trusses will then be felted, battened, tiled and sealed against the weather;
- The substation plinths will be shuttered and poured with reinforced concrete. An anti-bleeding admixture will be included in the concrete mix;
- The electrical equipment will be installed on the concrete plinths and commissioned;
- Perimeter fencing will be erected.

4.7.3 Underground Cable Trench

The underground cable will be laid beneath the surface of the site and/or road using the following methodology:

- Before works commence, surveying will take place along the proposed cable route, with all existing culverts identified. All relevant bodies i.e. ESB, Cork County

Council, Kerry County Council etc. will be contacted and all drawings for all existing services sought.

- When the cable is located on roads, a traffic management plan will be set up prior to any works commencing. A road opening licence will be obtained where required and all plant operators and general operatives will be inducted and informed as to the location of any services.
- The cable ducts will be concrete surrounded where they pass under the road and under drains or culverts.
- A tracked 360-degree excavator will then proceed to dig out the proposed trench, typically to a depth of 1200mm, within which the ducts will be laid.
- Trench supports will be installed, or the trench sides will be benched or battered back where appropriate and any ingress of ground water will be removed from the trench using submersible pumps, fitted with appropriate silt filtration systems, to prevent contamination of any watercourse.
- Once the trench has been excavated, a base-layer will be laid and compacted, comprising Clause 804, or 15 Newton CBM4 concrete as required.
- The ducting will be installed as per specification, with couplers fitted and capped to prevent any dirt etc. entering the duct. In poor ground conditions, the ends of the ducts will be shimmed up off of the bed of the trench, to prevent any possible ingress of water dirt. The shims will be removed again once the next length has been connected. Extreme care will be taken to ensure that all duct collars (both ends) are clean and in good condition prior to ducts being joined.
- As the works progress, the as-built location of the ducting will be recorded using a total station or GPS.
- As per the associated base-layer (Clause 804 material or 15 Newton CBM4 concrete) will be installed and compacted as per approved detail, with care not to displace the ducting.
- Spacers will be used to ensure that the correct cover is achieved at both sides of the
- ducting.
- The remainder of the trench will be backfilled in two compacted layers with approved engineer's specified material.
- Yellow marker warning tape will be installed across the width of the trench, at 300mm depth,
- The finished surface is to be reinstated, as per original specification. Off-road cabling may be finished with granular fill to facilitate access to the trench for any potential maintenance that is required during the operational phase of the Proposed Development.
- For the section of 110kV underground cabling to be installed in the degraded peatland habitat area, the peatlands will be replaced following the works in this area. The following methodology to be implemented in this area:
    - Temporary fences will be erected surrounding the proposed works area to prevent encroachment outside this area.
    - An existing track and the route of the existing cable that lies adjacent to the proposed cabling will be used as part of the working area in order to minimise impacts on the surrounding peatlands.
    - Low ground pressure wide-track machinery will be used and will be operated adjacent to the proposed 110kV underground cabling trench and existing track, with no access to areas that are not immediately adjacent to the proposed cabling route.
    - At the outset, the turves with their existing vegetation will be stripped and stored the right way up on the adjacent track and disturbed habitat.
    - The cabling will be laid as per the methodology set out in Chapter 4 of this EIAR, Description.
    - The turves will be replaced on top of the newly installed cabling and the temporary fence removed.

  - Temporary fences will be put in place in all areas where works are taking place in close proximity to peatland habitats to avoid temporary or permanent encroachment onto them.
- Marker posts will then be placed at regular intervals (generally at joint bays and any change in direction) to denote the location of the underground power cables.


Plate 4-5 Typical Cable Trench View

4.7.3.1 Existing Underground Services

Any underground services encountered along the cable routes will be surveyed for level and the ducting will pass over the service provided adequate cover is available. A minimum clearance of 300 mm will be required between the bottom of the ducts and the service in question. If the clearance cannot be achieved the ducting will pass under the service and again 300 mm clearance between the top of the communications duct and bottom of the service will be achieved. In deeper excavations an additional layer of marker tape will be installed between the communications duct and top level yellow marker tape. If the required separation distances cannot be achieved then a number of alternative options are available such as using steel plates laid across the width of the trench and using 35N concrete surrounding the proposed ducting where adjacent services are within 600mm, with marker tape on the side of the trench. Please refer to Section 4.7.3.3 below for cable crossing methodologies. Back fill around any utility services will be with dead sand/pea shingle where appropriate.

4.7.3.2 Joint Bays

Joint bays are typically pre-cast concrete chambers where lengths of cable will be joined to form one continuous cable. They will be located at various points along the underground ducting route generally between 600 to 1000 metres intervals or as otherwise required by ESB/ electrical requirements. An alternative method for cable jointing is to create a localised widening in the cable trench which is supported by sandbags to facilitate the installation of the cabling.

During construction the joint bay locations will be completely fenced off. Once they have been constructed they will be backfilled until cables are being installed. The proposed location of joint bays along the underground cabling routes are presented in Drawing Nos. 210732-18 and 210732-19 included in Appendix 4-1 to this EIAR. It is noted that once the cable installation is complete, the cables will be permanently covered and will not be perceptible.

4.7.3.3 Underground Cable Watercourse/Culvert Crossings

There are a total of 36 identified watercourse and existing culvert crossings along the proposed 33kV and 110kV underground electrical cabling route, of which 6 no. are EPA/OSI mapped crossings. The remaining crossings are classified as culverts over minor channels or manmade drains. The construction methodology for the 6 no. EPA/OSI mapped crossings has been designed to eliminate the requirement for in-stream works with 5 no. of these locations requiring a crossing to be constructed to traverse the watercourse with the cabling ducts. A general description of the various construction methods employed at watercourse/ culvert/ drain crossings are described in the following paragraphs below and Section 4.3.3 above. A list of the EPA/OSI mapped crossings along the underground cable route and the proposed crossing method at each location is provided in Table 4-2 below.

The crossing methodologies employed at the other culvert and manmade drain crossings along the underground cable route, will be selected from the suite of watercourse crossing options outlined below, as appropriate, depending on culvert type, depth, size and local ground conditions.

The EPA/OSI mapped crossing locations are shown in Figure 4-17. The crossing locations for all culvert and drain crossings are also shown on the underground cable route drawings included as Appendix 4-1. Details of all culvert and drain crossing are also provided in Appendix 4-6 of this EIAR.

Should an alternative methodology option be required for individual crossings during the construction process this will be agreed with the relevant authorities including Cork County Council and Kerry County Council prior to works commencing.

Where culverts require upgrading, the Applicant will commission a survey of culverts, the results of which will be forwarded to the Planning Authority. Having regard to the duration of the consent requested (10 years) it is considered best practice that any such surveys be carried out prior to construction to facilitate accuracy and timely reporting of the surveys.

4.7.3.3.1 *Standard Formation Crossing over Culvert – Option A*

Where adequate cover exists above a culvert, the standard aforementioned trench arrangement will be used where the cable ducts pass over a culvert without any contact with the existing culvert or water course. The cable trench will pass over the culvert in a standard trench as outlined in Figure 4-18.

Where no crossing currently exists, the cable will pass over the watercourse in a bottomless box culvert or pre-cast concrete slab in a standard trefoil arrangement. Where required existing culvert crossings will be extended using corripipe (see Section 4.3.3 above).

4.7.3.3.2 *Standard Formation Crossing under Culvert – Option B*

Where the culvert consists of a socketed concrete or sealed plastic pipe and sufficient depth is not available over the crossing, a trench will be excavated beneath the culvert and cable ducts will be installed in the standard formation 300mm below the existing pipe, as outlined in Figure 4-19.

4.7.3.3.3 *Shallow Formation Crossing over Culvert – Option C*

Where cable ducts are to be installed over an existing culvert and sufficient cover cannot be achieved, the ducts will be laid in a much shallower trench, the depth of which will be determined by the cover available at the culvert crossing location. The ducts within the shallow formation trench will be encased in 6mm thick steel galvanized plates and backfilled with 35N concrete.

Where sufficient deck cover is not available to fully accommodate the required ducts, it may be necessary to locally raise the pavement level. Any addition of a new pavement will be tied back into the existing road pavement at grade. This method of duct installation is further detailed in Figure 4-20.

Where no crossing currently exists, the cable will pass over the watercourse in a clear span bridge (see Section 4.3.3 above) or corrugated steel arch bridge (see Section 4.3.3 above).

Where required existing culvert crossings will be extended using corripipe (see Section 4.3.3 above).

4.7.3.3.4 Directional Drilling – Option D

In the event that none of the above methods are appropriate, directional drilling (DD) will be utilised.

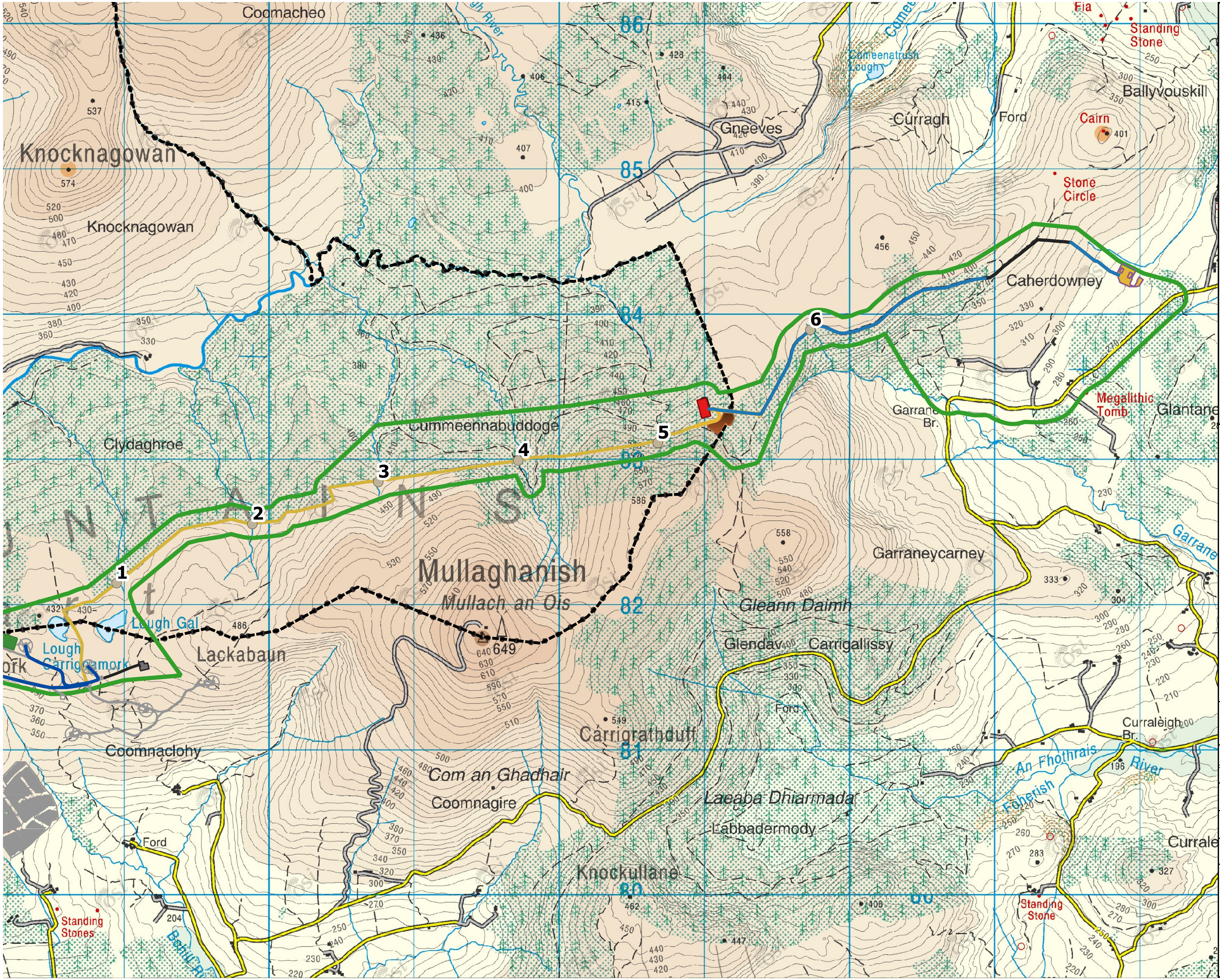
DD is a method of drilling under obstacles such as bridges, culverts, railways, water courses, etc. in order to install cable ducts under the obstacle. This method is employed where installing the ducts using standard installation methods is not possible.

The DD method of duct installation will be carried out using Vermeer D36 x 50 Directional Drill (approximately 22 tonnes), or similar plant, will be utilised for the horizontal directional drilling at watercourse/culvert crossings listed in Table 4-2 below. The launch and reception pits will be approximately 0.55m wide, 2.5m long and 1.5m deep. The pits will be excavated with a suitably sized excavator. The drilling rig will be securely anchored to the ground by means of anchor pins which will be attached to the front of the machine. The drill head will then be secured to the first drill rod and the operator shall commence to drill into the launch pit to a suitable angle which will enable him to obtain the depths and pitch required to the line and level of the required profile. Drilling of the pilot bore shall continue with the addition of 3.0m long drill rods, mechanically loaded and connected into position.

During the drilling process, a mixture of a natural, inert and fully biodegradable drilling fluid such as Clear Bore™ and water is pumped through the centre of the drill rods to the reamer head and is forced in to void and enables the annulus which has been created to support the surrounding subsoil and thus prevent collapse of the reamed length. Depending on the prevalent ground conditions, it may be necessary to repeat the drilling process by incrementally increasing the size of the reamers. When the reamer enters the launch pit, it is removed from the drill rods which are then passed back up the bore to the reception pit and the next size reamer is attached to the drill rods and the process is repeated until the required bore with the allowable tolerance is achieved.

The use of a natural, inert and biodegradable drilling fluid such as Clear Bore™ is intended to negate any adverse impacts arising from the use of other, traditional polymer-based drilling fluids and will be used sparingly as part of the drilling operations. It will be appropriately stored prior to use and deployed in the required amounts to avoid surplus. Should any excess drilling fluid accumulate in the reception or drilling pits, it will be contained and removed from the site in the same manner as other subsoil materials associated with the drilling process to a licensed recovery facility.

Backfilling of launch & reception pits will be conducted in accordance with the normal specification for backfilling excavated trenches. Sufficient controls and monitoring will be put in place during drilling to prevent frack-out, such as the installation of casing at entry points where reduced cover and bearing pressure exits.   The directional drilling methodology is further detailed in Figure 4-21.

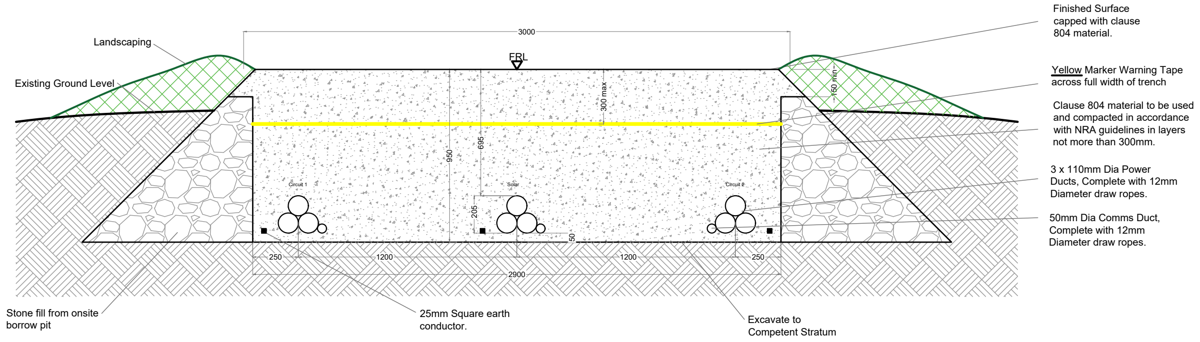


Map Legend

- EIAR Study Boundary
- Access Road (Upgrade & New)
- 33kV Underground Cabling in the Permitted Development
- 110kV Underground Cabling
- 110kV Cabling and Access Road
- Ballyvouskill 220kV Substation
- Proposed 110kV Substation Location
- Proposed Borrow Pit
- Permitted Borrow Pit Extension
- Omitted 38kV Electrical Substation and Battery Compound
- EPA Marked Watercourse Crossings

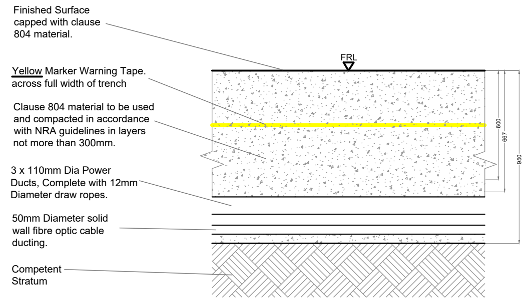
Drawing Title	Watercourse Crossings
Project Title	Proposed Substation, Underground Cabling & Access Roads to Knocknamork Renewable Energy Development
Drawn By: NMcH	Checked By: EOS
Project No.: 210732	Drawing No.: Figure 4-17
Scale: 1:8000	Date: 14.07.2022

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: www.mkoireland.ie



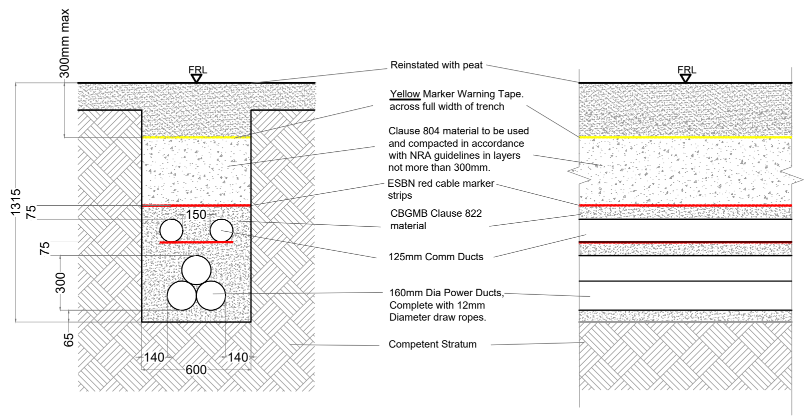
Option A - Cabling Cross Section - 33kV

SCALE 1:20



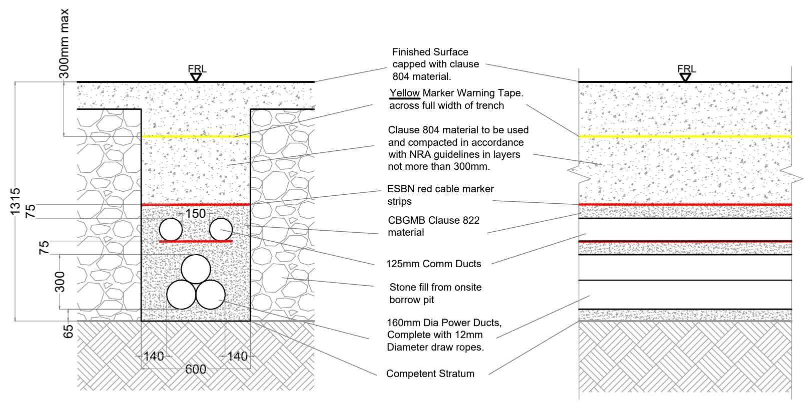
Option A - Cabling Cross Section - 33kV

SCALE 1:20



Option A - Cross section - 110kV

SCALE 1:20



Option A - Cross section - 110kV

SCALE 1:20

Note:

All dimensions are in millimetres, unless noted otherwise.

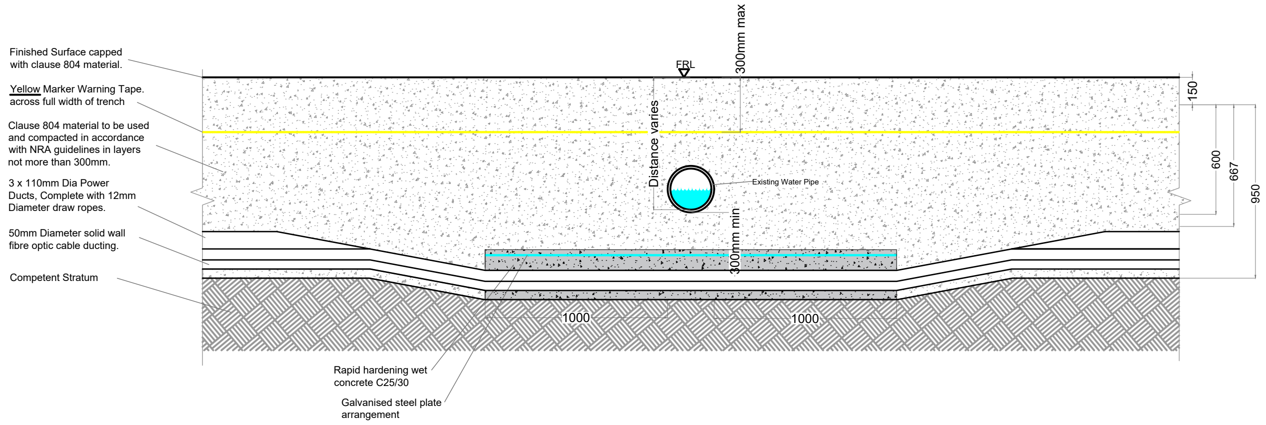
All dimensions to be checked on site and any discrepancy to be reported to the engineer.

Figured dimensions only to be used, drawings not to be scaled. If in doubt ask.

For illustration purposes only. Exact size and appearance of unit subject to manufacturer selection.

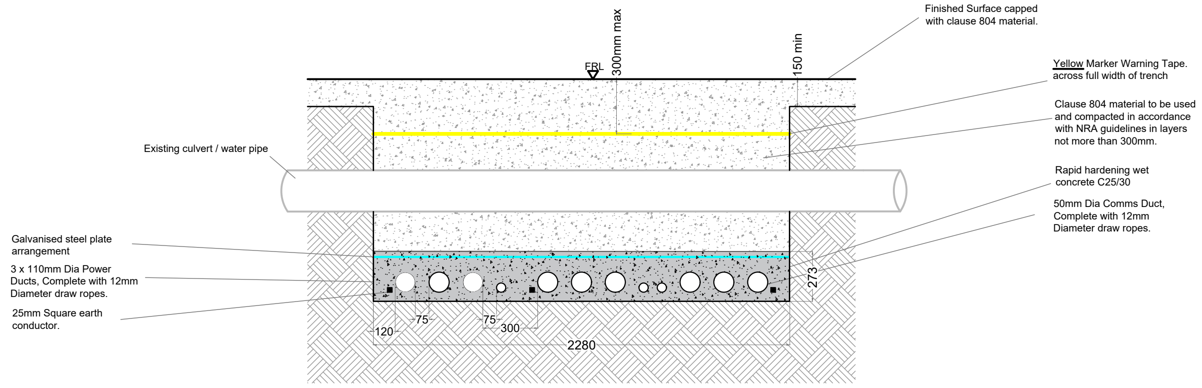
DRAWING TITLE: Standard Formation Crossing over Culvert - Option A	
PROJECT TITLE: Knocknamork Grid Connection Infrastructure	
DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210732	DRAWING No.: Fig 4-18
SCALE: 1:20 @ A1	DATE: 25.07.2022

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie



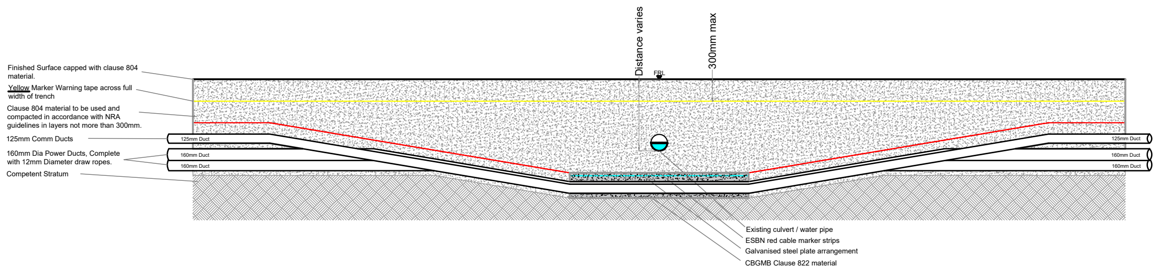
Option B - Flat bed under existing pipe - 33kV

SCALE 1:20



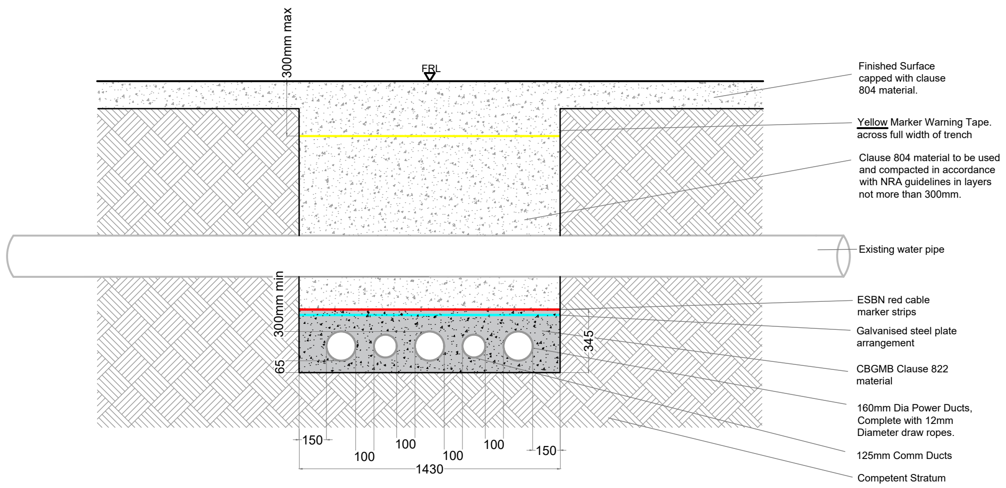
Option B - Flat bed under existing pipe - 33kV

SCALE 1:20



Option B - Flat bed under existing pipe - 110kV

SCALE 1:50



Option B - Flat bed under existing pipe - 110kV

SCALE 1:20

Note:

All dimensions are in millimetres, unless noted otherwise.

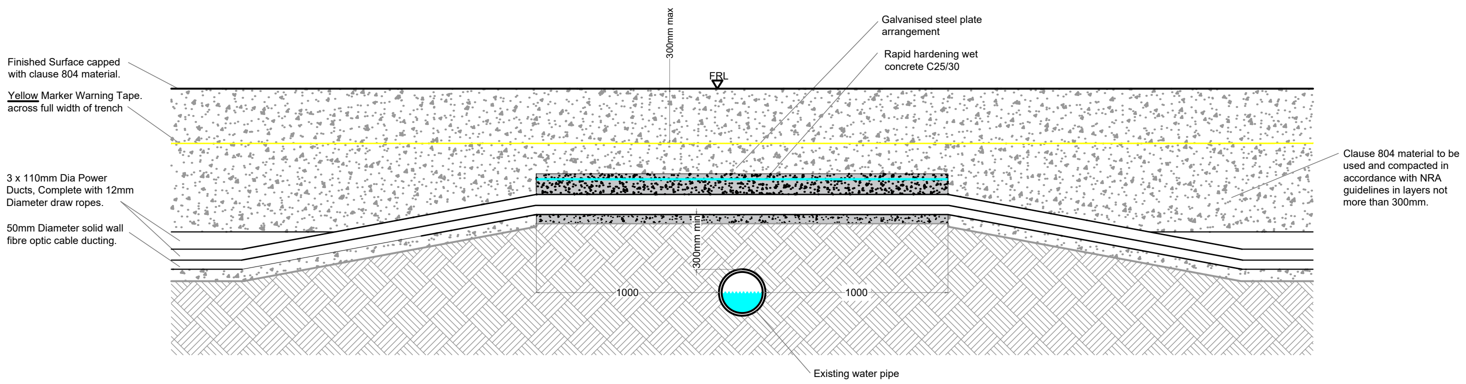
All dimensions to be checked on site and any discrepancy to be reported to the engineer.

Figured dimensions only to be used, drawings not to be scaled. If in doubt ask.

For illustration purposes only. Exact size and appearance of unit subject to manufacturer selection.

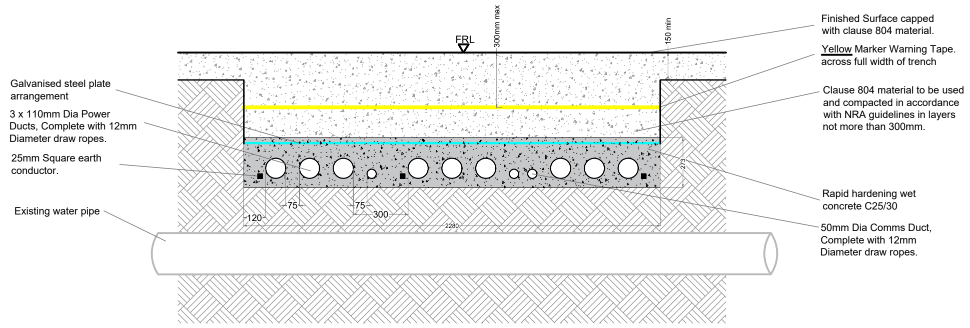
DRAWING TITLE: **Standard Formation Crossing over Culvert - Option B**	
PROJECT TITLE: Knocknamork Grid Connection Infrastructure	
DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210732	DRAWING No.: Fig 4-19
SCALE: As Shown @ A1	DATE: 25.07.2022

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie



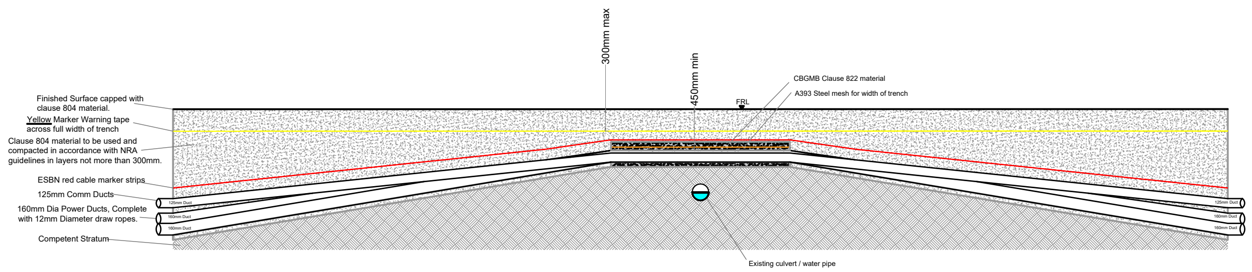
Option C - Flat bed over existing pipe - 33kV

SCALE 1:20



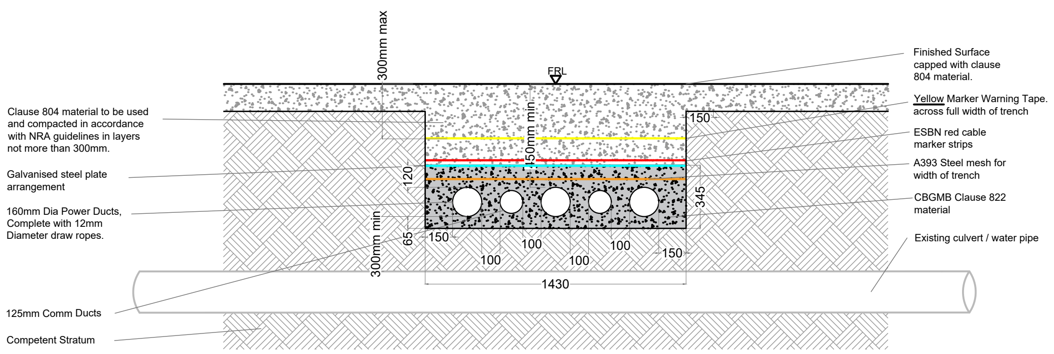
Option C - Flat bed over existing pipe - 33kV

SCALE 1:20



Option C - Flat bed over existing pipe - 110kV

SCALE 1:50



Option C - Flat bed over existing pipe - 110kV

SCALE 1:20

Note:

All dimensions are in millimetres, unless noted otherwise.

All dimensions to be checked on site and any discrepancy to be reported to the engineer.

Figured dimensions only to be used, drawings not to be scaled. If in doubt ask.

For illustration purposes only. Exact size and appearance of unit subject to manufacturer selection.

DRAWING TITLE: Shallow Formation Crossing over Culvert - Option C	
PROJECT TITLE: Knocknamork Grid Connection Infrastructure	
DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210732	DRAWING No.: Fig 4-20
SCALE: 1:20 @ A1	DATE: 25.07.2022

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie

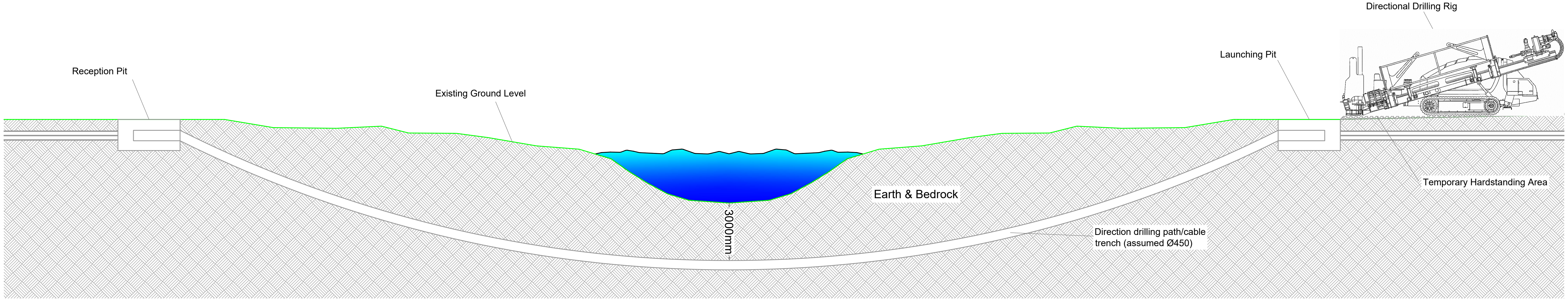
Note:

All dimensions are in millimetres, unless noted otherwise.

All dimensions to be checked on site and any discrepancy to be reported to the engineer.

Figured dimensions only to be used, drawings not to be scaled. If in doubt ask.

For illustration purposes only. Exact size and appearance of unit subject to manufacturer selection.



Option D - Typical Horizontal Directional Drill - Cross Section

SCALE: 1:200

DRAWING TITLE: **Option D - Typical Horizontal Directional Drill - Cross Section**	
PROJECT TITLE: Knocknamork Grid Connection Infrastructure	
DRAWING BY: **Joseph O Brien**	CHECKED BY: **Meabhann Crowe**
PROJECT No.: **210732**	DRAWING No.: **Fig 4-21**
SCALE: **1:200 @ A3**	DATE: **25.07.2022**

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie

Table 4-2 Underground Cable Route – Watercourse Crossings Methodology

Watercourse Crossing Reference No.	Watercourse Type	Width of Channel (m)	Cover from Road Level to Top of Culvert (m)	Crossing Option Description	Watercourse Crossing Option	Extent of In-Channel Works
1	Open channel	0.5	-	Where no crossing currently exists, the cable will pass over the watercourse over a bottomless box culvert or pre-cast concrete slab in a standard trefoil arrangement.	Option A/ Option C	None. No in-stream works required.
2	Open channel	1.2	-	Where no crossing currently exists, the cable will pass over the watercourse over a bottomless box culvert or pre-cast concrete slab in a standard trefoil arrangement.	Option A/ Option C	None. No in-stream works required.
3	Open channel	1	-	Where no crossing currently exists, the cable will pass over the watercourse over a bottomless box culvert or pre-cast concrete slab in a standard trefoil arrangement.	Option A/ Option C	None. No in-stream works required.
4	Open channel	2.0	-	Where no crossing currently exists, the cable will pass over the watercourse over a bottomless box culvert or pre-cast concrete slab in a standard trefoil arrangement.	Option A/ Option C	None. No in-stream works required.
5	Open channel	1.5	-	Where no crossing currently exists, the cable will pass over the watercourse over a bottomless box culvert or pre-cast concrete slab in a standard trefoil arrangement.	Option A/ Option C	None. No in-stream works required.

Watercourse Crossing Reference No.	Watercourse Type	Width of Channel (m)	Cover from Road Level to Top of Culvert (m)	Crossing Option Description	Watercourse Crossing Option	Extent of In-Channel Works
6	600 mm diameter concrete pipe	-	1.6	Where cable ducts are to be installed over an existing culvert and sufficient cover cannot be achieved, the ducts will be laid in a much shallower trench, the depth of which will be determined by the cover available at the culvert crossing location. The ducts within the shallow formation trench will be encased in 6mm thick steel galvanized plates and backfilled with 35N concrete.	Option C	None. No in-stream works required.

4.8 Operation

The proposed substation components will require periodic maintenance throughout the operational phase. It is proposed to manage wastewater from the staff welfare facilities in the control building by means of a sealed underground storage tank, with all wastewater being tankered off site by permitted waste collector to wastewater treatment plants. Hydrocarbons and oils will be present during the operation of the substation however these will be stored in an appropriately bunded area. The operation of a substation is not a recognized source of environmental emissions or nuisance and so there will be no adverse effects associated with its operation.

The site tracks will also require periodic maintenance. Although the level of activity required for the maintenance of the Proposed Development is not significant, the impacts associated with traffic volumes for this period are assessed in Chapter 13.

It is not foreseen that any works will be required during the operational phase of the underground cabling element and therefore there is no potential for effects on any environmental media.

4.9 Decommissioning

It is not intended that the on-site electrical substation will be removed at the end of the useful life of the Permitted Development, as permanent planning permission is being sought for the substation. By the time the decommissioning of the Permitted Development is to be considered, the proposed 110kV substation and the proposed underground electrical cabling (110kV) from the proposed 110kV electrical substation to the existing 220kV Ballyvouskill will likely form an integral part of the local electricity network, with a number of supply connections and possibly some additional generation connection. Therefore, it is intended that the proposed 110kV substation and underground electrical cabling (110kV) will be retained as a permanent structure and will not be decommissioned.

The underground electrical cabling (33kV) connecting the Permitted Development to the proposed 110kV electrical substation will be removed from the underground cable ducting at the end of the useful life of the renewable energy development. The cabling will be pulled from the cable duct using a mechanical winch which will extract the cable and re-roll it on to a cable drum. This will be undertaken at each of the joint bays/pull pits along the underground cabling route. The original pulling pits will be excavated using a mechanical excavator and will be fully re-instated once the cables are removed. The cable ducting will be left in-situ as it is considered the most environmentally prudent option, avoiding unnecessary excavation and soil disturbance for an underground element that is not visible.

During the construction of the Proposed Development, a number of road and junction improvements and temporary works will be completed to provide access to the site during materials delivery. All these accommodation areas will be re-used during decommissioning. This includes the re-instatement and re-establishment of the temporary access road from the N22 to the old N22 alignment to facilitate the removal of abnormally large vehicle loads. The use of this temporary access road will be carefully managed, and the route will be blocked with traffic bollards when not in use for component removal. On completion of the component removal from the site, the temporary accommodation area will be fully re-instated.

Site roadways could be in use for purposes other than the operation of the development by the time the decommissioning of the Permitted Development is to be considered, and therefore it may be more appropriate to leave the site roads in situ for future use. It is envisaged that the roads will provide a useful means of extracting the commercial forestry crop which exists on the site, along with general agricultural use. The environmental assessments undertaken as part of this EIAR have concluded that once the mitigation proposals as outlined in the EIAR are implemented during the decommissioning phase of the Proposed Development, there will be no cumulative negative effects and therefore there is no potential for any cumulative impacts with the decommissioning of the Permitted Development or any other permitted or proposed developments in the environment.

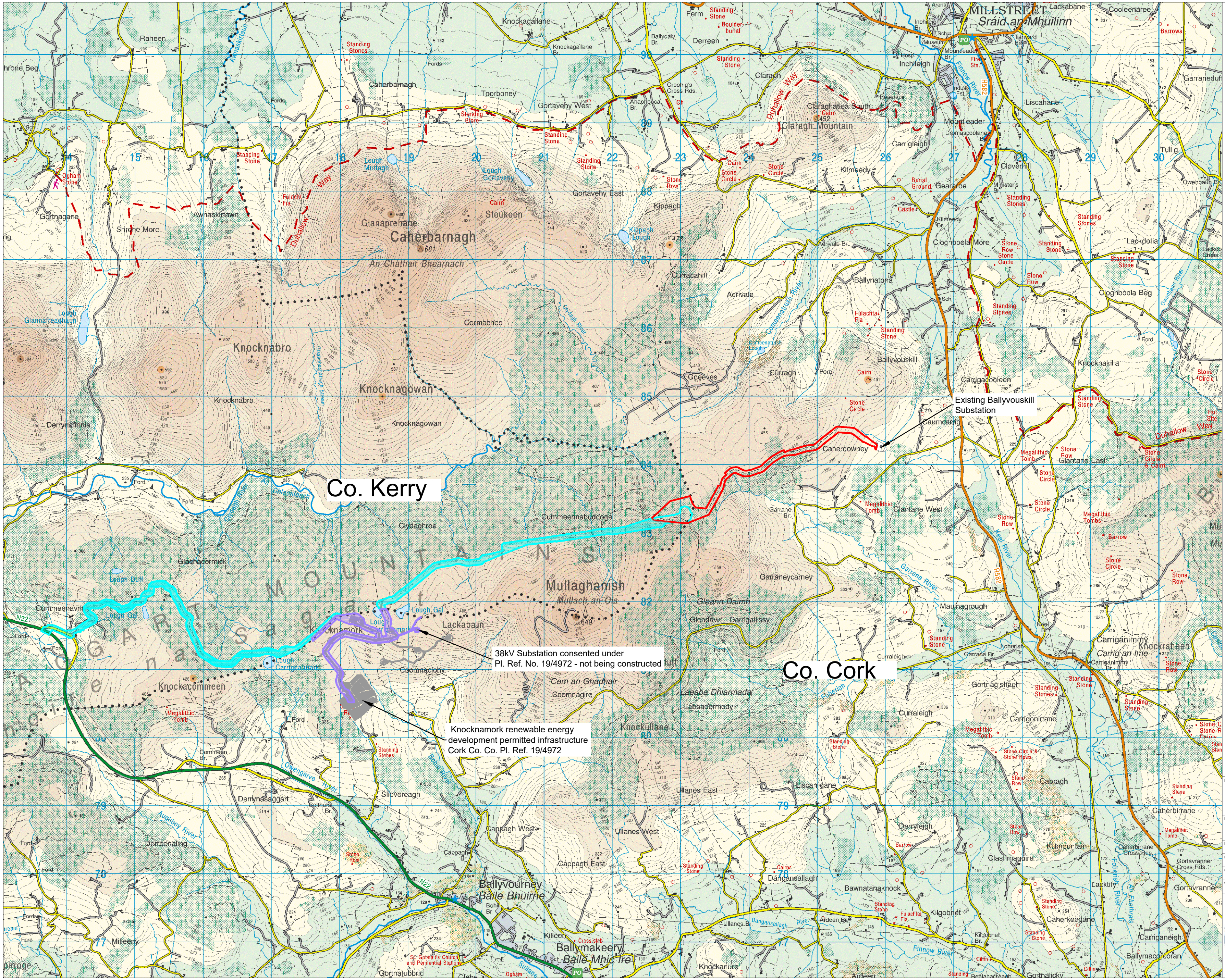
A Decommissioning Plan has been prepared (Appendix 4-7) the detail of which will be agreed with the local authority prior to any decommissioning. The Decommissioning Plan will be updated prior to the end of the operational period in line with decommissioning methodologies that may exist at the time and will be agreed with the competent authority at that time. The potential for effects during the decommissioning phase of the Proposed Development has been fully assessed in each relevant section of this EIAR.

APPENDIX 4-1

SITE LAYOUT PLANNING DRAWINGS

APPENDIX 4-1A

SITE LAYOUT PLANNING DRAWINGS - AN BORD PLEANÁLA



Drawing Legend

- Application Boundary An Bord Pleanala
- Application Boundary Cork County Council
- Application Boundary Kerry County Council

Ordnance Survey Ireland Licence No. CYAL50267517© Ordnance Survey Ireland/Government of Ireland

DRAWING TITLE:

Location Context Map

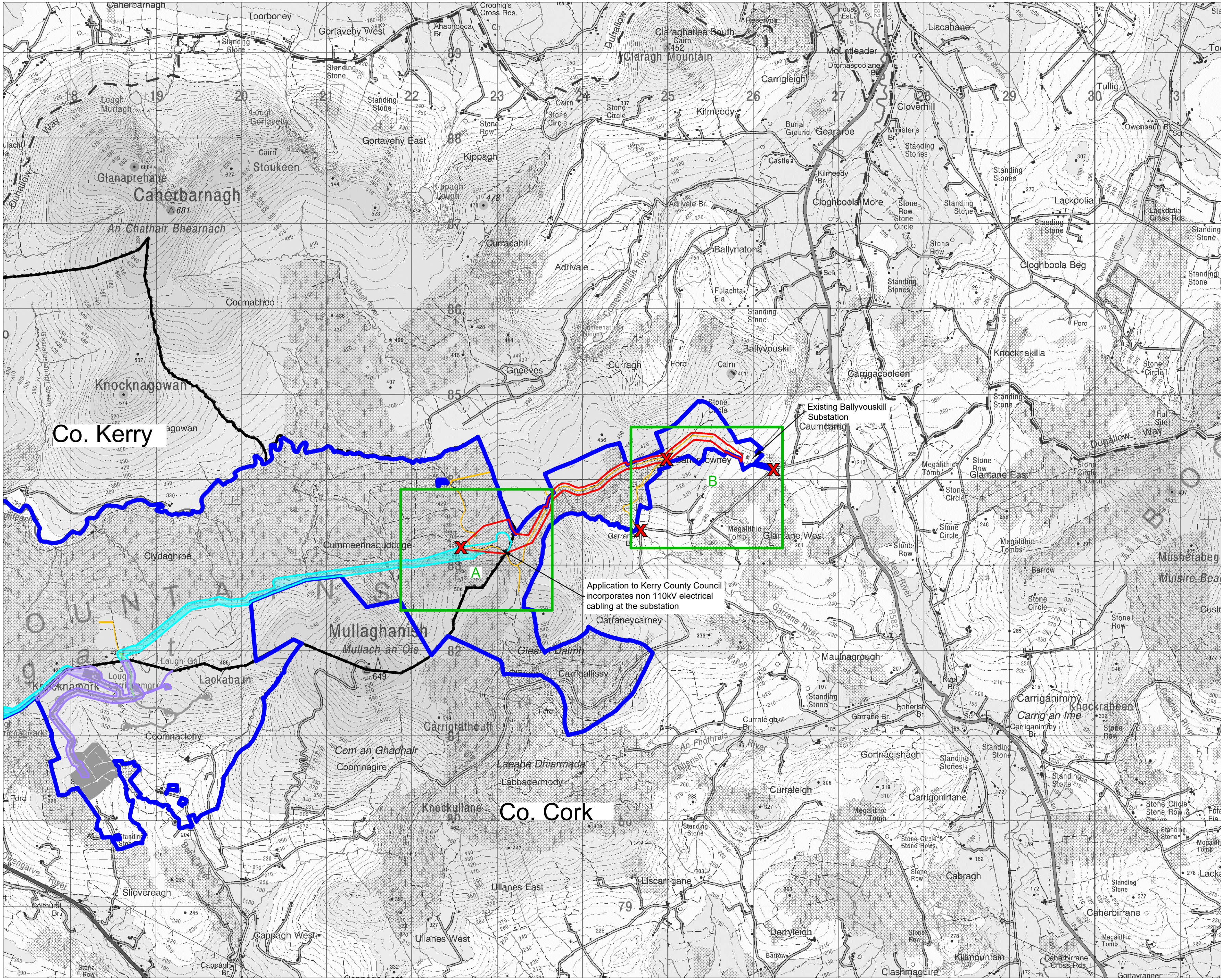
PROJECT TITLE:

Knocknamork Grid Connection Infrastructure, An Bord Pleanala

DRAWN BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210732	DRAWING No.: 210732 - 01
SCALE: 1:50,000 @ A3	DATE: 26.07.2022

OS SHEET No.: 6135, 6136, 6137, 6182, 6183, 6184, 6230, 6231, 6232

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie

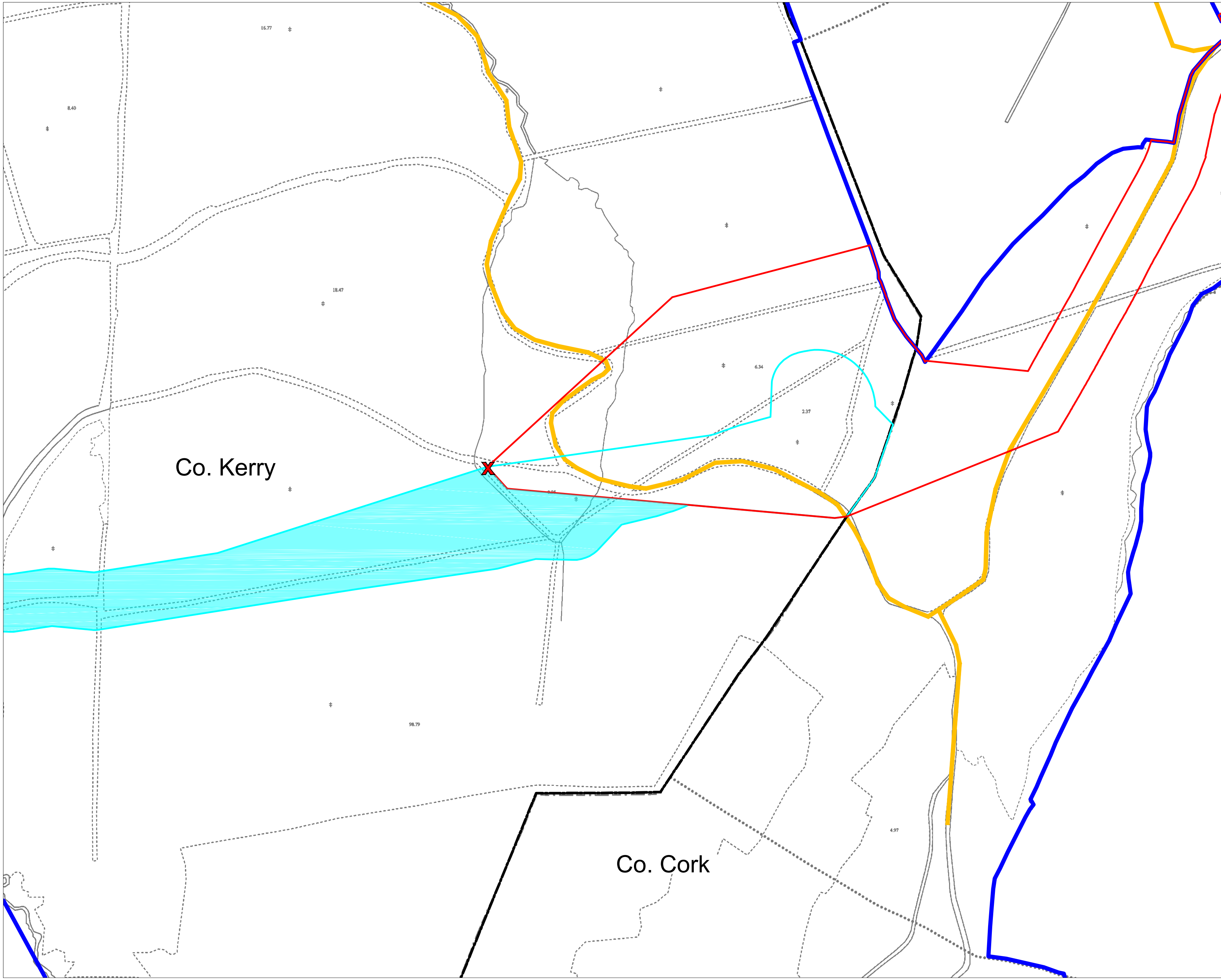


Drawing Legend

- Application Boundary An Bord Pleanala
- Landowners Boundary
- Application Boundary Kerry County Council
- Site Notice
- Wayleaves

DRAWING TITLE: **Site Location Map**	
PROJECT TITLE: **Knocknamork Grid Connection Infrastructure, An Bord Pleanala**	
DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210732	DRAWING No.: 210732 - 02
SCALE: 1:40,000 @ A3	DATE: 26.07.2022
OS SHEET No.: 6134, 6135, 6136, 6137, 6180, 6181, 6182, 6183, 6228, 6229, 6230, 6276, 6277	

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie



Drawing Legend

- Application Boundary An Bord Pleanala
- Landowners Boundary
- Application Boundary Kerry County Council
- Site Notice
- Wayleaves

N

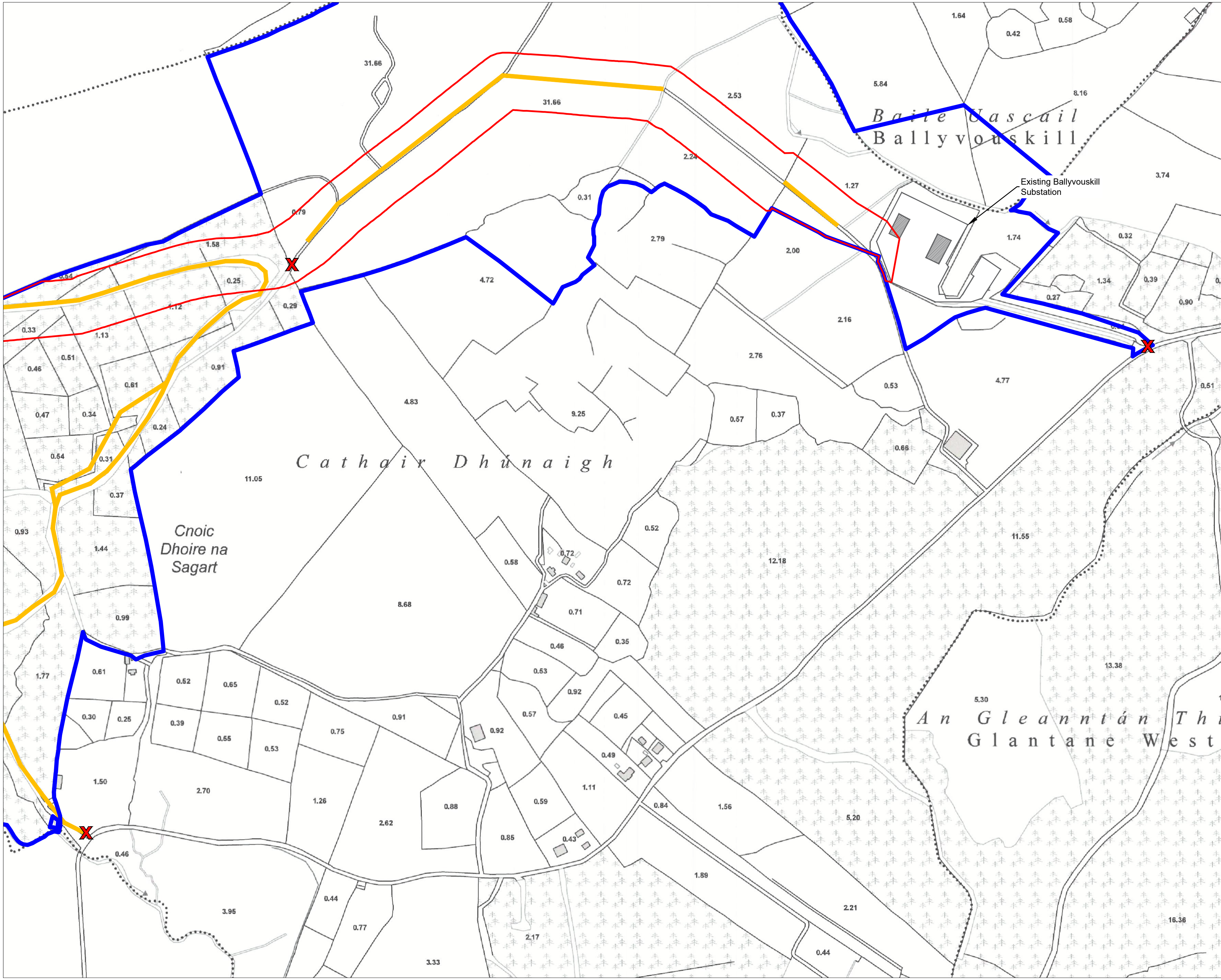
DRAWING TITLE:
Site Location Map Sheet A

PROJECT TITLE:
Knocknamork Grid Connection Infrastructure, An Bord Pleanala

DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210732	DRAWING No.: 210732 - 02A
SCALE: 1:5,000 @ A3	DATE: 26.07.2022

OS SHEET No.: 6134, 6135, 6136, 6137, 6180, 6181, 6182, 6183, 6228, 6229, 6230, 6276, 6277

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie



Drawing Legend

- Application Boundary An Bord Pleanala
- Landowners Boundary
- Site Notice
- Wayleaves

DRAWING TITLE:

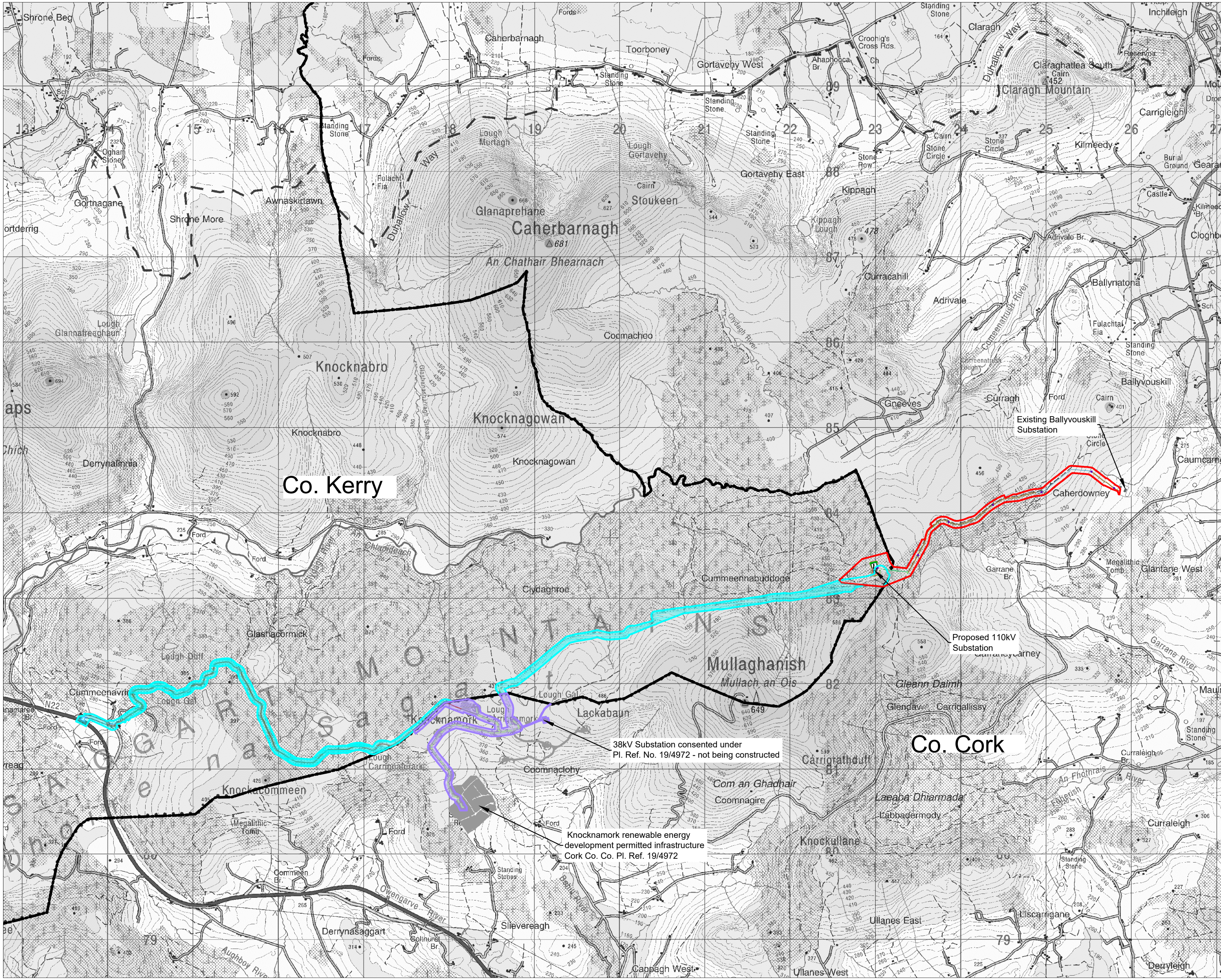
Site Location Map Sheet B

PROJECT TITLE: Knocknamork Grid Connection Infrastructure, An Bord Pleanala

DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210732	DRAWING No.: 210732 - 02B
SCALE: 1:5,000 @ A3	DATE: 26.07.2022

OS SHEET No.: 6134, 6135, 6136, 6137, 6180, 6181, 6182, 6183, 6228, 6229, 6230, 6276, 6277

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie



Drawing Legend

- Application Boundary An Bord Pleanala
- Application Boundary Cork County Council
- Application Boundary Kerry County Council
- Proposed 110kV Electrical Cabling
- Permitted Knocknamork renewable energy development permitted infrastructure Cork Co. Co. Pl. Ref. 19/4972
- Proposed Electrical Cabling Maintenance Track
- Proposed Substation Access Track
- Joint Bay
- Cut
- Fill
- Borrow Pit
- County Border

DRAWING TITLE:

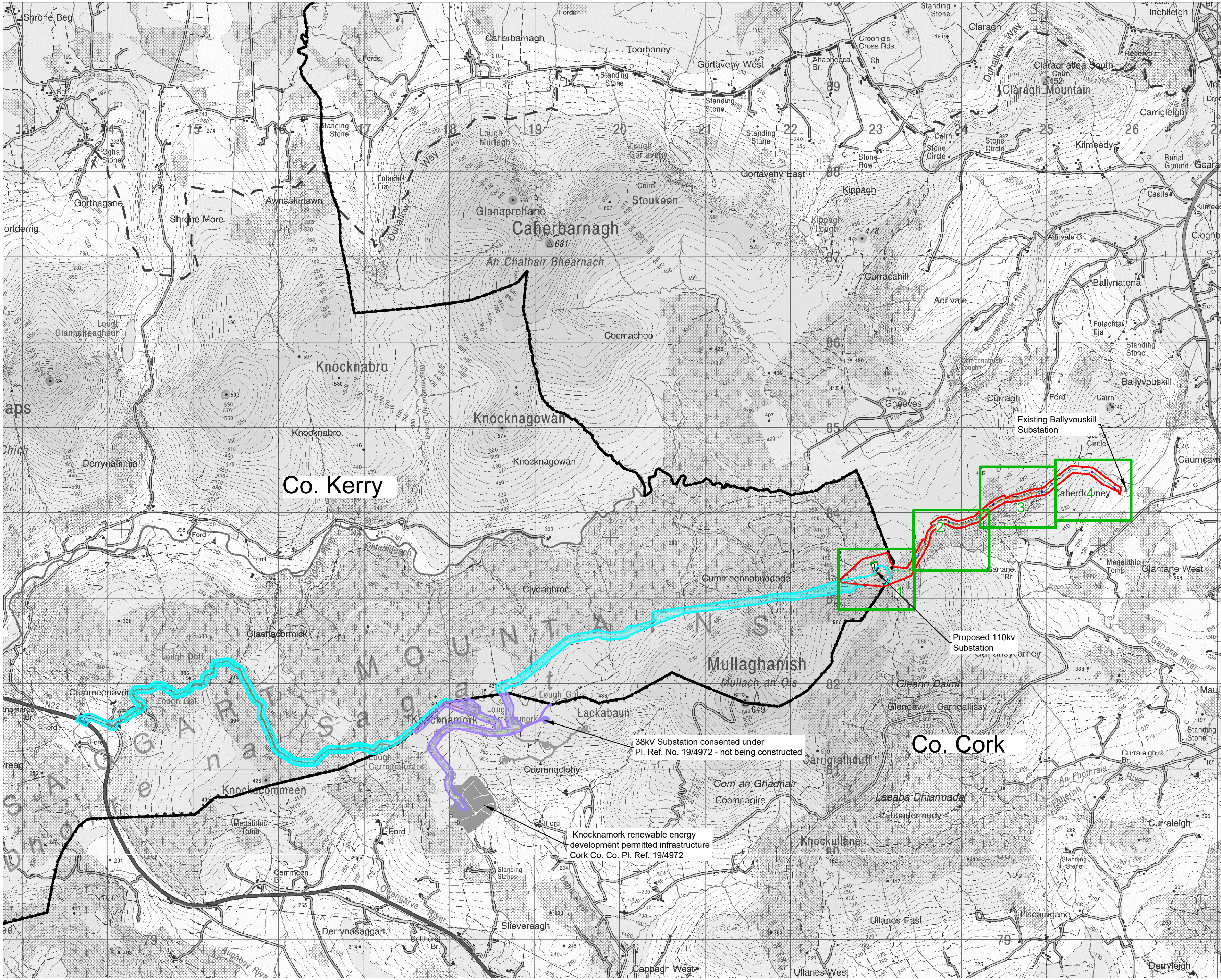
Site Layout Overview

PROJECT TITLE: **Knocknamork Grid Connection Infrastructure, An Bord Pleanala**

DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210732	DRAWING No.: 210732 - 03
SCALE: 1:40,000 @ A3	DATE: 26.07.2022

OS SHEET No.: 6134, 6135, 6136, 6137, 6180, 6181, 6182, 6183, 6228, 6229, 6230, 6276, 6277

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie



Drawing Legend

- Application Boundary An Bord Pleanala
- Application Boundary Cork County Council
- Application Boundary Kerry County Council
- Proposed 110kV Electrical Cabling
- Permitted Knocknamork renewable energy development permitted infrastructure Cork Co. Co. Pl. Ref. 19/4972
- Proposed Electrical Cabling Maintenance Track
- Proposed Substation Access Track
- Joint Bay
- Cut
- Fill
- Borrow Pit
- County Border

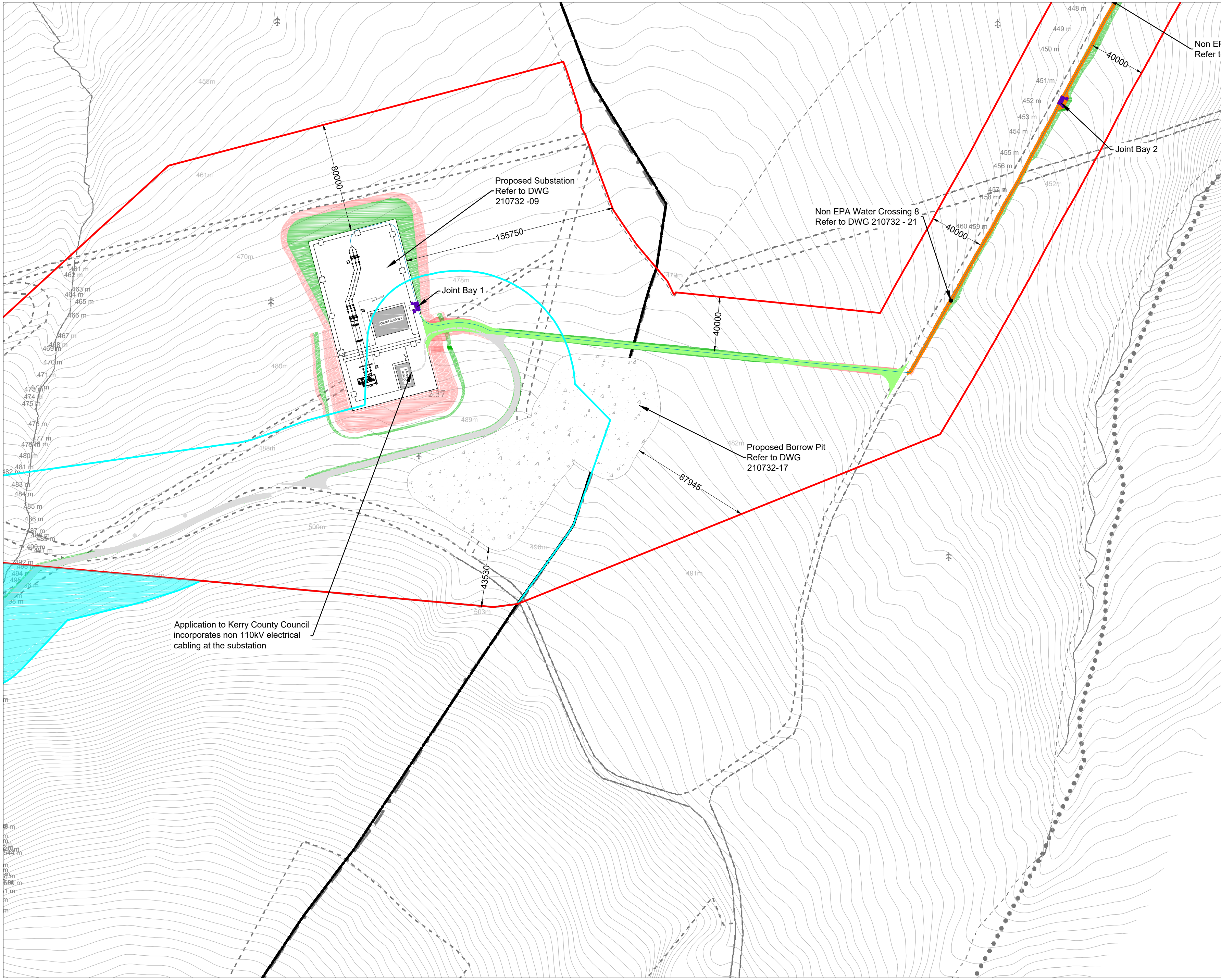
Ordnance Survey Ireland Licence No. CYAL50267517© Ordnance Survey Ireland/Government of Ireland

DRAWING TITLE:
Site Layout Keyplan

PROJECT TITLE:
Knocknamork Grid Connection Infrastructure, An Bord Pleanala

DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210732	DRAWING No.: 210732 - 04
SCALE: 1:40,000 @ A3	DATE: 26.07.2022
OS SHEET No.: 6134, 6135, 6136, 6137, 6180, 6181, 6182, 6183, 6228, 6229, 6230, 6276, 6277	

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie



Drawing Legend

- Application Boundary An Bord Pleanala
- Application Boundary Kerry County Council
- Proposed 110kV Electrical Cabling
- Proposed Electrical Cabling Maintenance Track
- Proposed Substation Access Track
- Joint Bay
- Cut
- Fill
- Borrow Pit
- County Border

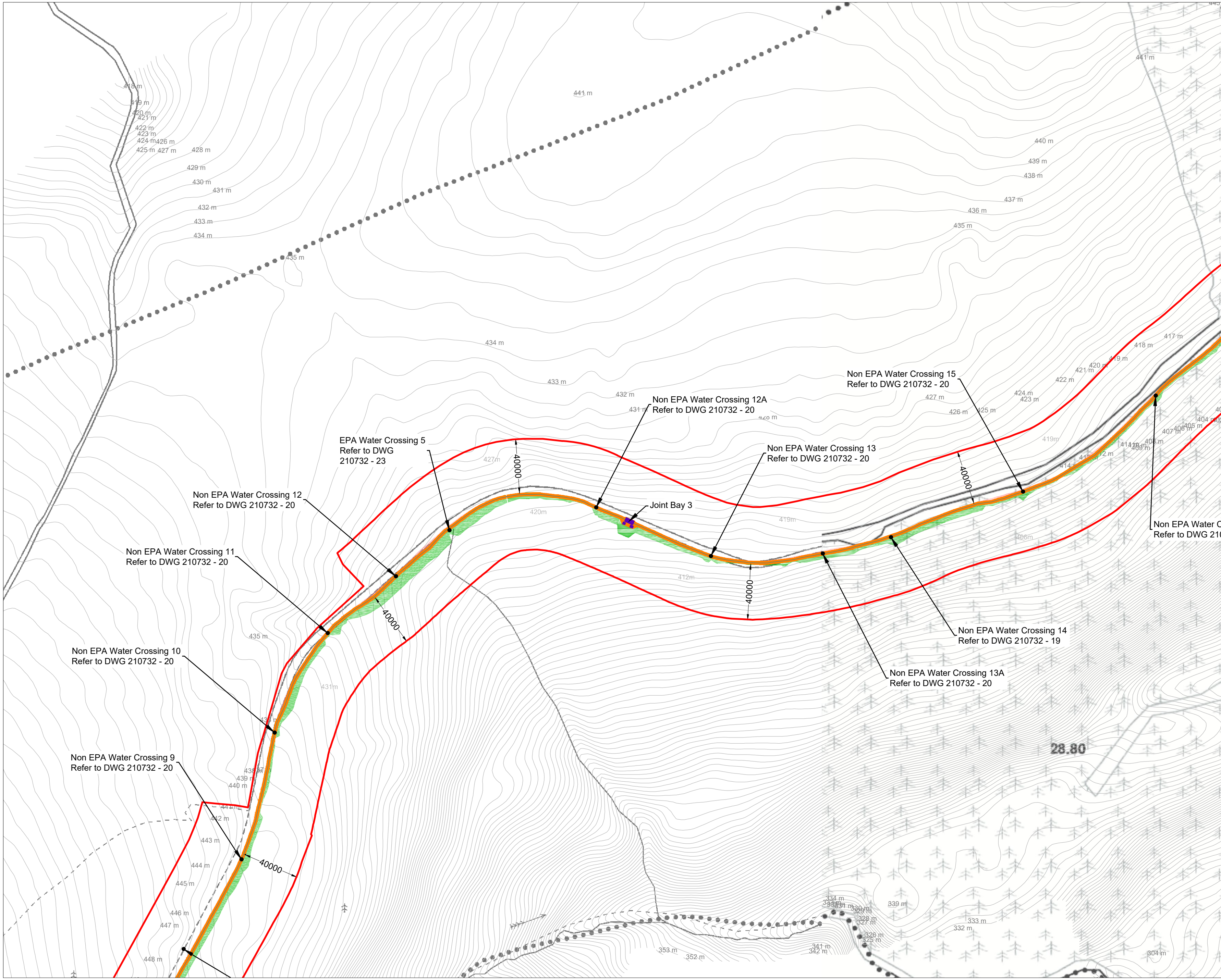
N

DRAWING TITLE:
Site Layout Plan
Sheet 1 of 4

PROJECT TITLE:
Knocknamork Grid Connection Infrastructure, An Bord Pleanala

DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210732	DRAWING No.: 210732 - 05
SCALE: 1:2,500 @ A3	DATE: 26.07.2022
OS SHEET No.: 6134, 6135, 6136, 6137, 6180, 6181, 6182, 6183, 6228, 6229, 6230, 6276, 6277	

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie



Drawing Legend

- Application Boundary An Bord Pleanala
- Proposed 110kV Electrical Cabling
- Proposed Electrical Cabling Maintenance Track
- Joint Bay
- Cut
- Fill

N

Ordnance Survey Ireland Licence No. CYAL50267517 © Ordnance Survey Ireland/Government of Ireland

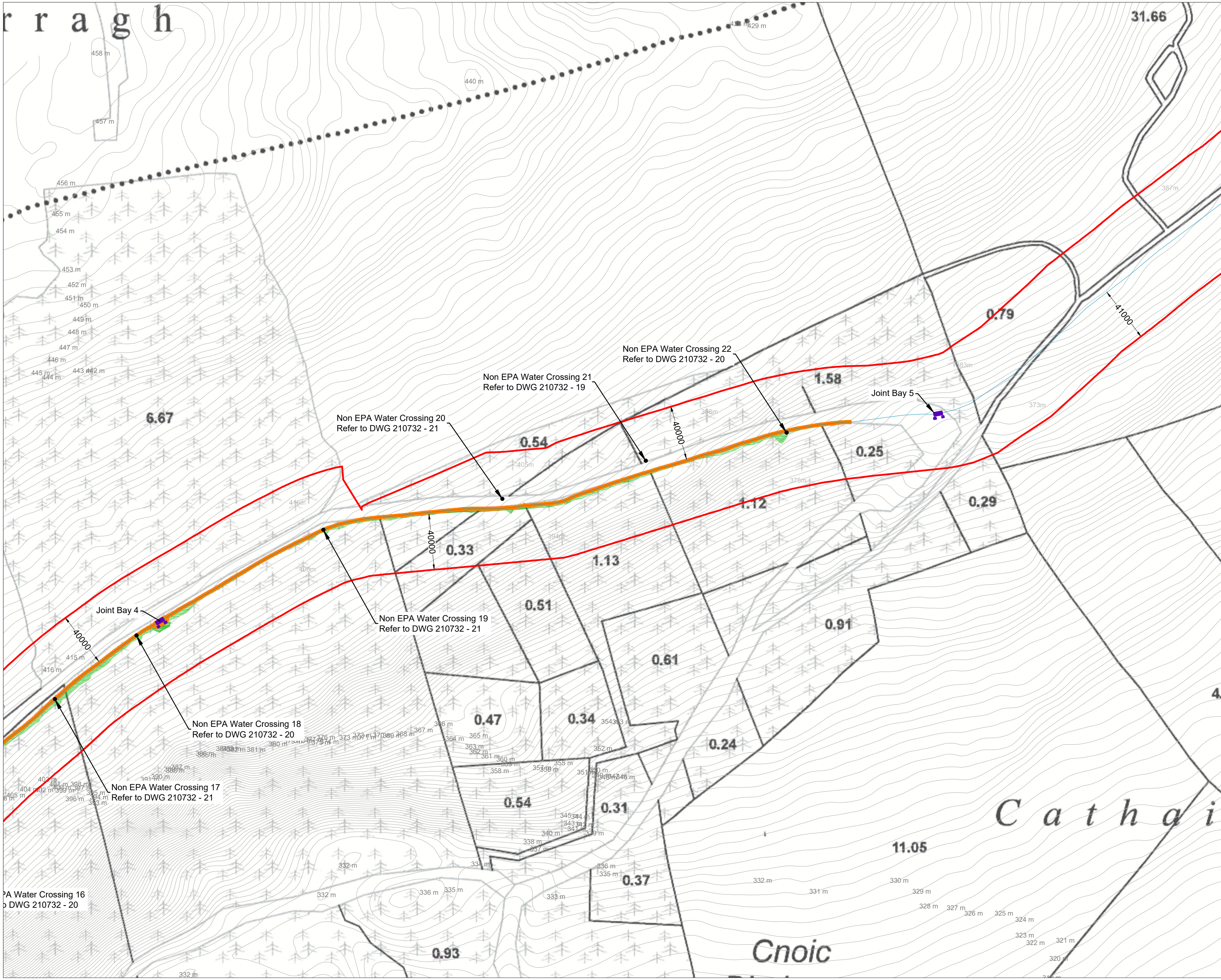
DRAWING TITLE:
Site Layout Plan Sheet 2 of 4

PROJECT TITLE:
Knocknamork Grid Connection Infrastructure, An Bord Pleanala

DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210732	DRAWING No.: 210732 - 06
SCALE: 1:2,500 @ A3	DATE: 26.07.2022

OS SHEET No.: 6134, 6135, 6136, 6137, 6180, 6181, 6182, 6183, 6228, 6229, 6230, 6276, 6277

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie



Drawing Legend

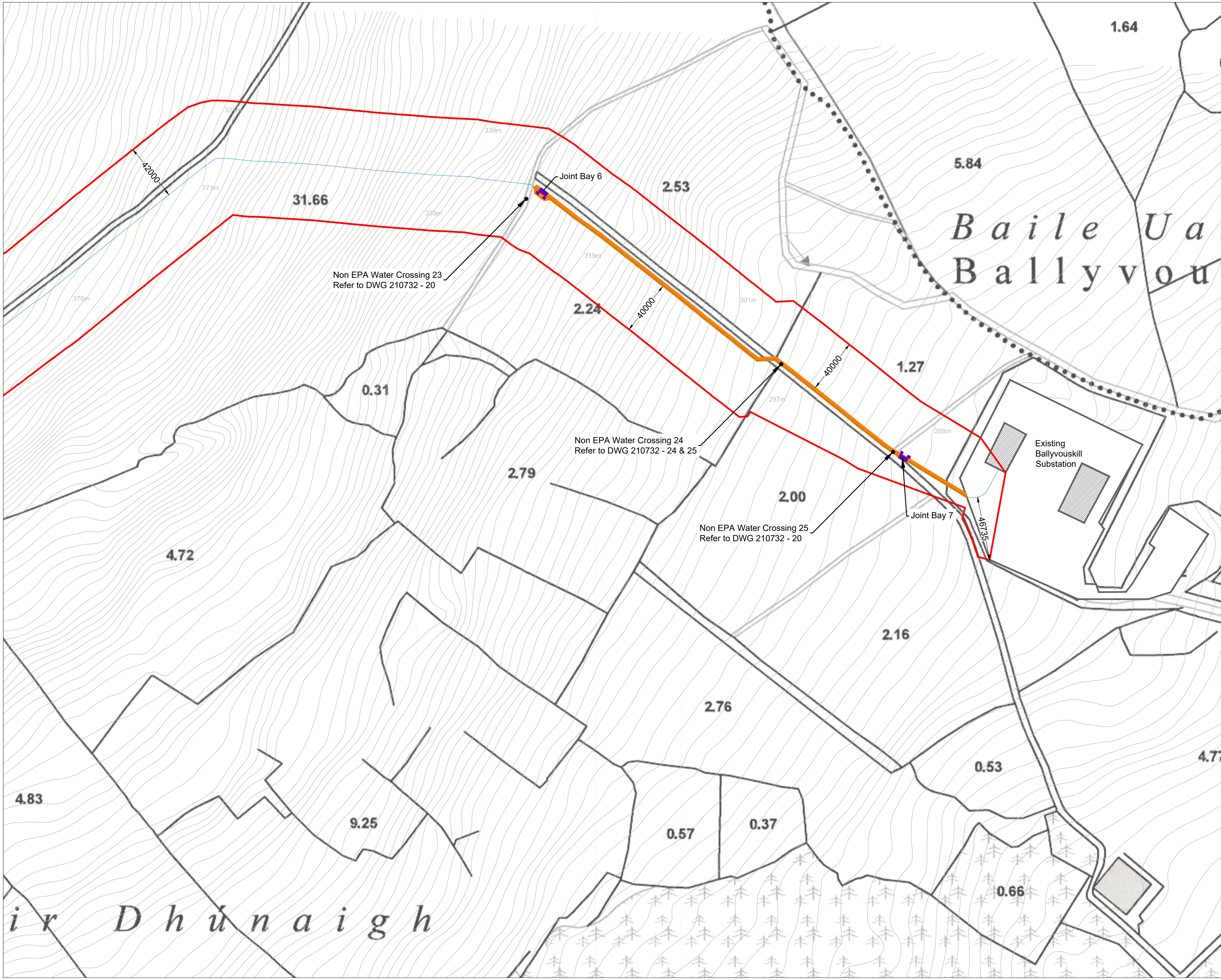
- Application Boundary An Bord Pleanala
- Proposed 110kV Electrical Cabling
- Proposed Electrical Cabling Maintenance Track
- Joint Bay
- Cut
- Fill

N

Ordnance Survey Ireland Licence No. CYAL50267517© Ordnance Survey Ireland/Government of Ireland

DRAWING TITLE: **Site Layout Plan Sheet 3 of 4**	
PROJECT TITLE: **Knocknamork Grid Connection Infrastructure, An Bord Pleanala**	
DRAWING BY: **Joseph O Brien**	CHECKED BY: **Meabhann Crowe**
PROJECT No.: **210732**	DRAWING No.: **210732 - 07**
SCALE: **1:2,500 @ A3**	DATE: **26.07.2022**
OS SHEET No.: 6134, 6135, 6136, 6137, 6180, 6181, 6182, 6183, 6228, 6229, 6230, 6276, 6277	

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie



Drawing Legend

Application Boundary An Bord Pleanala	
Proposed 110kV Electrical Cabling	
Proposed Electrical Cabling Maintenance Track	
Joint Bay	
Cut	
Fill	

N

Ordnance Survey Ireland Licence No. CYAL50267517© Ordnance Survey Ireland/Government of Ireland

DRAWING TITLE: **Site Layout Plan Sheet 4 of 4**	
PROJECT TITLE: **Knocknamork Grid Connection Infrastructure, An Bord Pleanala**	
DRAWING BY: **Joseph O Brien**	CHECKED BY: **Meabhann Crowe**
PROJECT No.: **210732**	DRAWING No.: **210732 - 08**
SCALE: **1:2,500 @ A3**	DATE: **26.07.2022**
OS SHEET No.: 6134, 6135, 6136, 6137, 6180, 6181, 6182, 6183, 6228, 6229, 6230, 6276, 6277	

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie

APPENDIX 4-1B

SITE LAYOUT PLANNING DRAWINGS – CORK COUNTY COUNCIL

Drawing Legend

- Application Boundary Cork County Council
- Application Boundary Kerry County Council
- Application Boundary An Bord Pleanala

Ordnance Survey Ireland Licence No. CYAL50267517© Ordnance Survey Ireland/Government of Ireland

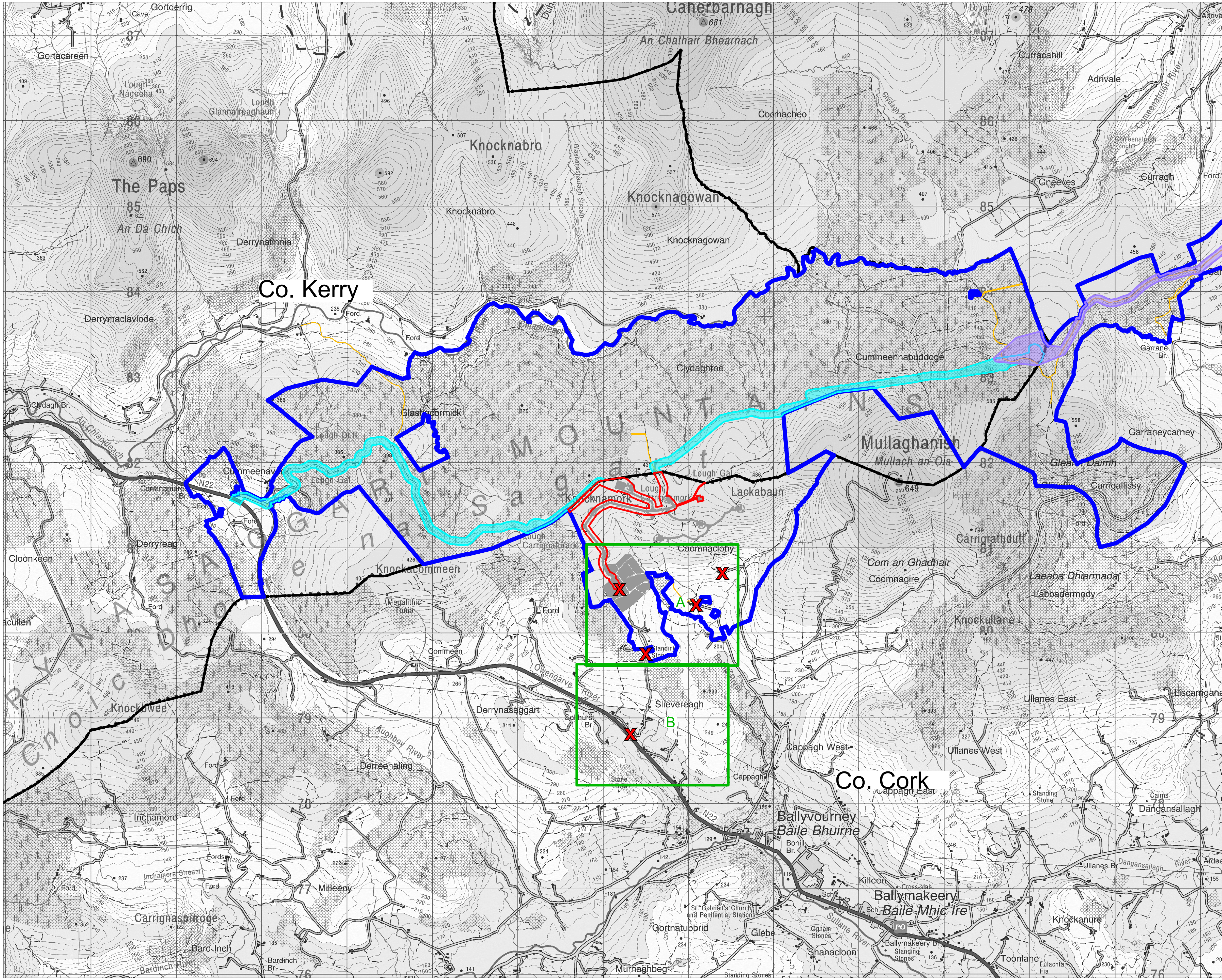
N

DRAWING TITLE:

Location Context Map

PROJECT TITLE: Knocknamork Grid Connection Infrastructure, Co. Cork	
DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210732	DRAWING No.: 210732 - 01
SCALE: 1:50,000 @ A3	DATE: 26.07.2022
OS SHEET No.: 6135, 6136, 6137, 6182, 6183, 6184, 6230, 6231, 6232	

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie



Drawing Legend

- Application Boundary Cork County Council
- Application Boundary Kerry County Council
- Permitted Knocknamork renewable energy development permitted infrastructure Cork Co. Co. Pl. Ref. 19/4972
- Landowners Boundary
- X Site Notice
- Wayleaves
- County Border

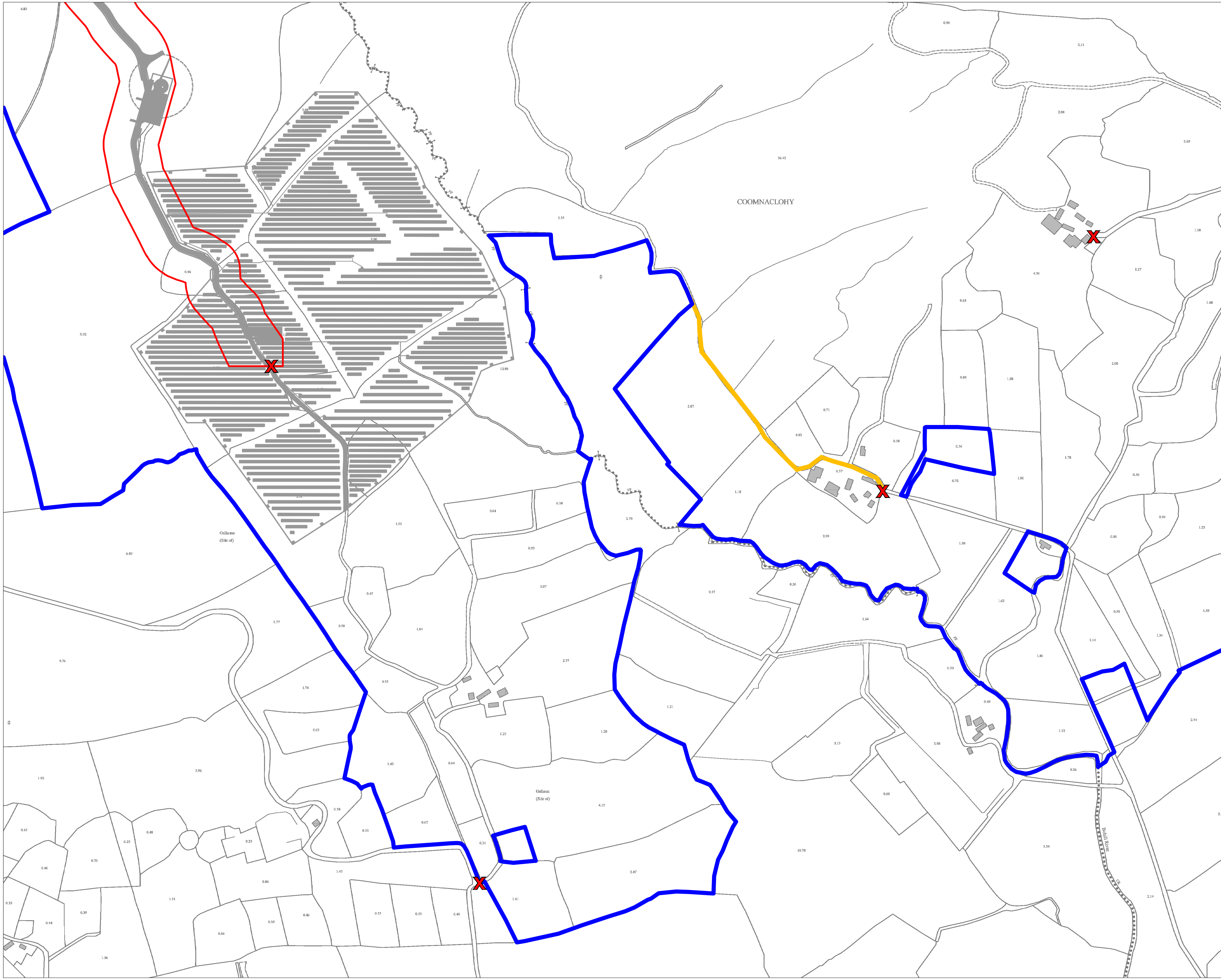
N

DRAWING TITLE:

Site Location Map

PROJECT TITLE: Knocknamork Grid Connection Infrastructure, Co. Cork	
DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210732	DRAWING No.: 210732 - 02
SCALE: 1:40,000 @ A3	DATE: 26.07.2022
OS SHEET No.: 6134, 6135, 6136, 6137, 6180, 6181, 6182, 6183, 6228, 6229, 6230, 6276, 6277	

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie



Drawing Legend

- Application Boundary Cork County Council
- Permitted Knocknamork renewable energy development permitted infrastructure Cork Co. Co. Pl. Ref. 19/4972
- Landowners Boundary
- Site Notice
- Wayleaves

DRAWING TITLE:

Site Location Map Sheet A

PROJECT TITLE:

Knocknamork Grid Connection Infrastructure, Co. Cork

DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210732	DRAWING No.: 210732 - 02A
SCALE: 1:5,000 @ A3	DATE: 26.07.2022
OS SHEET No.: 6134, 6135, 6136, 6137, 6180, 6181, 6182, 6183, 6228, 6229, 6230, 6276, 6277	

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@mkoireland.ie
Website: www.mkoireland.ie

Drawing Legend

X Site Notice

N

DRAWING TITLE:

Site Location Map Sheet B

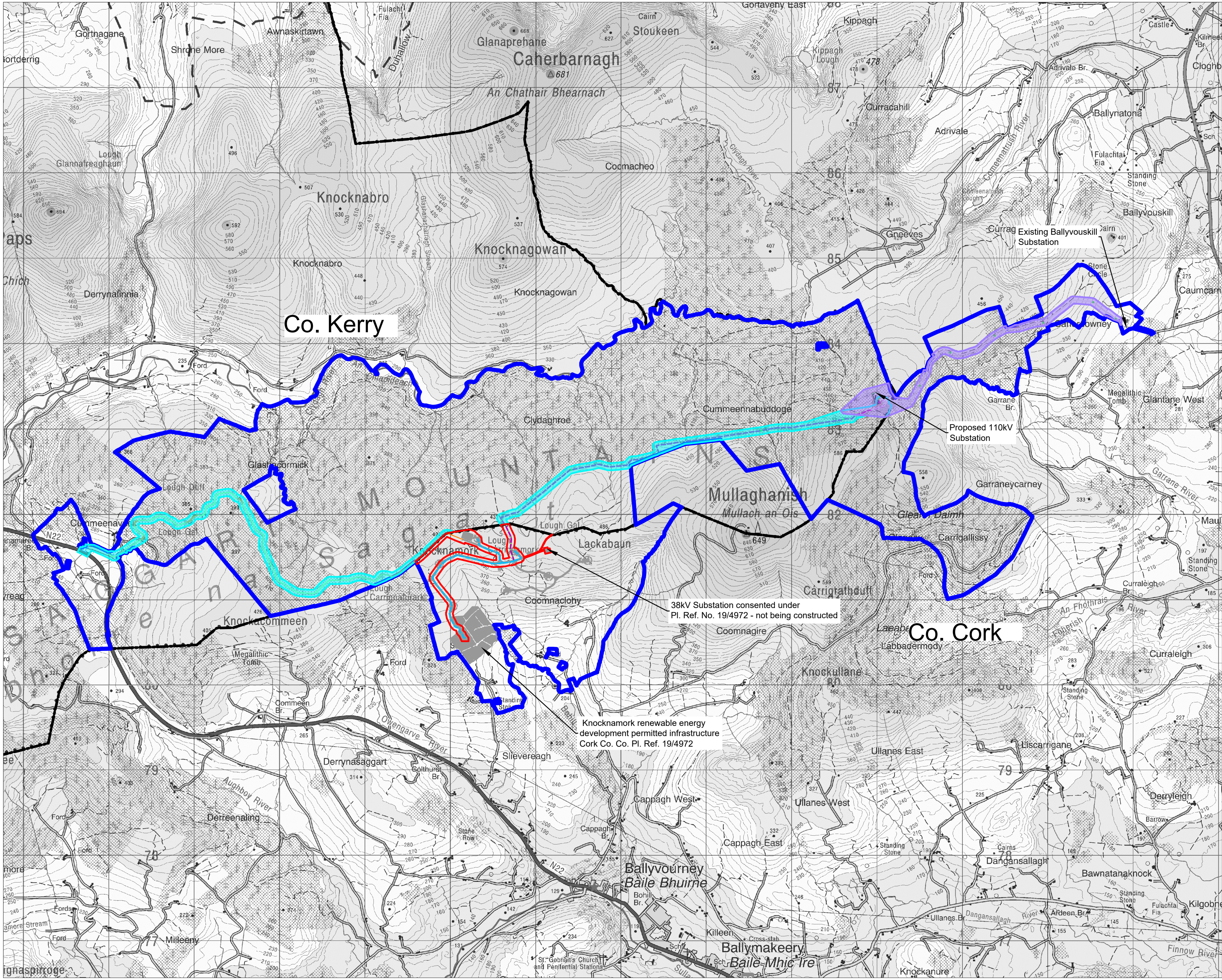
PROJECT TITLE:

Knocknamork Grid Connection Infrastructure, Co. Cork

DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210732	DRAWING No.: 210732 - 02B
SCALE: 1:5,000 @ A3	DATE: 26.07.2022

OS SHEET No.: 6134, 6135, 6136, 6137, 6180, 6181, 6182, 6183, 6228, 6229, 6230, 6276, 6277

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie



Drawing Legend

- Application Boundary Cork County Council
- Landowners Boundary
- Application Boundary Kerry County Council
- Application Boundary An Bord Pleanala
- 33kV Electrical Cabling Route
- Internal 33kV Electrical Cabling
- Permitted Knocknamork renewable energy development permitted infrastructure Cork Co. Co. Pl. Ref. 19/4972
- Proposed New Access Track
- Upgrade of Existing Track for Electrical Cabling Maintenance
- Cut
- Fill
- Borrow Pit
- County Border

DRAWING TITLE:

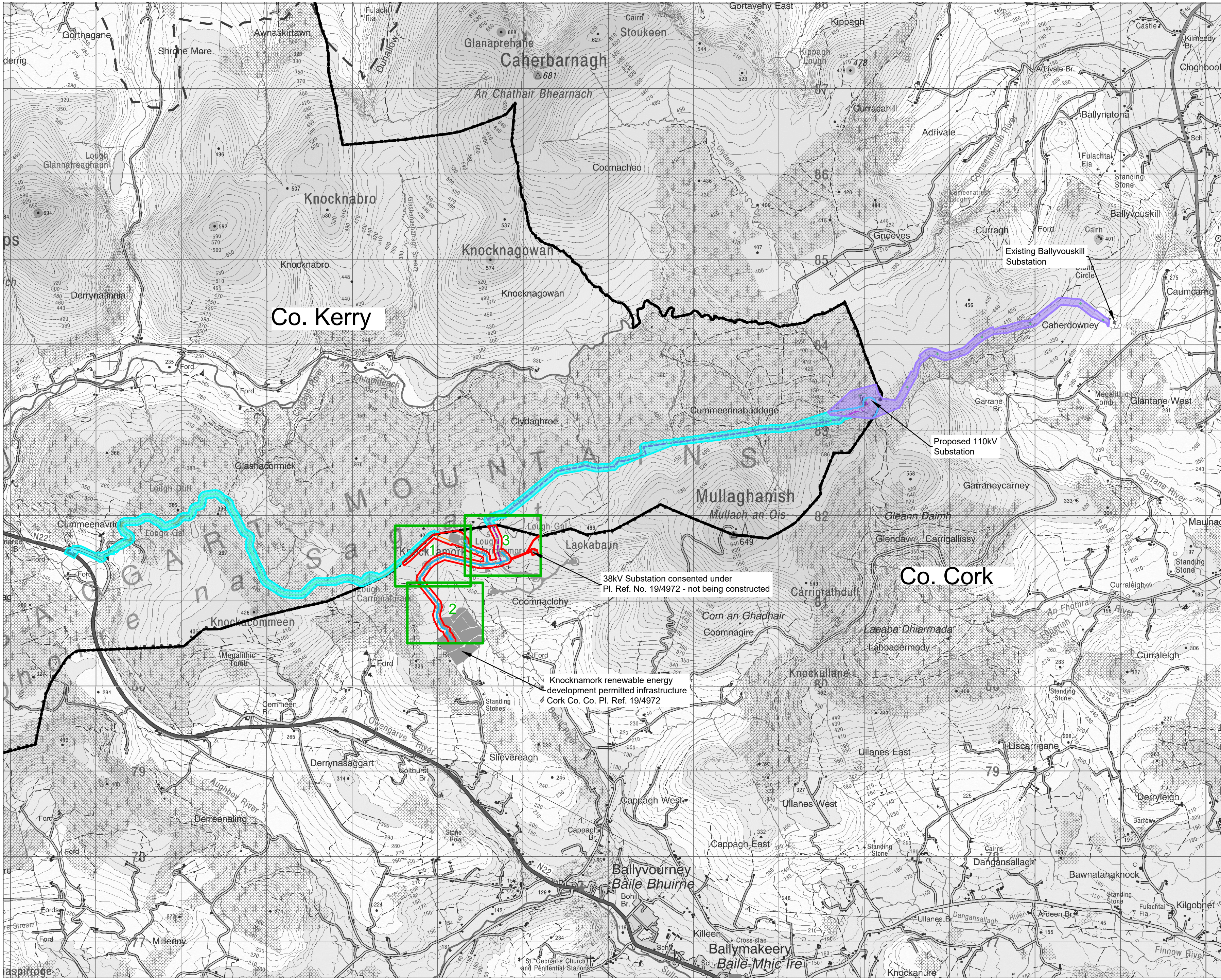
Site Layout Overview

PROJECT TITLE:

Knocknamork Grid Connection Infrastructure, Co. Cork

DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210732	DRAWING No.: 210732 - 03
SCALE: 1:40,000 @ A3	DATE: 26.07.2022
OS SHEET No.: 6134, 6135, 6136, 6137, 6180, 6181, 6182, 6183, 6228, 6229, 6230, 6276, 6277	

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie



Drawing Legend

- Application Boundary Cork County Council
- Application Boundary Kerry County Council
- Application Boundary An Bord Pleanala
- 33kV Electrical Cabling Route
- Internal 33kV Electrical Cabling
- Permitted Knocknamork renewable energy development permitted infrastructure Cork Co. Co. Pl. Ref. 19/4972
- Proposed New Access Track
- Upgrade of Existing Track for Electrical Cabling Maintenance
- Turbine Delivery Access Temporary Hardcore Surface Area
- Cut
- Fill
- Borrow Pit
- County Border

DRAWING TITLE:

Site Layout Keyplan

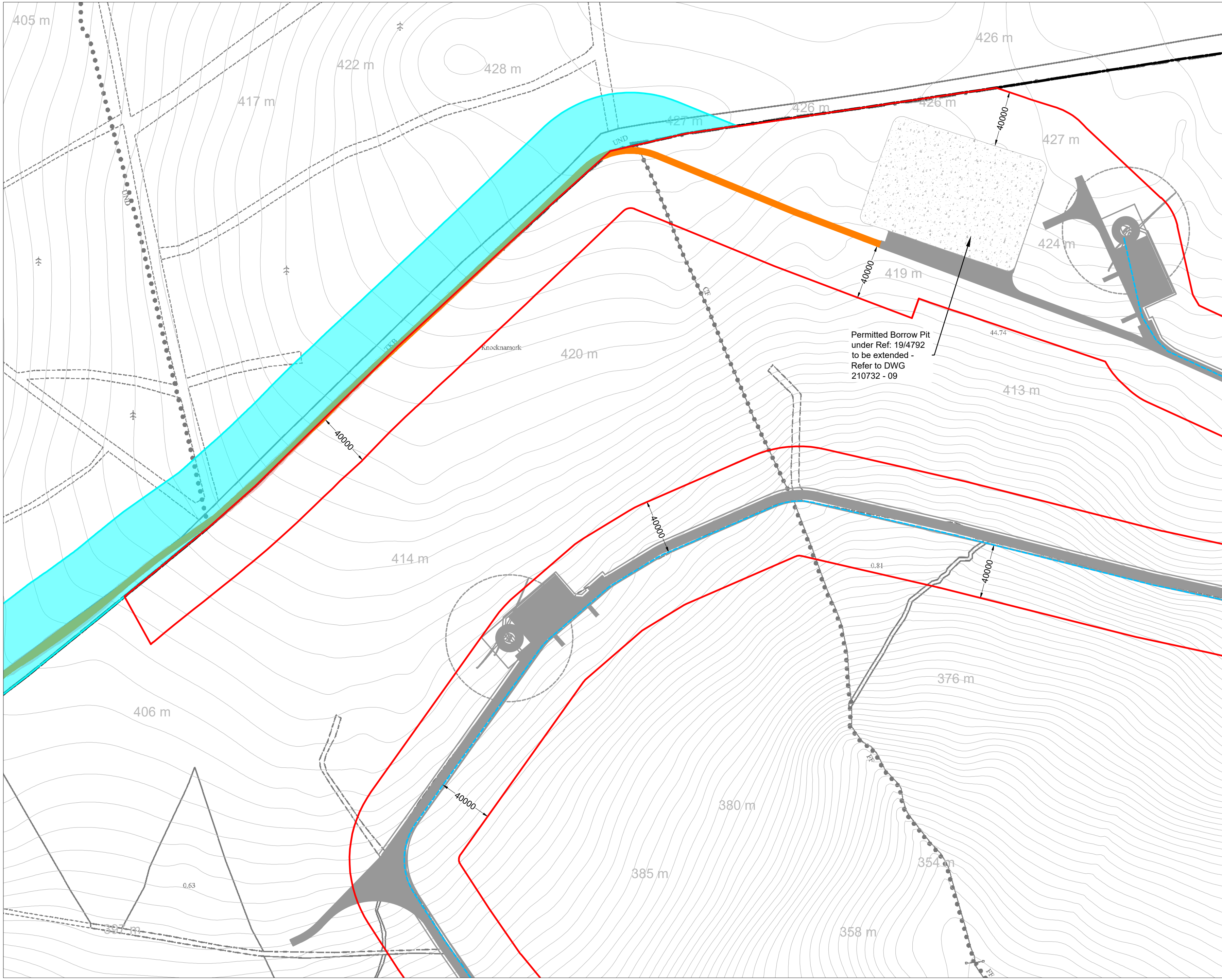
PROJECT TITLE:

Knocknamork Grid Connection Infrastructure, Co. Cork

DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210732	DRAWING No.: 210732 - 04
SCALE: 1:40,000 @ A3	DATE: 26.07.2022

OS SHEET No: 6134, 6135, 6136, 6137, 6180, 6181, 6182, 6183, 6228, 6229, 6230, 6276, 6277

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@mkoireland.ie
Website: www.mkoireland.ie



Drawing Legend

- Application Boundary Cork County Council
- Application Boundary Kerry County Council
- Permitted Knocknamork renewable energy development permitted infrastructure Cork Co. Co. Pl. Ref. 19/4972
- Proposed New Access Track
- Internal 33kV Electrical Cabling
- Cut
- Fill
- Borrow Pit
- County Border

N

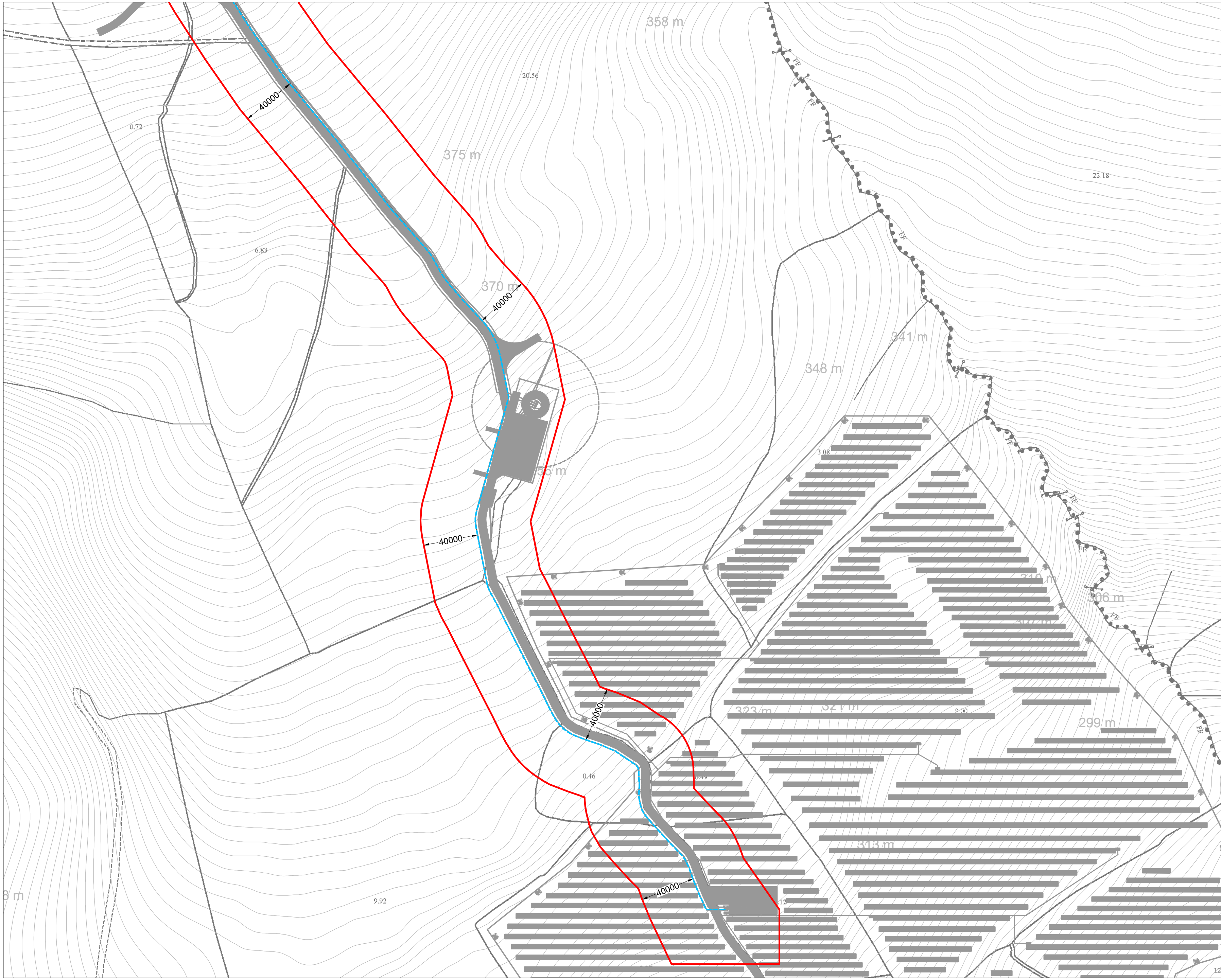
DRAWING TITLE:
Site Layout Plan Sheet 1 of 3

PROJECT TITLE:
Knocknamork Grid Connection Infrastructure, Co. Cork

DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210732	DRAWING No.: 210732 - 05
SCALE: 1:2,500 @ A3	DATE: 26.07.2022

OS SHEET No.: 6134, 6135, 6136, 6137, 6180, 6181, 6182, 6183, 6228, 6229, 6230, 6276, 6277

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie



Drawing Legend

- Application Boundary Cork County Council
- Permitted Knocknamork renewable energy development permitted infrastructure Cork Co. Co. Pl. Ref. 19/4972
- Internal 33kV Electrical Cabling

N

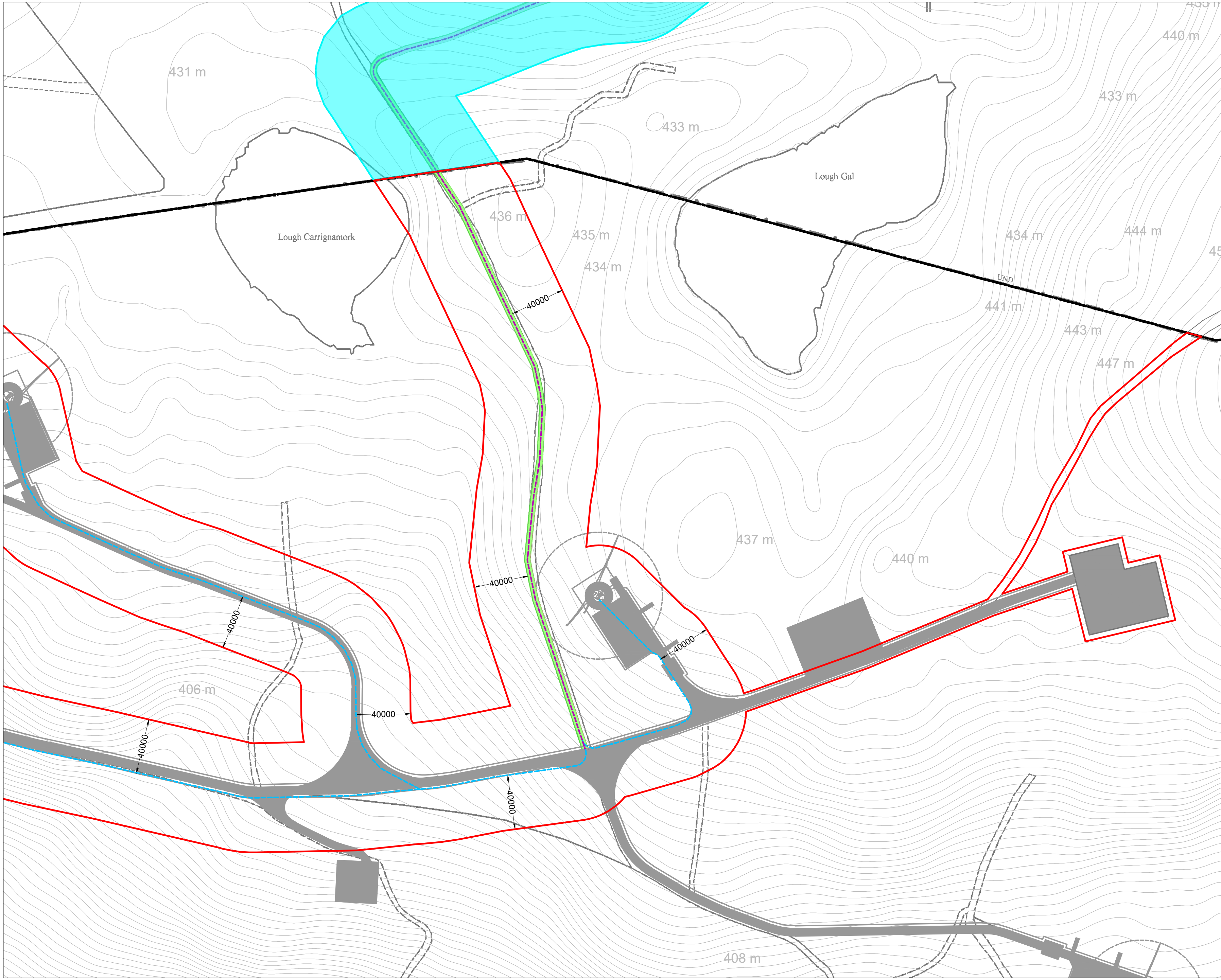
DRAWING TITLE:
Site Layout Plan Sheet 2 of 3

PROJECT TITLE:
Knocknamork Grid Connection Infrastructure, Co. Cork

DRAWING BY: **Joseph O Brien**	CHECKED BY: **Meabhann Crowe**
PROJECT No.: **210732**	DRAWING No.: **210732 - 06**
SCALE: **1:2,500 @ A3**	DATE: **26.07.2022**

OS SHEET No.: 6134, 6135, 6136, 6137, 6180, 6181, 6182, 6183, 6228, 6229, 6230, 6276, 6277

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie



Drawing Legend

- Application Boundary Cork County Council
- Application Boundary Kerry County Council
- Permitted Knocknamork renewable energy development permitted infrastructure Cork Co. Co. Pl. Ref. 19/4972
- Upgrade of Existing Track for Electrical Cabling Maintenance
- 33kV Electrical Cabling Route
- Internal 33kV Electrical Cabling
- Cut
- Fill
- County Border

N

DRAWING TITLE:
Site Layout Plan Sheet 3 of 3

PROJECT TITLE:
Knocknamork Grid Connection Infrastructure, Co. Cork

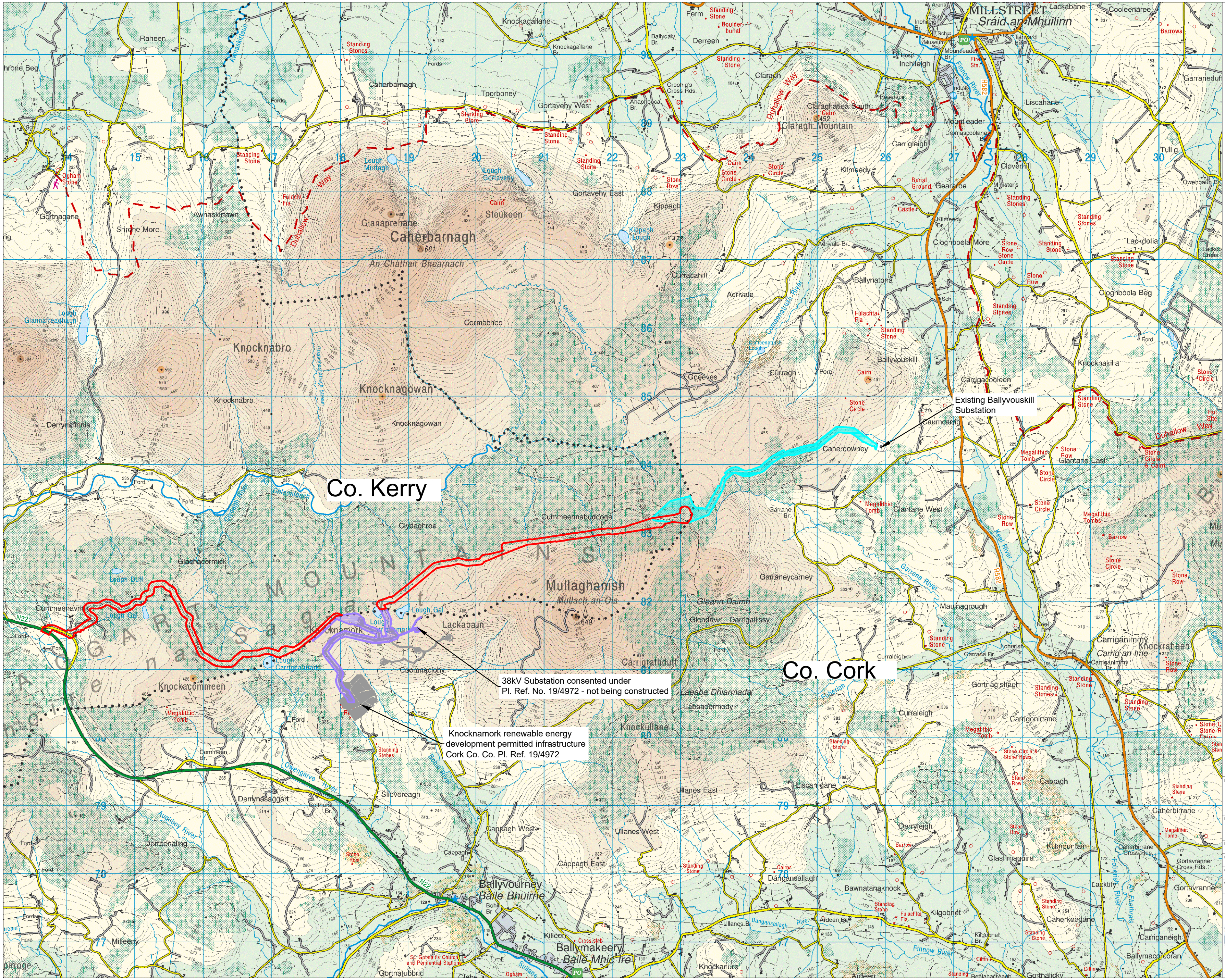
DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210732	DRAWING No.: 210732 - 07
SCALE: 1:2,500 @ A3	DATE: 26.07.2022

OS SHEET No.: 6134, 6135, 6136, 6137, 6180, 6181, 6182, 6183, 6228, 6229, 6230, 6276, 6277

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie

APPENDIX 4-1C

SITE LAYOUT PLANNING DRAWINGS – KERRY COUNTY COUNCIL



Drawing Legend

- Application Boundary Kerry County Council
- Application Boundary Cork County Council
- Application Boundary An Bord Pleanala

N

DRAWING TITLE:

Location Context Map

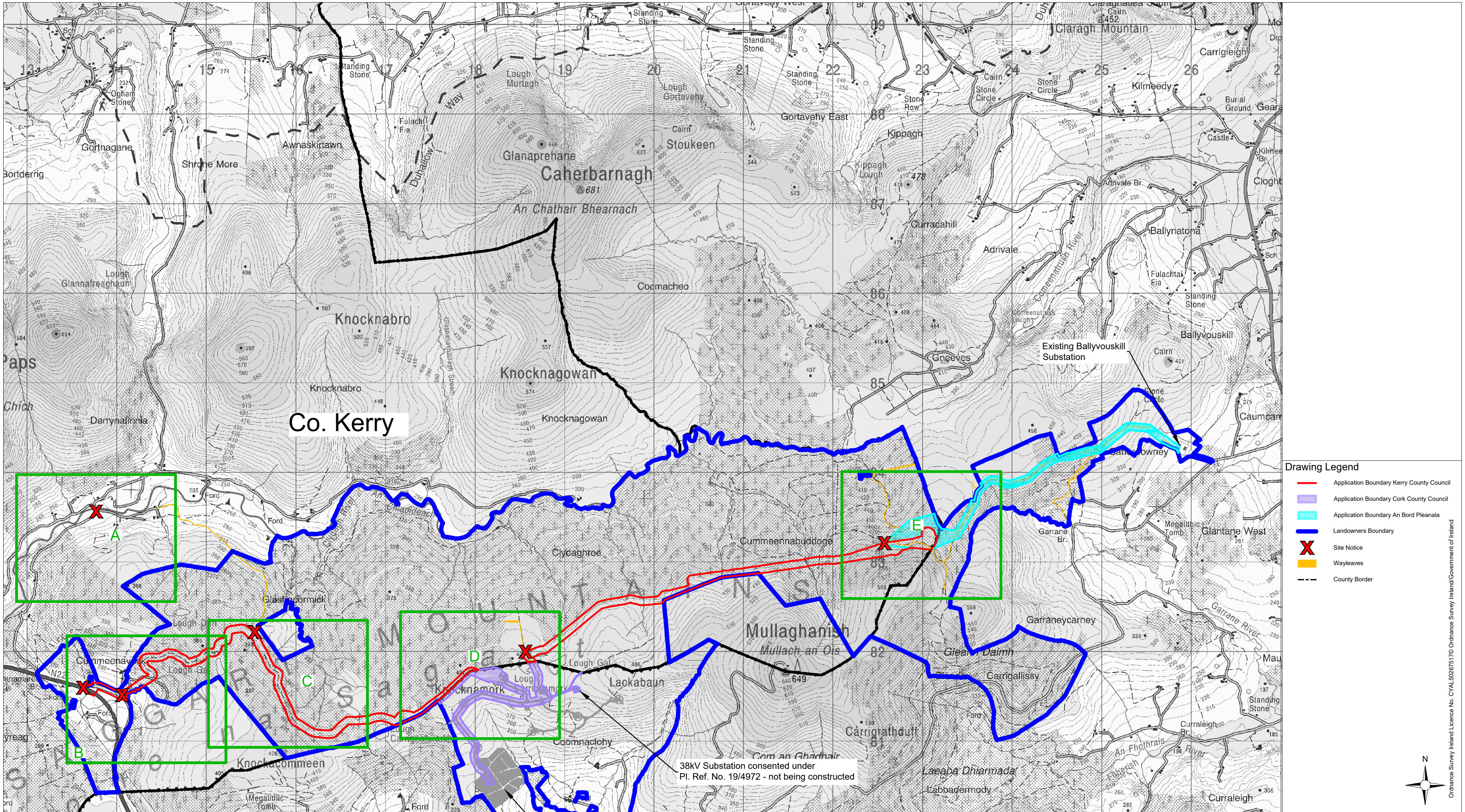
PROJECT TITLE:

Knocknamork Grid Connection Infrastructure, Co. Kerry

DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210732	DRAWING No.: 210732 - 01
SCALE: 1:50,000 @ A3	DATE: 26.07.2022

OS SHEET No.: 6135, 6136, 6137, 6182, 6183, 6184, 6230, 6231, 6232

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie



DRAWING TITLE:

Site Location Map

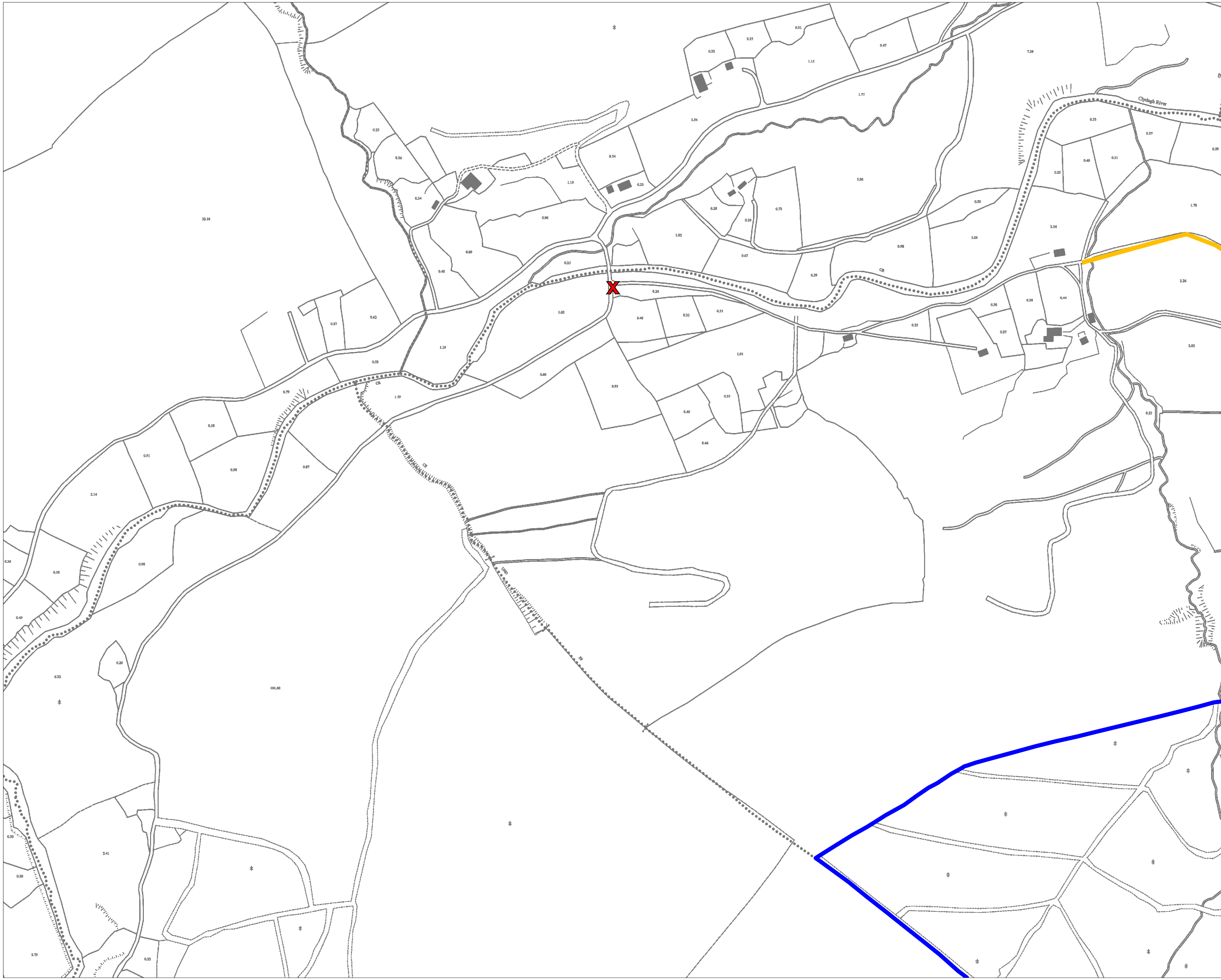
PROJECT TITLE:

Knocknamork Grid Connection Infrastructure, Co. Kerry

DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210732	DRAWING No.: 210732 - 02
SCALE: 1:40,000 @ A3	DATE: 26.07.2022

OS SHEET No.: 6134, 6135, 6136, 6137, 6180, 6181, 6182, 6183, 6228, 6229, 6230, 6276, 6277

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie



Drawing Legend

- Landowners Boundary
- Site Notice
- Wayleaves

N

DRAWING TITLE:

Site Location Map Sheet A

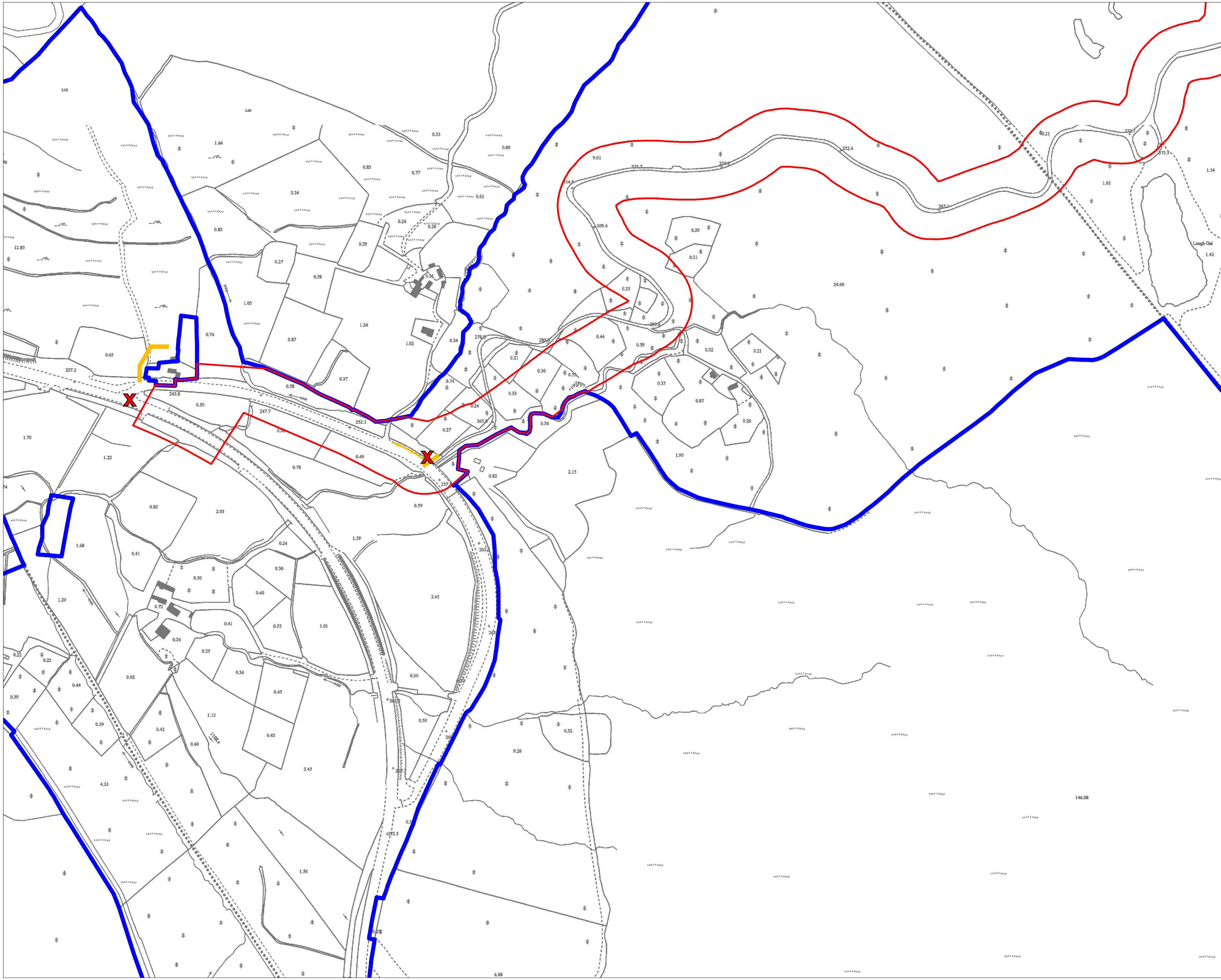
PROJECT TITLE:

Knocknamork Grid Connection Infrastructure, Co. Kerry

DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210732	DRAWING No.: 210732 - 02A
SCALE: 1:5,000 @ A3	DATE: 26.07.2022

OS SHEET No.: 6134, 6135, 6136, 6137, 6180, 6181, 6182, 6183, 6228, 6229, 6230, 6276, 6277

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@mkoireland.ie
Website: www.mkoireland.ie



Drawing Legend

- Application Boundary Kerry County Council
- Landowners Boundary
- X Site Notice
- Wayleaves

N

DRAWING TITLE:

Site Location Map Sheet B

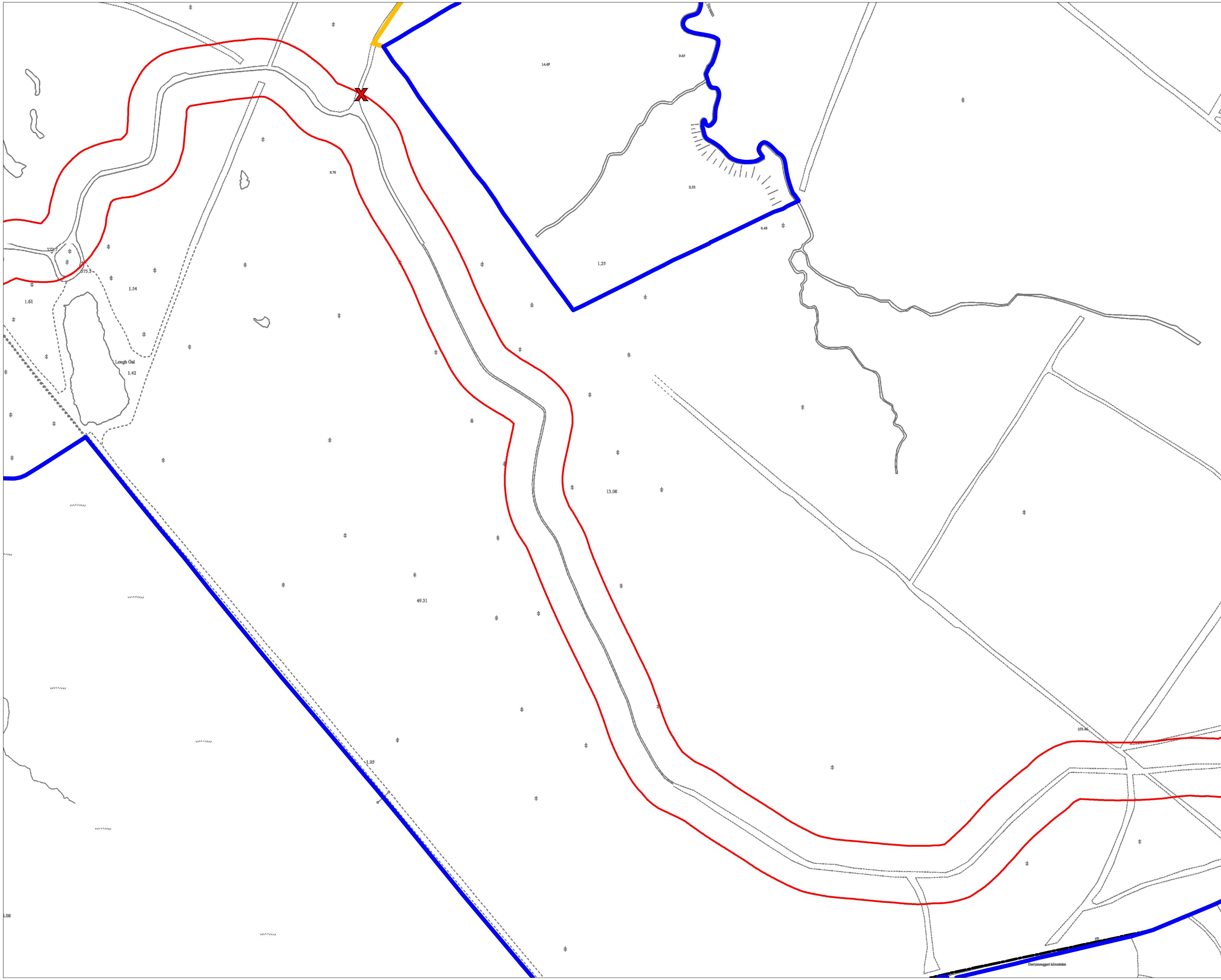
PROJECT TITLE:

Knocknamork Grid Connection Infrastructure, Co. Kerry

DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210732	DRAWING No.: 210732 - 02B
SCALE: 1:5,000 @ A3	DATE: 26.07.2022

OS SHEET No.: 6134, 6135, 6136, 6137, 6180, 6181, 6182, 6183, 6228, 6229, 6230, 6276, 6277

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie



Drawing Legend

- Application Boundary Kerry County Council
- Landowners Boundary
- Site Notice
- Wayleaves
- County Border

N

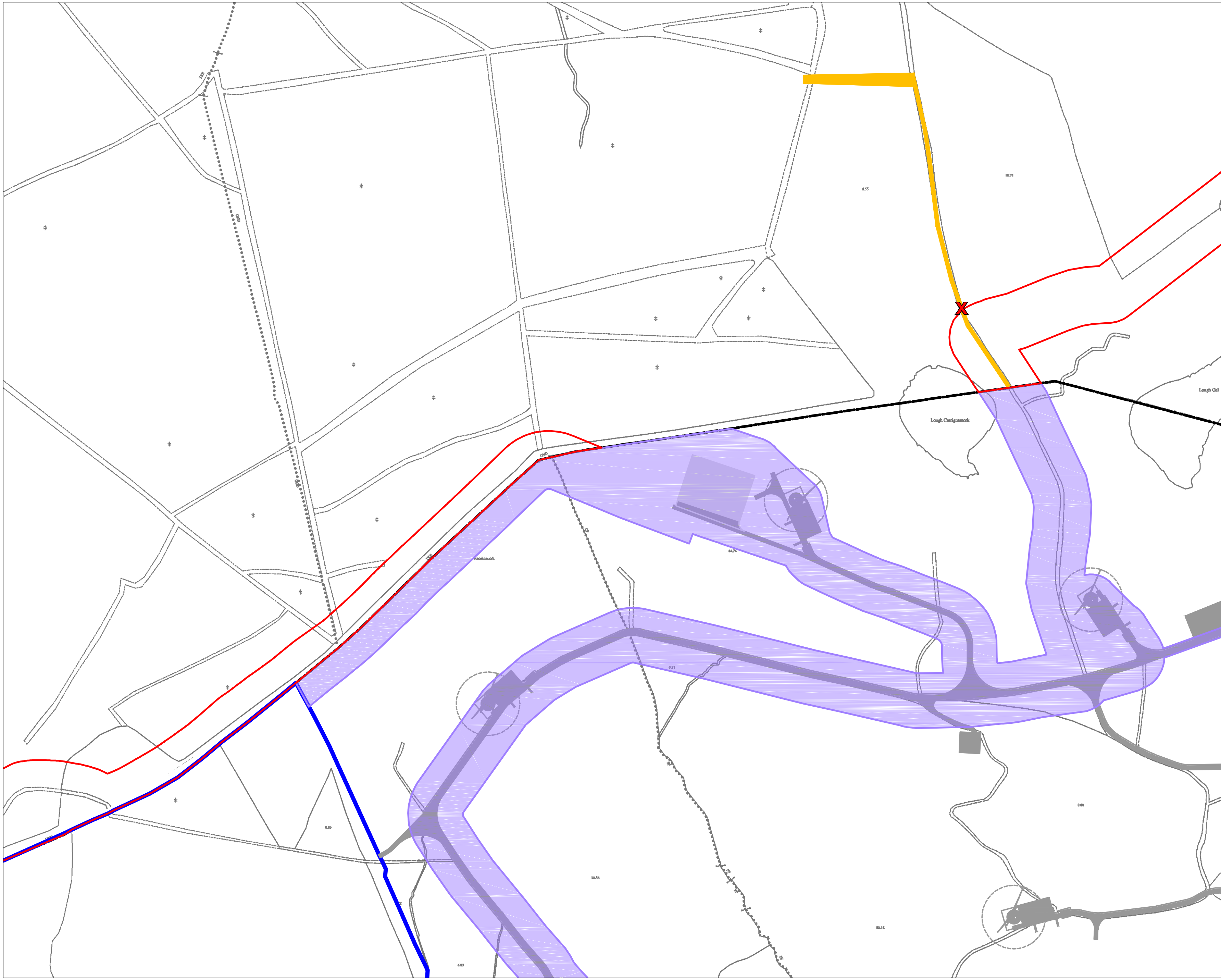
DRAWING TITLE:
Site Location Map Sheet C

PROJECT TITLE:
Knocknamork Grid Connection Infrastructure, Co. Kerry

DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210732	DRAWING No.: 210732 - 02C
SCALE: 1:5,000 @ A3	DATE: 26.07.2022

OS SHEET No.: 6134, 6135, 6136, 6137, 6180, 6181, 6182, 6183, 6228, 6229, 6230, 6276, 6277

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@mkoireland.ie
Website: www.mkoireland.ie



Drawing Legend

- Application Boundary Kerry County Council
- Application Boundary Cork County Council
- Landowners Boundary
- Site Notice
- Wayleaves
- Permitted Knocknamork renewable energy development permitted infrastructure Cork Co. Co. Pl. Ref. 19/4972
- County Border

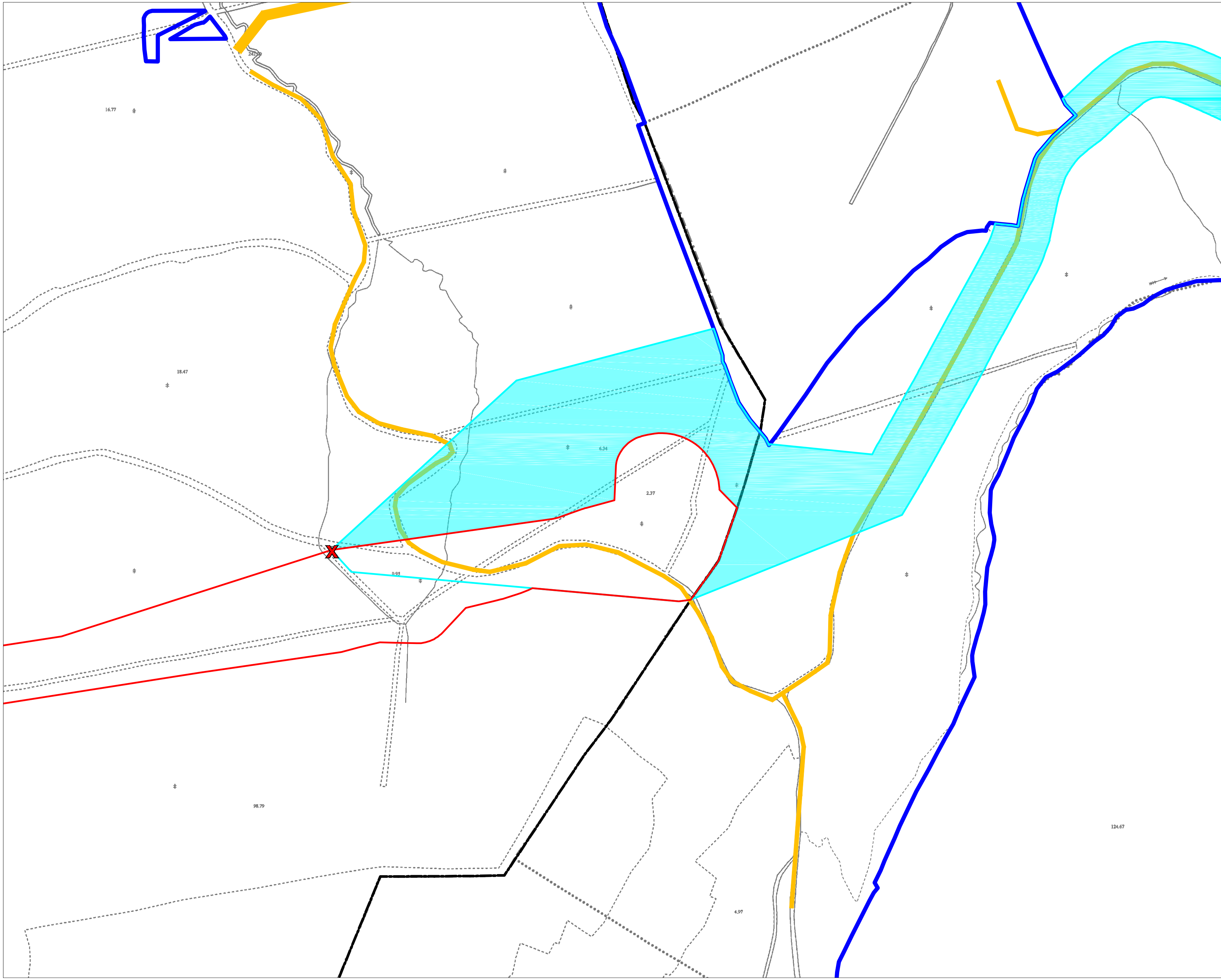
DRAWING TITLE:
Site Location Map Sheet D

PROJECT TITLE:
Knocknamork Grid Connection Infrastructure, Co. Kerry

DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210732	DRAWING No.: 210732 - 02D
SCALE: 1:5,000 @ A3	DATE: 26.07.2022

OS SHEET No.: 6134, 6135, 6136, 6137, 6180, 6181, 6182, 6183, 6228, 6229, 6230, 6276, 6277

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie



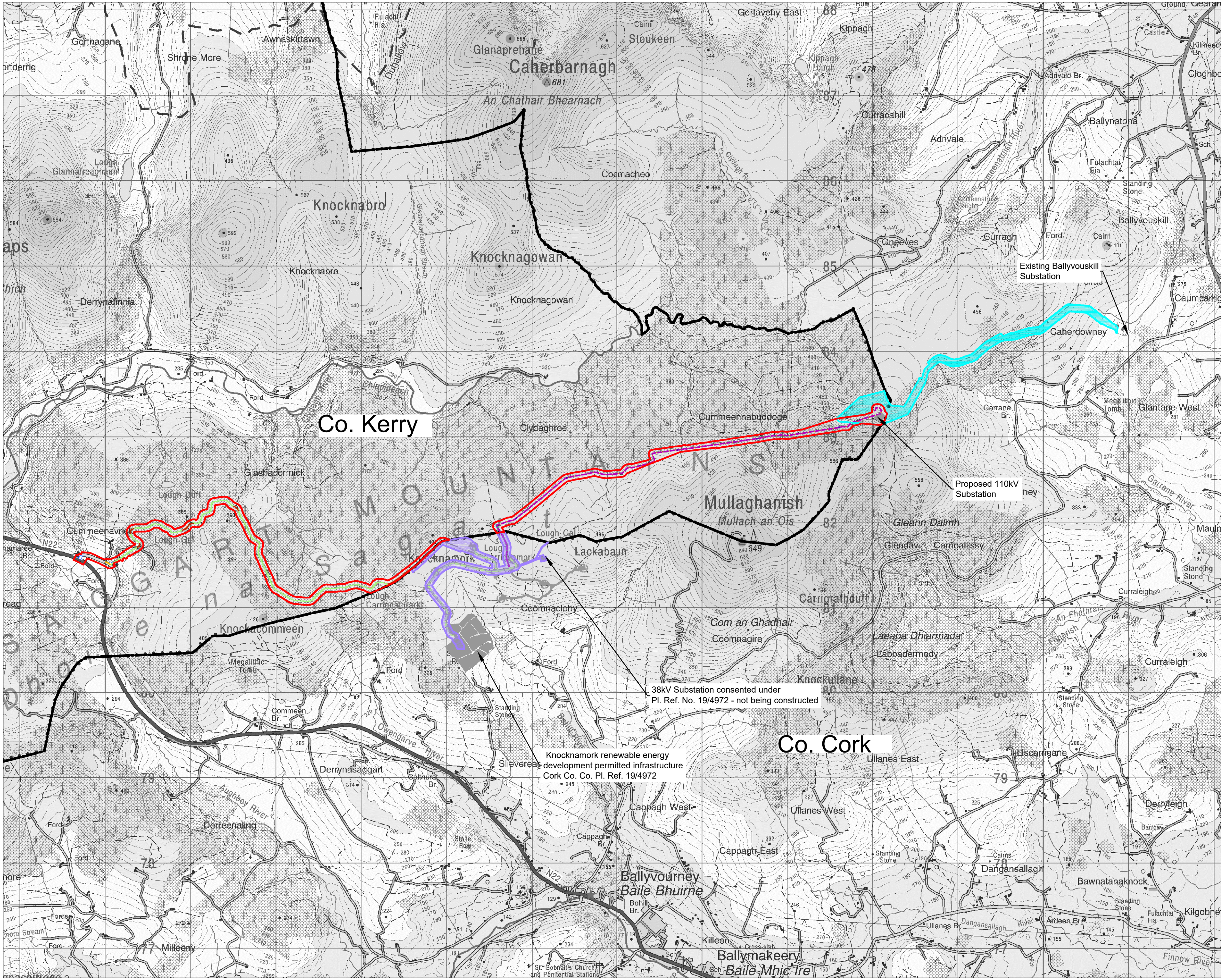
Drawing Legend

- Application Boundary Kerry County Council
- Application Boundary An Bord Pleanala
- Landowners Boundary
- Site Notice
- Wayleaves
- County Border

N

DRAWING TITLE: **Site Location Map Sheet E**	
PROJECT TITLE: **Knocknamork Grid Connection Infrastructure, Co. Kerry**	
DRAWING BY: **Joseph O Brien**	CHECKED BY: **Meabhann Crowe**
PROJECT No.: **210732**	DRAWING No.: **210732 - 02E**
SCALE: **1:5,000 @ A3**	DATE: **26.07.2022**
OS SHEET No.: 6134, 6135, 6136, 6137, 6180, 6181, 6182, 6183, 6228, 6229, 6230, 6276, 6277	

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie



Drawing Legend

- Application Boundary Kerry County Council
- Application Boundary Cork County Council
- Application Boundary An Bord Pleanala
- 33kV Electrical Cabling Route
- Permitted Knocknamork renewable energy development permitted infrastructure Cork Co. Co. Pl. Ref. 19/4972
- Existing Access Track for Upgrade
- Proposed New Access Track
- Proposed Electrical Cabling Maintenance Track
- Upgrade of Existing Track for Electrical Cabling Maintenance
- Joint Pit
- Turbine Delivery Access Temporary Hardcore Surface Area
- Cut
- Fill
- Borrow Pit
- County Border

N

DRAWING TITLE:

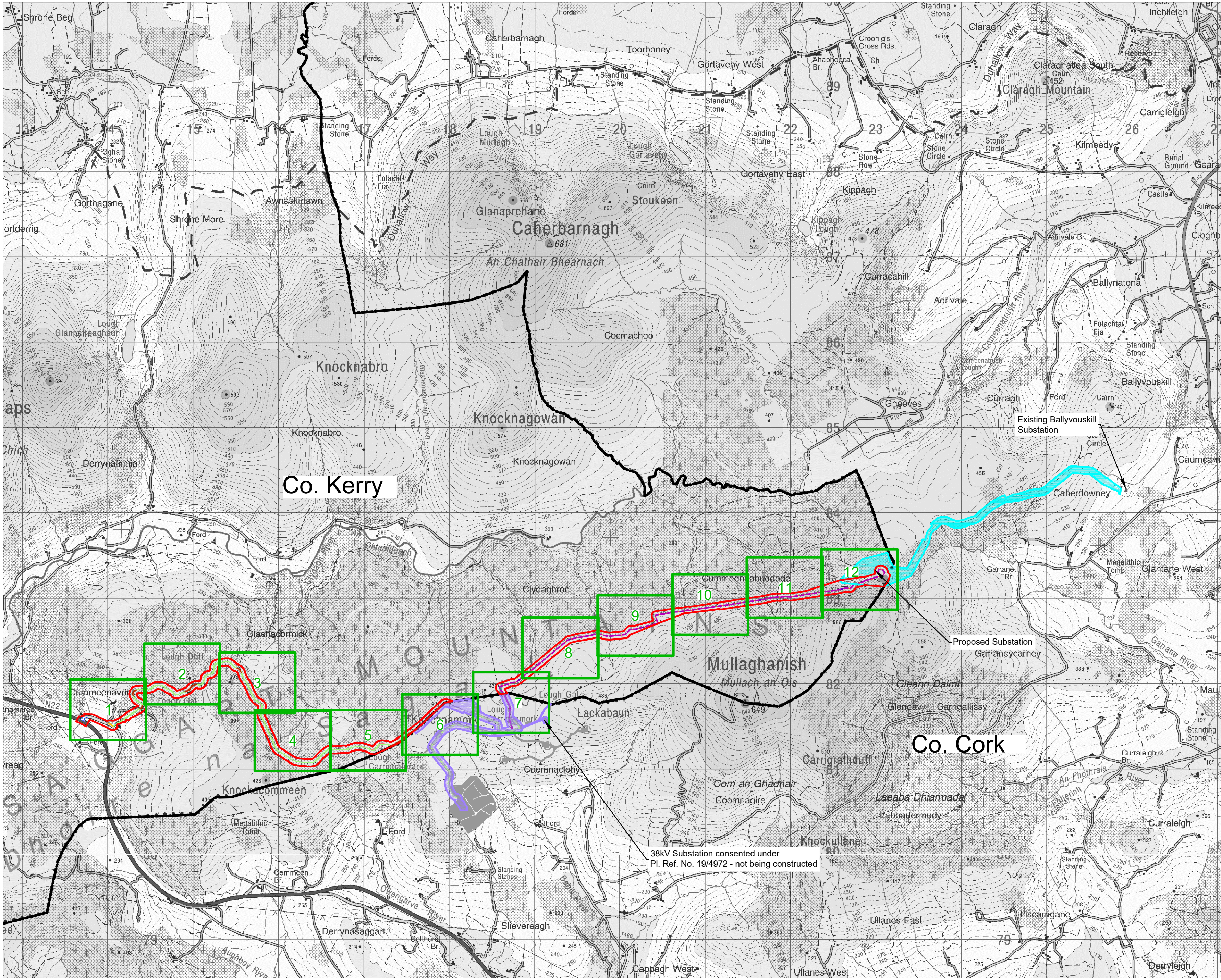
Site Layout Overview

PROJECT TITLE:
Knocknamork Grid Connection Infrastructure, Co. Kerry

DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210732	DRAWING No.: 210732 - 03
SCALE: 1:40,000 @ A3	DATE: 26.07.2022

OS SHEET No.: 6134, 6135, 6136, 6137, 6180, 6181, 6182, 6183, 6228, 6229, 6230, 6276, 6277

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie



Drawing Legend

- Application Boundary Kerry County Council
- Application Boundary Cork County Council
- Application Boundary An Bord Pleanala
- 33kV Electrical Cabling Route
- Permitted Knocknamork renewable energy development permitted infrastructure Cork Co. Co. Pl. Ref. 19/4972
- Existing Access Track for Upgrade
- Proposed New Access Track
- Proposed Electrical Cabling Maintenance Track
- Upgrade of Existing Track for Electrical Cabling Maintenance
- Joint Pit
- Turbine Delivery Access Temporary Hardcore Surface Area
- Cut
- Fill
- Borrow Pit
- County Border

DRAWING TITLE:

Site Layout Keyplan

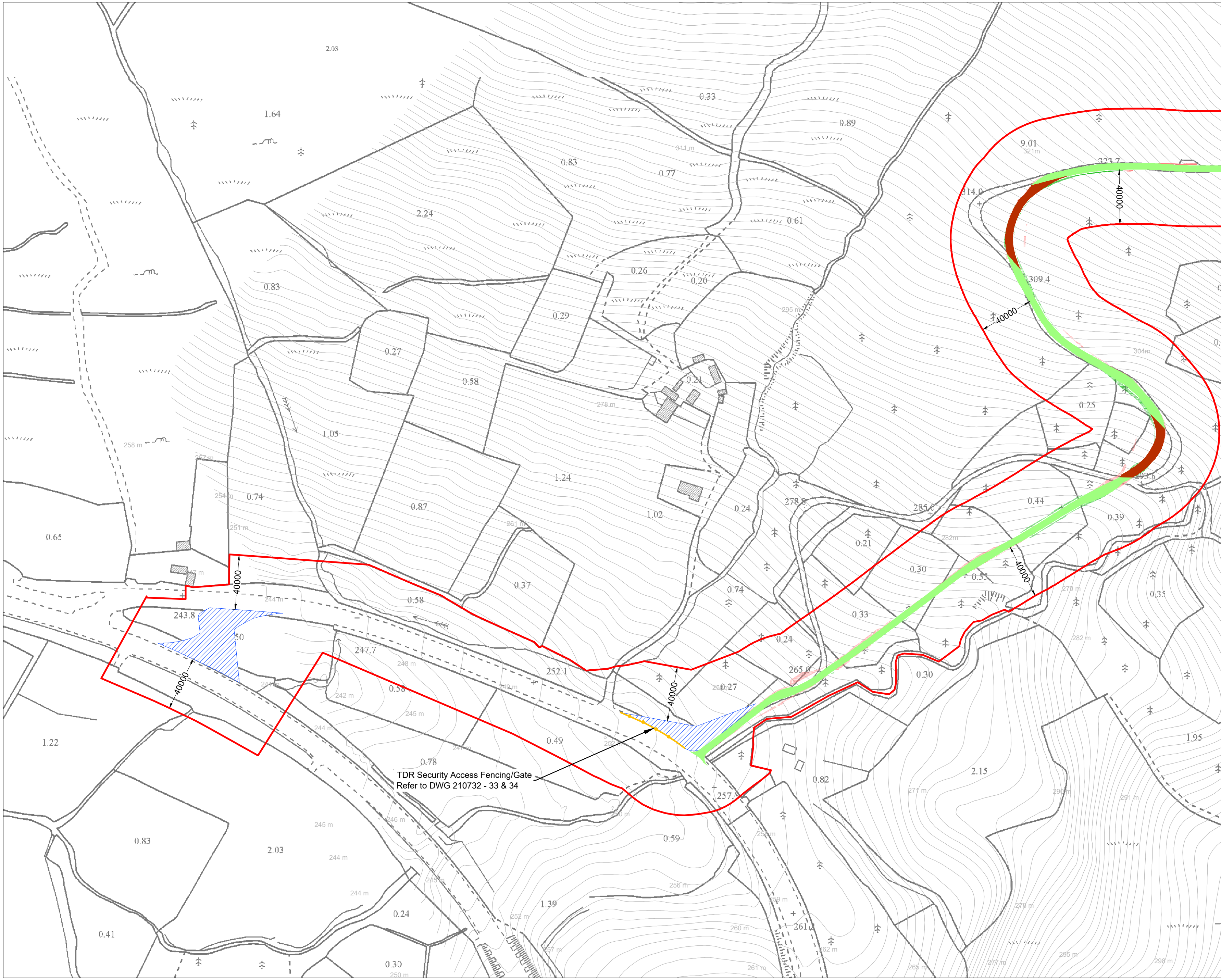
PROJECT TITLE:

Knocknamork Grid Connection Infrastructure, Co. Kerry

DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210732	DRAWING No.: 210732 - 04
SCALE: 1:40,000 @ A3	DATE: 26.07.2022

OS SHEET No.: 6134, 6135, 6136, 6137, 6180, 6181, 6182, 6183, 6228, 6229, 6230, 6276, 6277

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie



Drawing Legend

- Application Boundary Kerry County Council
- Existing Access Track for Upgrade
- Proposed New Access Track
- Turbine Delivery Access Temporary Hardcore Surface Area
- Cut
- Fill
- TDR Security Access Fencing/Gate

Ordnance Survey Ireland Licence No. CYAL50267517© Ordnance Survey Ireland/Government of Ireland

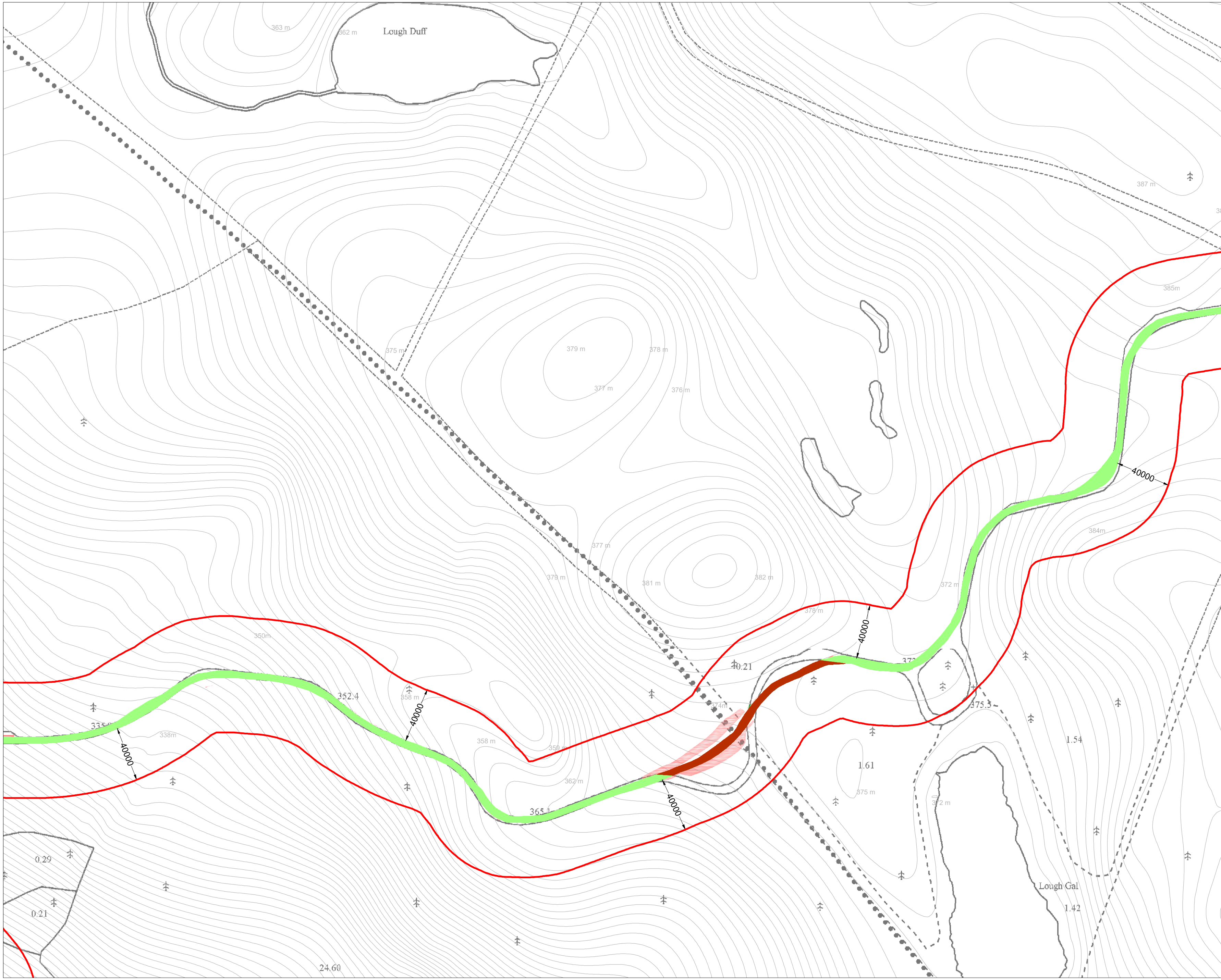
DRAWING TITLE:
Site Layout Plan Sheet 1 of 12

PROJECT TITLE:
Knocknamork Grid Connection Infrastructure, Co. Kerry

DRAWING BY: **Joseph O Brien**	CHECKED BY: **Meabhann Crowe**
PROJECT No.: **210732**	DRAWING No.: **210732 - 05**
SCALE: **1:2,500 @ A3**	DATE: **26.07.2022**

OS SHEET No.: 6134, 6135, 6136, 6137, 6180, 6181, 6182, 6183, 6228, 6229, 6230, 6276, 6277

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie



Drawing Legend

- Application Boundary Kerry County Council
- Existing Access Track for Upgrade
- Proposed New Access Track
- Cut
- Fill

N

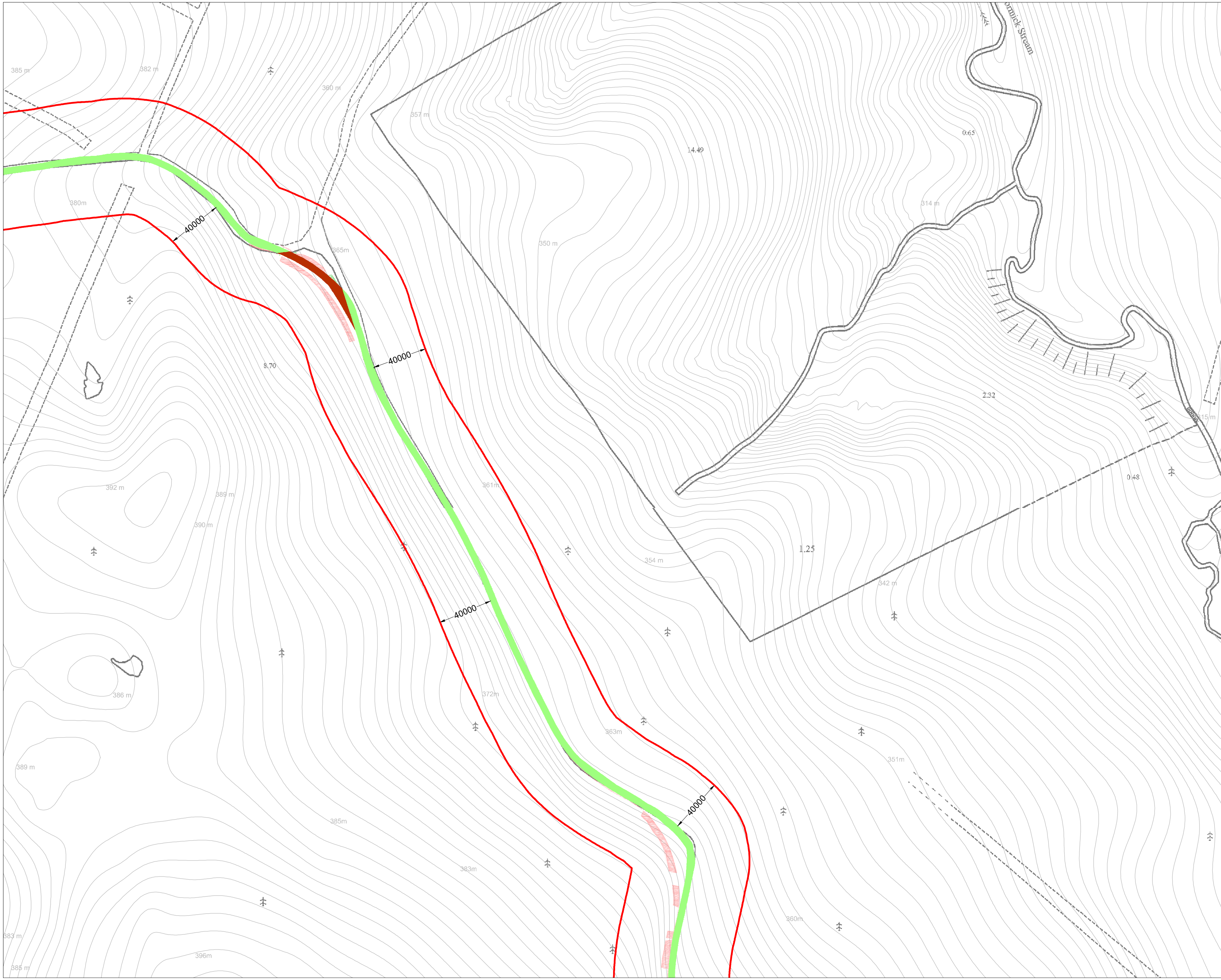
DRAWING TITLE:
Site Layout Plan Sheet 2 of 12

PROJECT TITLE:
Knocknamork Grid Connection Infrastructure, Co. Kerry

DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210732	DRAWING No.: 210732 - 06
SCALE: 1:2,500 @ A3	DATE: 26.07.2022

OS SHEET No.: 6134, 6135, 6136, 6137, 6180, 6181, 6182, 6183, 6228, 6229, 6230, 6276, 6277

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie



Drawing Legend

- Application Boundary Kerry County Council
- Existing Access Track for Upgrade
- Proposed New Access Track
- Cut
- Fill

N

DRAWING TITLE:
Site Layout Plan
Sheet 3 of 12

PROJECT TITLE:
Knocknamork Grid Connection Infrastructure, Co. Kerry

DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210732	DRAWING No.: 210732 - 07
SCALE: 1:2,500 @ A3	DATE: 26.07.2022
OS SHEET No.: 6134, 6135, 6136, 6137, 6180, 6181, 6182, 6183, 6228, 6229, 6230, 6276, 6277	

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie

Drawing Legend

- Application Boundary Kerry County Council
- Existing Access Track for Upgrade
- Cut
- Fill

N

DRAWING TITLE:

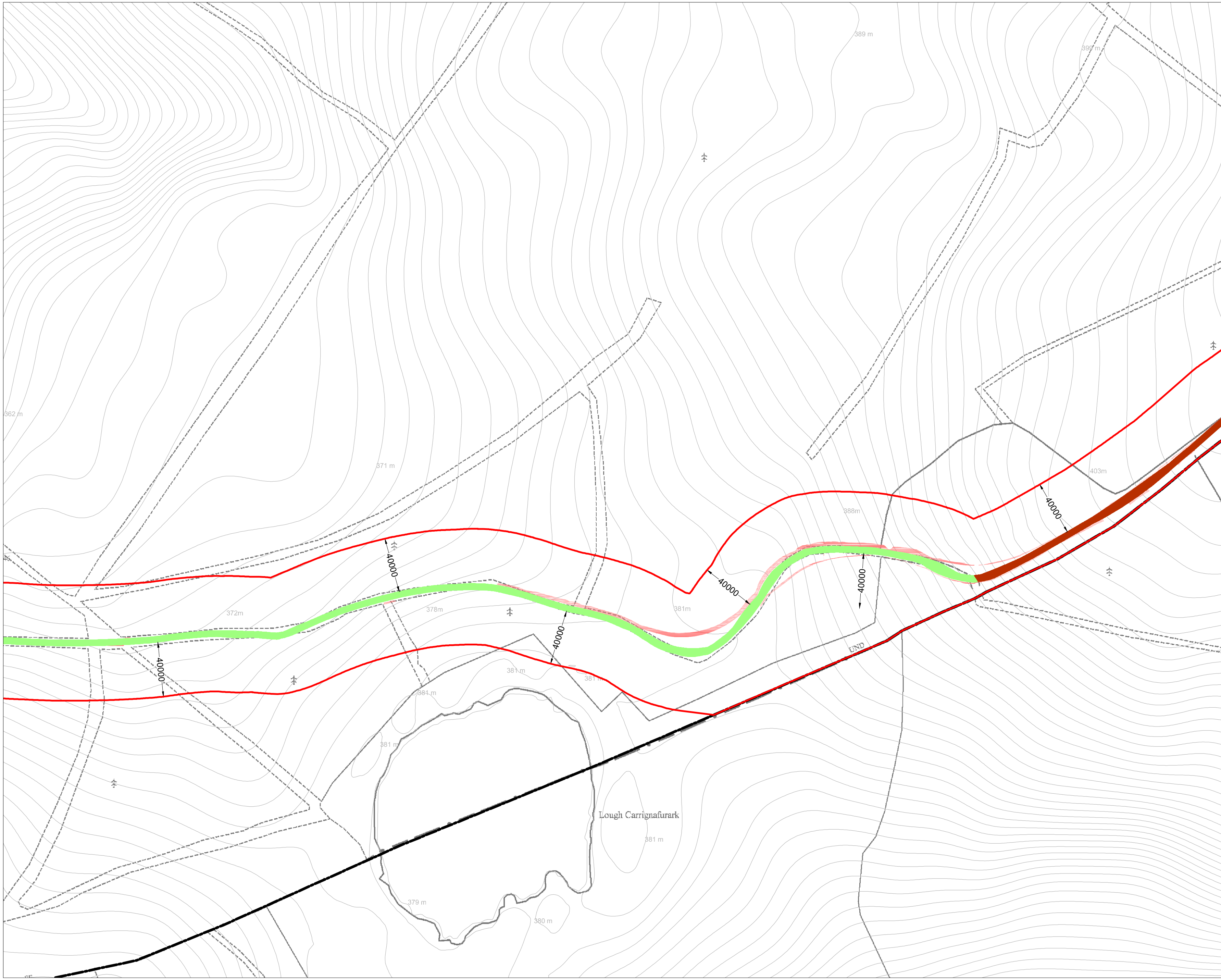
Site Layout Plan Sheet 4 of 12

PROJECT TITLE:
Knocknamork Grid Connection Infrastructure, Co. Kerry

DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210732	DRAWING No.: 210732 - 08
SCALE: 1:2,500 @ A3	DATE: 26.07.2022

OS SHEET No.: 6134, 6135, 6136, 6137, 6180, 6181, 6182, 6183, 6228, 6229, 6230, 6276, 6277

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie



Drawing Legend

- Application Boundary Kerry County Council
- Existing Access Track for Upgrade
- Proposed New Access Track
- Cut
- Fill
- County Border

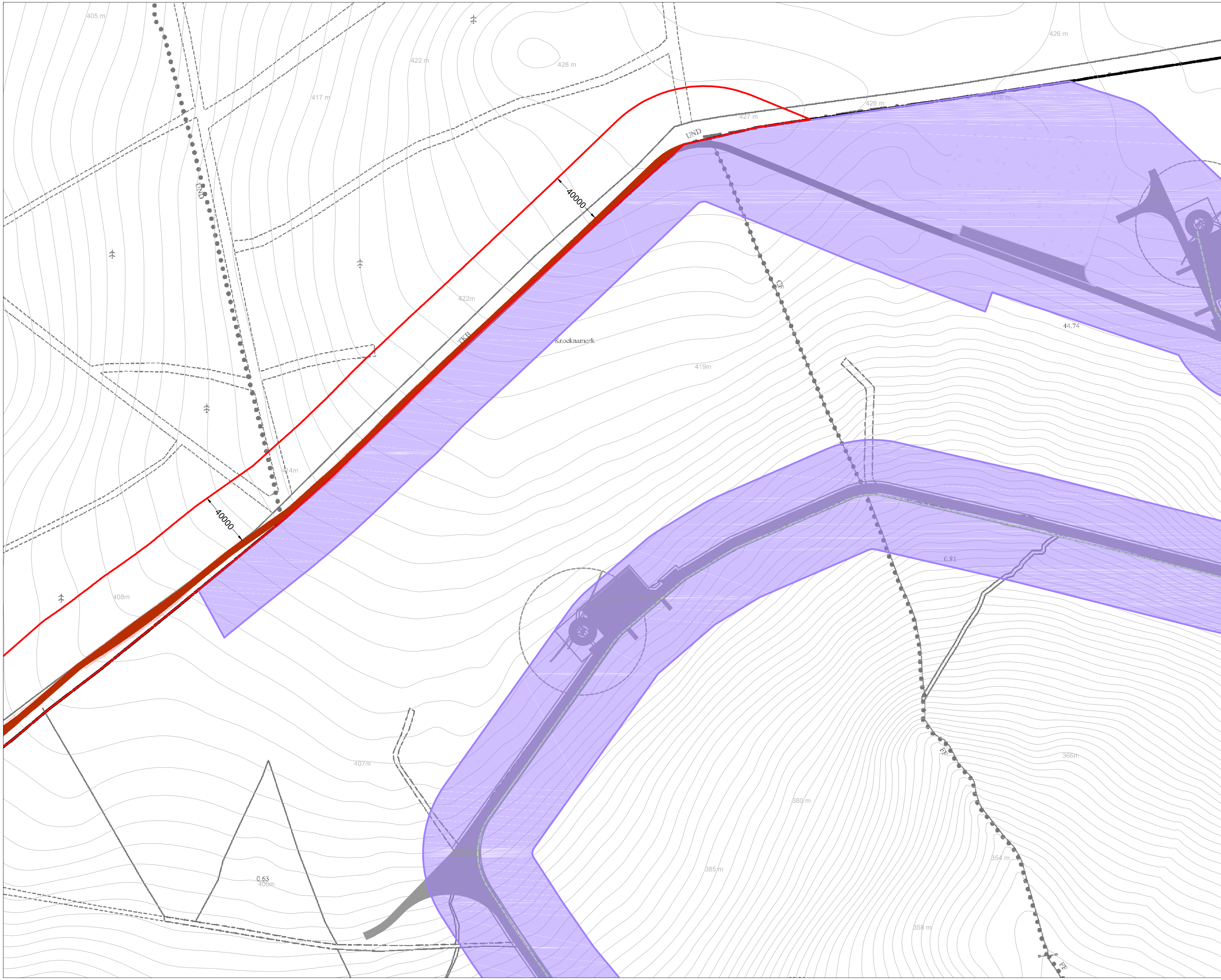
DRAWING TITLE:
Site Layout Plan Sheet 5 of 12

PROJECT TITLE:
Knocknamork Grid Connection Infrastructure, Co. Kerry

DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210732	DRAWING No.: 210732 - 09
SCALE: 1:2,500 @ A3	DATE: 26.07.2022

OS SHEET No.: 6134, 6135, 6136, 6137, 6180, 6181, 6182, 6183, 6228, 6229, 6230, 6276, 6277

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie



Drawing Legend

- Application Boundary Kerry County Council
- Application Boundary Cork County Council
- Permitted Knocknamork renewable energy development permitted infrastructure Cork Co. Co. Pl. Ref. 19/4972
- Proposed New Access Track
- Cut
- Fill
- Borrow Pit
- County Border

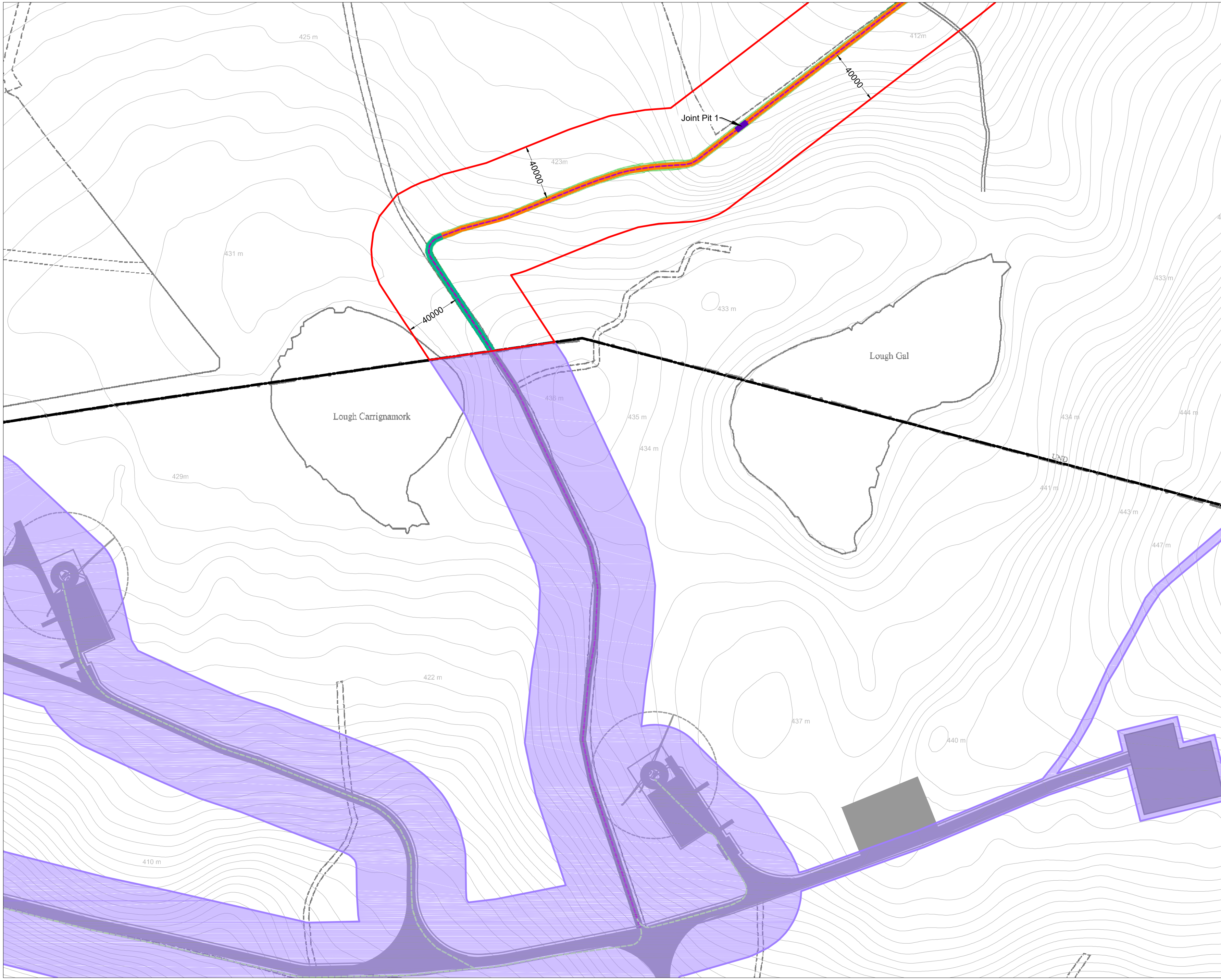
N

DRAWING TITLE:
Site Layout Plan Sheet 6 of 12

PROJECT TITLE:
Knocknamork Grid Connection Infrastructure, Co. Kerry

DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210732	DRAWING No.: 210732 - 10
SCALE: 1:2,500 @ A3	DATE: 26.07.2022
OS SHEET No.: 6134, 6135, 6136, 6137, 6180, 6181, 6182, 6183, 6228, 6229, 6230, 6276, 6277	

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie



Drawing Legend

- Application Boundary Kerry County Council
- Application Boundary Cork County Council
- 33kV Electrical Cabling Route
- Permitted Knocknamork renewable energy development permitted infrastructure Cork Co. Co. Pl. Ref. 19/4972
- Upgrade of Existing Track for Electrical Cabling Maintenance
- Proposed Electrical Cabling Maintenance Track
- Joint Pit
- Cut
- Fill
- County Border

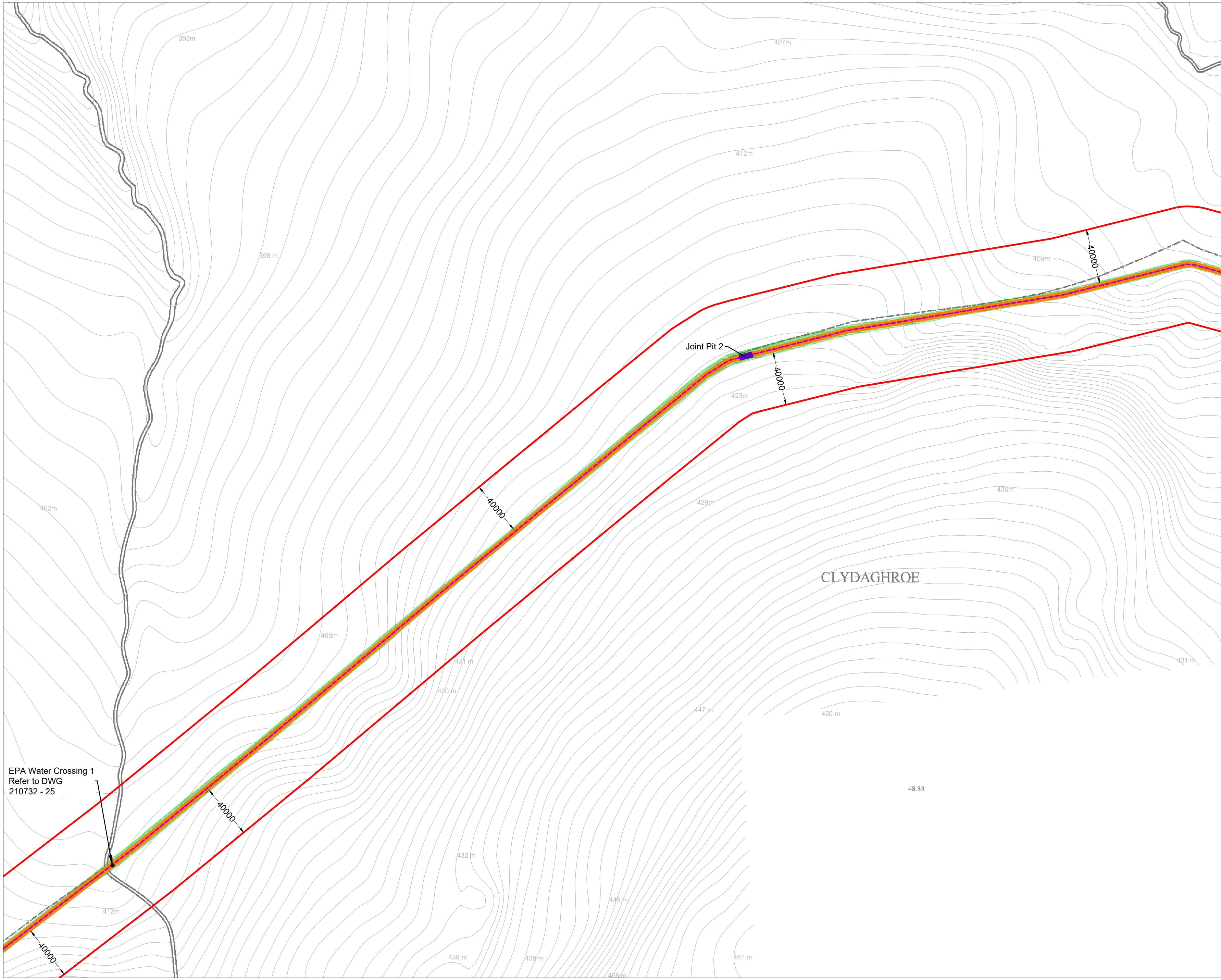
DRAWING TITLE:
Site Layout Plan
Sheet 7 of 12

PROJECT TITLE:
Knocknamork Grid Connection Infrastructure, Co. Kerry

DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210732	DRAWING No.: 210732 - 11
SCALE: 1:2,500 @ A3	DATE: 26.07.2022

OS SHEET No.: 6134, 6135, 6136, 6137, 6180, 6181, 6182, 6183, 6228, 6229, 6230, 6276, 6277

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie



Drawing Legend

- Application Boundary Kerry County Council
- 33kV Electrical Cabling Route
- Proposed Electrical Cabling Maintenance Track
- Joint Pit
- Cut
- Fill

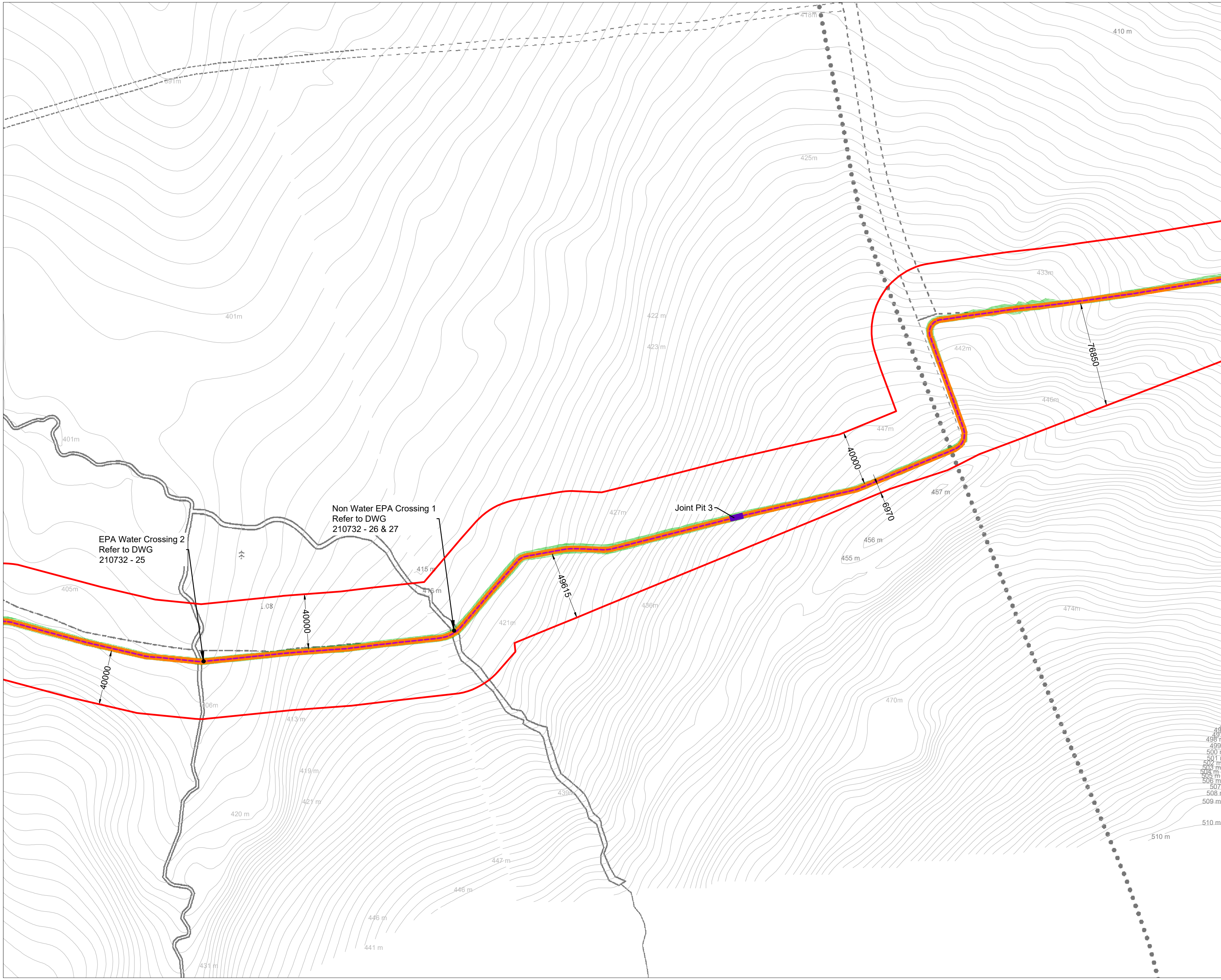
N

DRAWING TITLE:
Site Layout Plan
Sheet 8 of 12

PROJECT TITLE:
Knocknamork Grid Connection Infrastructure, Co. Kerry

DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210732	DRAWING No.: 210732 - 12
SCALE: 1:2,500 @ A3	DATE: 26.07.2022
OS SHEET No.: 6134, 6135, 6136, 6137, 6180, 6181, 6182, 6183, 6228, 6229, 6230, 6276, 6277	

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie



Drawing Legend

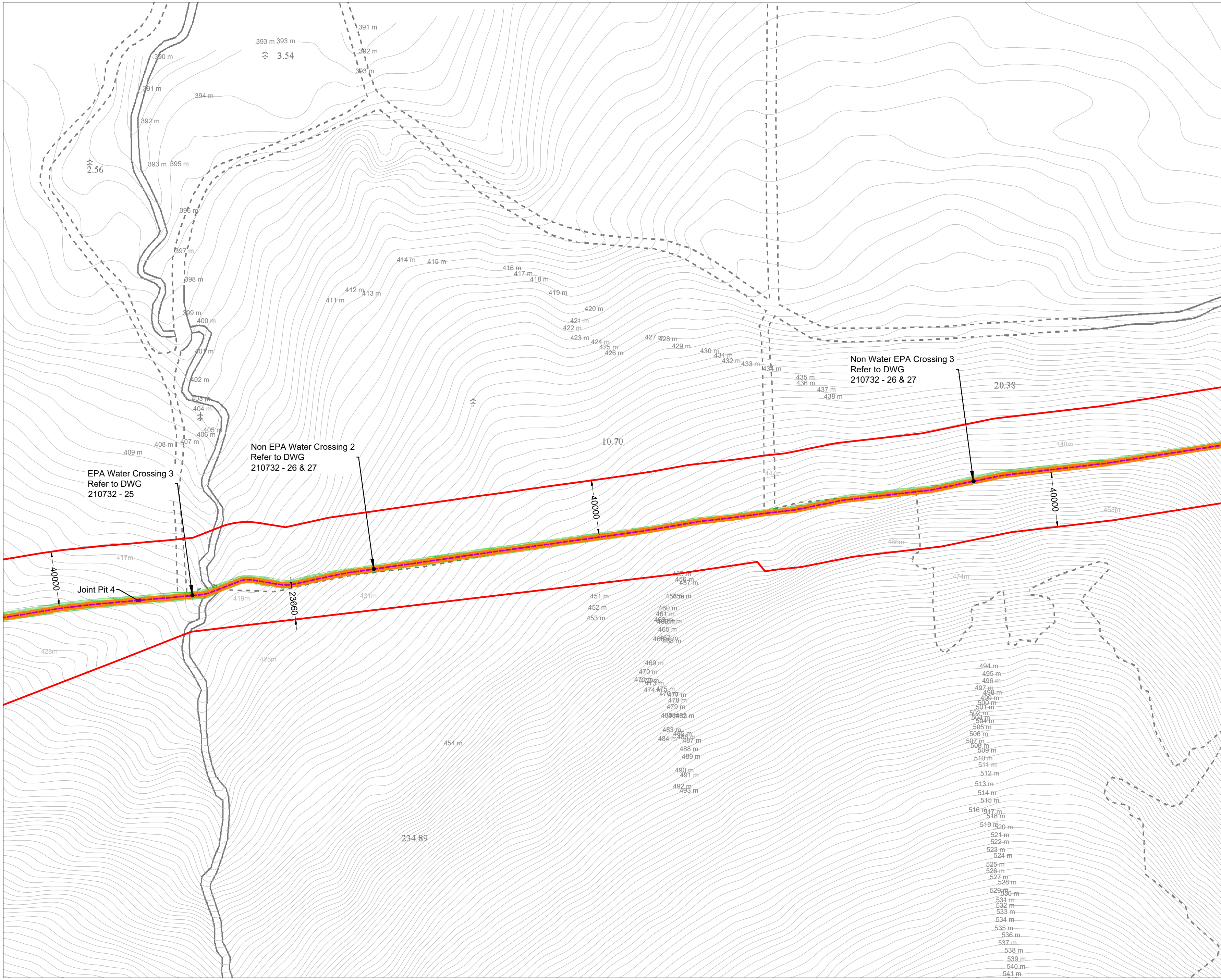
- Application Boundary Kerry County Council
- 33kV Electrical Cabling Route
- Proposed Electrical Cabling Maintenance Track
- Joint Pit
- Cut
- Fill

N

Ordnance Survey Ireland Licence No. CYAL50267517© Ordnance Survey Ireland/Government of Ireland

DRAWING TITLE: **Site Layout Plan Sheet 9 of 12**	
PROJECT TITLE: **Knocknamork Grid Connection Infrastructure, Co. Kerry**	
DRAWING BY: **Joseph O Brien**	CHECKED BY: **Meabhann Crowe**
PROJECT No.: **210732**	DRAWING No.: **210732 - 13**
SCALE: **1:2,500 @ A3**	DATE: **26.07.2022**
OS SHEET No.: 6134, 6135, 6136, 6137, 6180, 6181, 6182, 6183, 6228, 6229, 6230, 6276, 6277	

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie



Drawing Legend

- Application Boundary Kerry County Council
- 33kV Electrical Cabling Route
- Proposed Electrical Cabling Maintenance Track
- Joint Pit
- Cut
- Fill

N

Ordnance Survey Ireland Licence No. CYAL50267517© Ordnance Survey Ireland/Government of Ireland

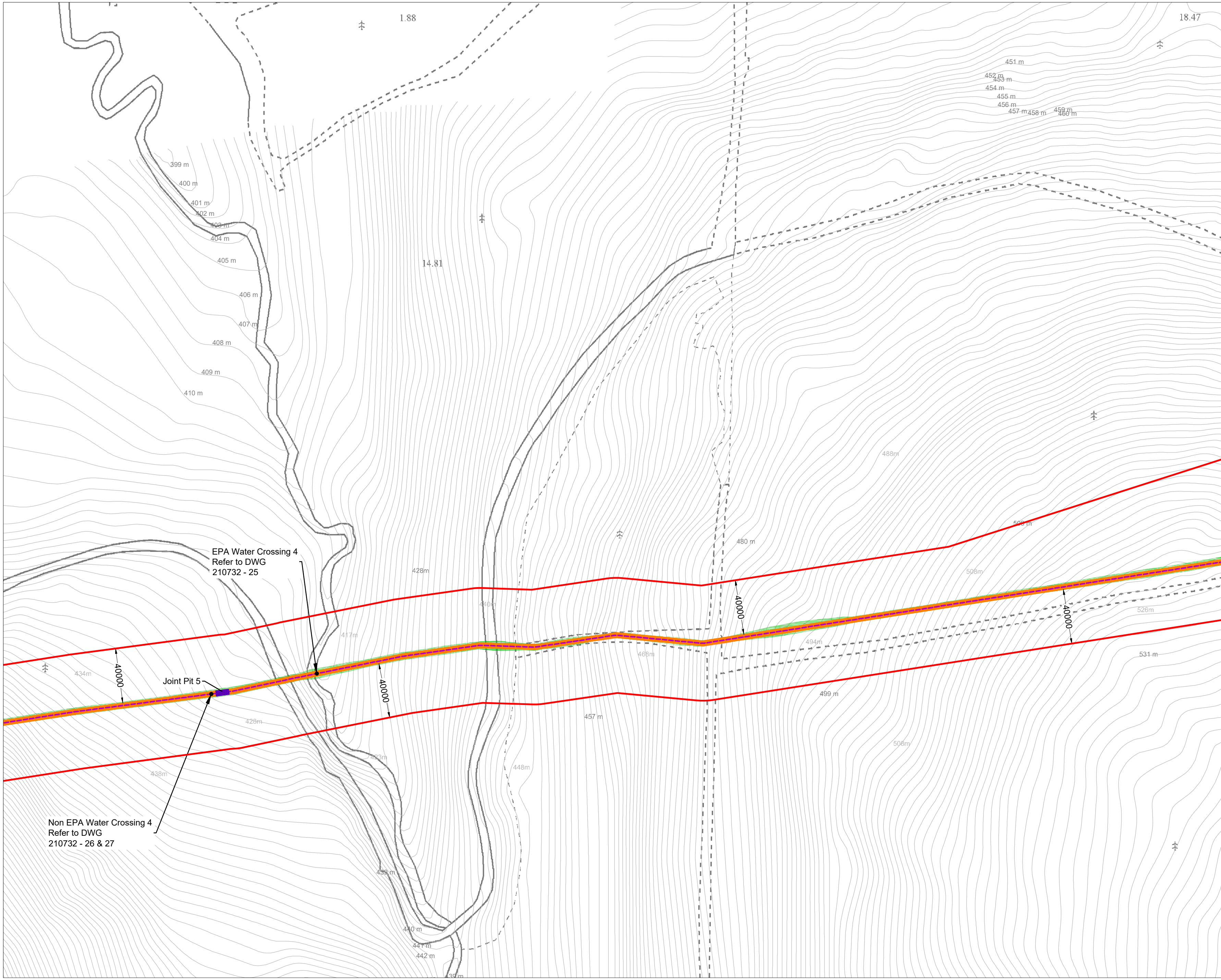
DRAWING TITLE:
Site Layout Plan
Sheet 10 of 12

PROJECT TITLE:
Knocknamork Grid Connection Infrastructure, Co. Kerry

DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210732	DRAWING No.: 210732 - 14
SCALE: 1:2,500 @ A3	DATE: 26.07.2022

OS SHEET No.: 6134, 6135, 6136, 6137, 6180, 6181, 6182, 6183, 6228, 6229, 6230, 6276, 6277

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie



Drawing Legend

- Application Boundary Kerry County Council
- 33kV Electrical Cabling Route
- Proposed Electrical Cabling Maintenance Track
- Joint Pit
- Cut
- Fill

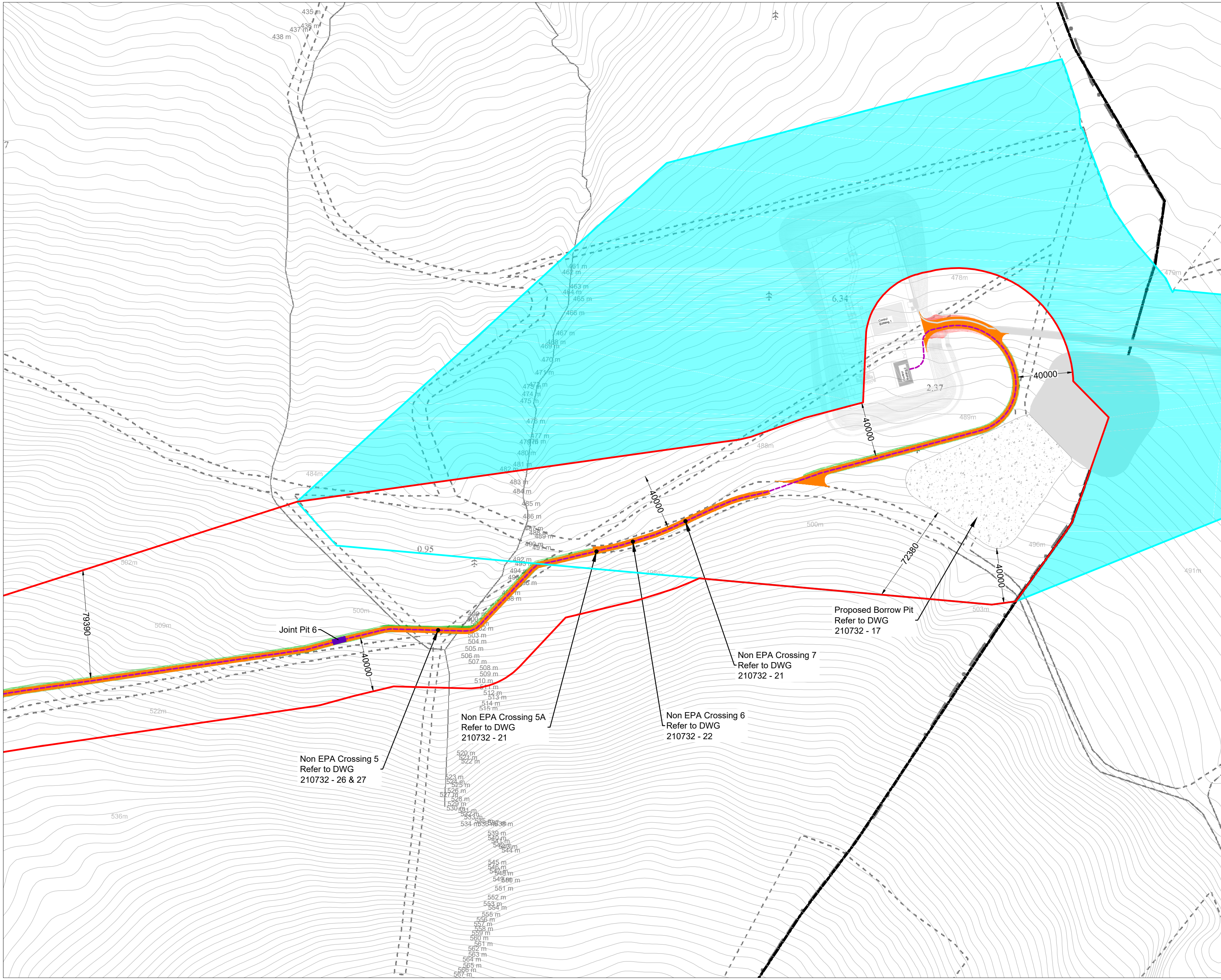
DRAWING TITLE:
Site Layout Plan
Sheet 11 of 12

PROJECT TITLE:
Knocknamork Grid Connection Infrastructure, Co. Kerry

DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210732	DRAWING No.: 210732 - 15
SCALE: 1:2,500 @ A3	DATE: 26.07.2022

OS SHEET No.: 6134, 6135, 6136, 6137, 6180, 6181, 6182, 6183, 6228, 6229, 6230, 6276, 6277

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie



Drawing Legend

- Application Boundary Kerry County Council
- Application Boundary An Bord Pleanala
- 33kV Electrical Cabling Route
- Proposed Electrical Cabling Maintenance Track
- Joint Pit
- Cut
- Fill
- Borrow Pit
- County Border

DRAWING TITLE:
Site Layout Plan Sheet 12 of 12

PROJECT TITLE:
Knocknamork Grid Connection Infrastructure, Co. Kerry

DRAWING BY: Joseph O Brien	CHECKED BY: Meabhann Crowe
PROJECT No.: 210732	DRAWING No.: 210732 - 16
SCALE: 1:2,500 @ A3	DATE: 26.07.2022

OS SHEET No.: 6134, 6135, 6136, 6137, 6180, 6181, 6182, 6183, 6228, 6229, 6230, 6276, 6277

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email: info@www.mkoireland.ie
Website: www.mkoireland.ie

APPENDIX 4-2

FEHILY TIMONEY – PEAT & SPOIL MANAGEMENT PLAN PROPOSED SUBSTATION, UNDERGROUND CABLING & ACCESS ROADS TO KNOCKNAMORK RENEWABLE ENERGY DEVELOPMENT

FEHILY TIMONEY

CONSULTANTS IN ENGINEERING, ENVIRONMENTAL SCIENCE & PLANNING

PEAT & SPOIL MANAGEMENT PLAN

PROPOSED SUBSTATION, UNDERGROUND CABLING & ACCESS ROADS TO KNOCKNAMORK RENEWABLE ENERGY DEVELOPMENT

Prepared for: **MKO Ltd**

Date: **July 2022**

Unit 6, Bagenalstown Industrial Park, Bagenalstown,
Co. Carlow, R21 XW81, Ireland
T: +353 59 9723800 E: info@ftco.ie

CORK | DUBLIN | CARLOW

www.fehilytimoney.ie

PEAT AND SPOIL MANAGEMENT PLAN

PROPOSED SUBSTATION, UNDERGROUND CABLING & ACCESS ROADS TO KNOCKNAMORK RENEWABLE ENERGY DEVELOPMENT

REVISION CONTROL TABLE, CLIENT, KEYWORDS AND ABSTRACT
User is responsible for Checking the Revision Status of This Document

Rev. No.	Description of Changes	Prepared by:	Checked by:	Approved by:	Date:
0	Draft for Comment	IH	TC	BdeH	23.05.22
1	Final	IH	TC	BdeH	14.06.22
2	Final	IH	TC	BdeH	08.07.22
3	Final	IH	TC	BdeH	14.07.22

Client: MKO Ltd

Keywords: **Peat, Spoil, Management, Excavation, Borrow Pits**

Abstract: Fehily Timoney and Company (FT) were engaged by McCarthy Keville O'Sullivan (MKO) to compile a Peat and Spoil Management Plan (PSMP) for the proposed substation, underground cabling and access roads to the Knocknamork Renewable Energy Development. The purpose of this report is to provide a Peat and Spoil Management Plan for the construction phase of the Proposed Development. The report describes how peat and spoil which will be excavated from infrastructure locations such as the substation platform and access roads and will be handled and placed/reinstated onsite. The report also provides construction details for the types of roads which will be put in place at the Proposed Development site and proposed peat and spoil placement/reinstatement areas which will be developed at the Proposed Development site.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION

1.1 Fehily Timoney and Company

Fehily Timoney and Company (FT) is an Irish engineering, environmental science and planning consultancy with offices in Cork, Dublin and Carlow. The practice was established in 1990 and currently has c.95 members of staff, including engineers, scientists, planners and technical support staff. We deliver projects in Ireland and internationally in our core competency areas of Waste Management, Environment and Energy, Civils Infrastructure, Planning and GIS and Data Management.

1.2 Project Description

Fehily Timoney and Company (FT) was engaged in March 2021 by McCarthy Keville O'Sullivan on behalf of Knocknamork Ltd. to compile a Peat and Spoil Management Plan for the proposed substation, underground cabling and access roads to the Knocknamork Renewable Energy Development (the "Proposed Development").

The Proposed Development site is located approximately 3km northwest of Ballyvourvey, Co. Cork.

The site is located on the border between Co. Cork and Co. Kerry. The surrounding landscape is hilly with land-use comprising forestry and poor quality agricultural land.

The Proposed Development is described in detail in Chapter 4 of the EIAR.

1.3 Purpose

The purpose of this report is to provide a peat and spoil management plan with particular reference to peat stability for the construction phase of the Proposed Development.

This peat and spoil management plan also includes a monitoring programme which will be implemented during the construction phase of the Proposed Development and a contingency plan should peat instability/failure occur at the site.

As for all construction projects, a detailed engineering construction design must be carried out by the appointed construction stage designer prior to any construction work commencing on site. This must take account of the consented project details and any conditions imposed by that consent. This must include a detailed peat stability assessment to account for any changes in the environment which may have occurred in the time leading up to the commencement of construction and a peat and spoil management plan to allow for the most appropriate geotechnical and environmental led solutions to be developed for the management of peat and spoil.

As work is carried out on site the contents of the peat and spoil management plan and peat stability monitoring programme will be updated, as appropriate.

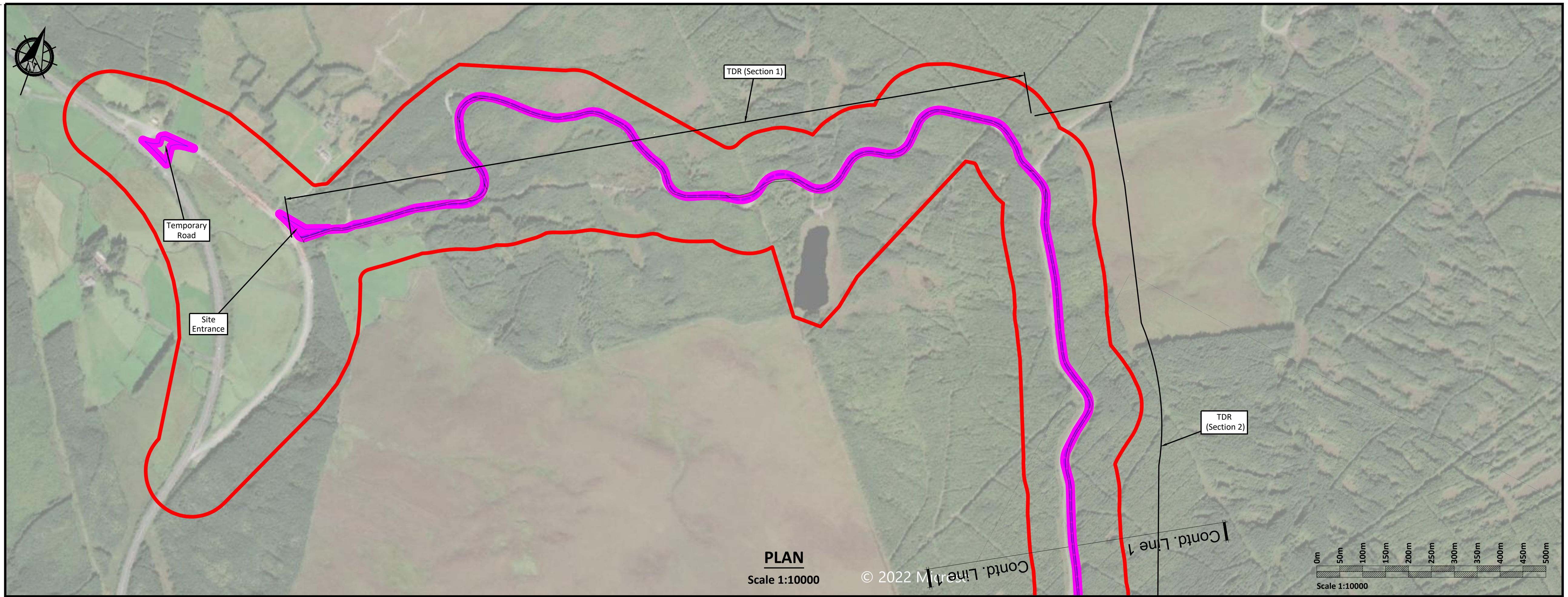
This peat and spoil management plan contains some drainage guidelines for construction works and for management of peat on site. It should be noted that the control of water quality and drainage measures for site is outlined in detail in the relevant chapter of Environmental Impact Assessment Report (EIAR).

1.4 Peat Instability Definition

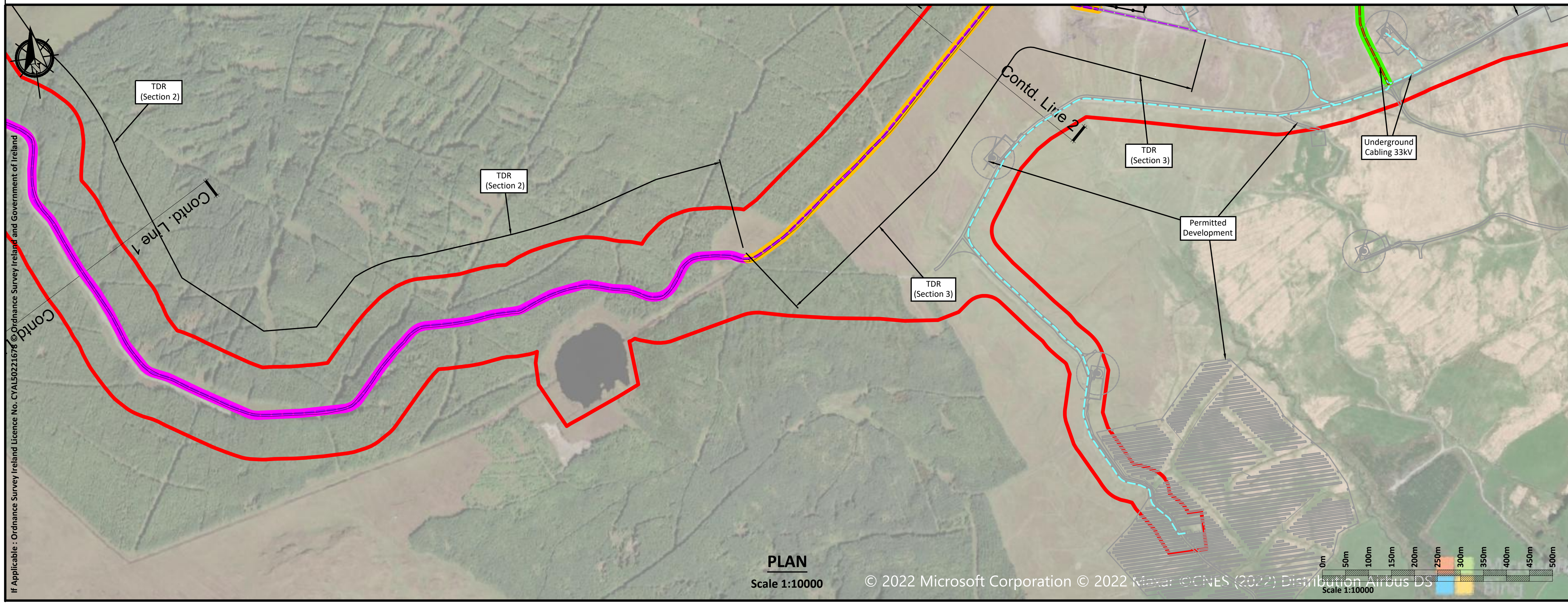
Peat instability in this report is defined as a mass movement of a body of peat that would have a significant adverse impact on the surrounding environment. Peat instability excludes localised movement of peat that would occur below a floating access road, creep movement or localised erosion type events.

Adherence to the peat and spoil management plan should reasonably minimise the potential for all such peat movements. However, it is noted that due to the soft ground nature of the peat terrain it is not possible to completely avoid localised peat movement.

FEHILY TIMONEY Cork | Dublin | Carlow www.fehilytimoney.ie



PLAN
Scale 1:10000



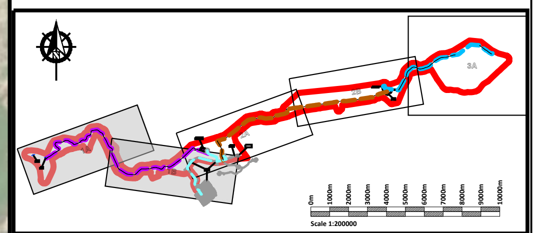
PLAN
Scale 1:10000

Legend:

- EIAR Planning Boundary
- Proposed Access Track
- Turbine Delivery Route (TDR)
- Underground Cabling 33kV
- Underground Cabling 110 kV
- 33kV Underground Cabling in Permitted Development
- Permitted Development

Road Type Legend:

- Type A - Upgrade of Existing Excavated Access Tracks
- Type B - New Excavate & Replace Access Road
- Type C - New Excavate & Replace Road Alongside Existing Access Road



KEYPLAN
Scale 1:200000

If Applicable : Ordnance Survey Ireland Licence No. CYAL50221678 © Ordnance Survey Ireland and Government of Ireland

Scale (@ A3) 1:10000

Date - 13.07.22

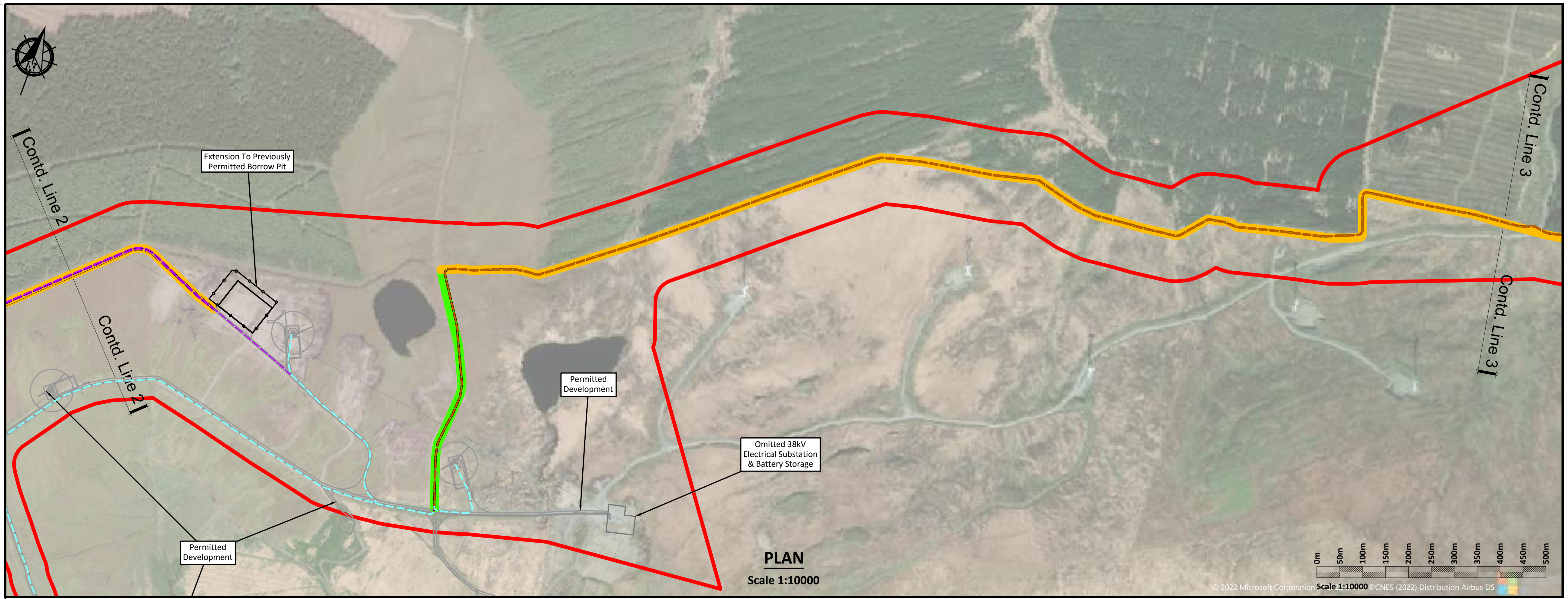
ROAD CONSTRUCTION TYPES PLAN SHEET 1 OF 3

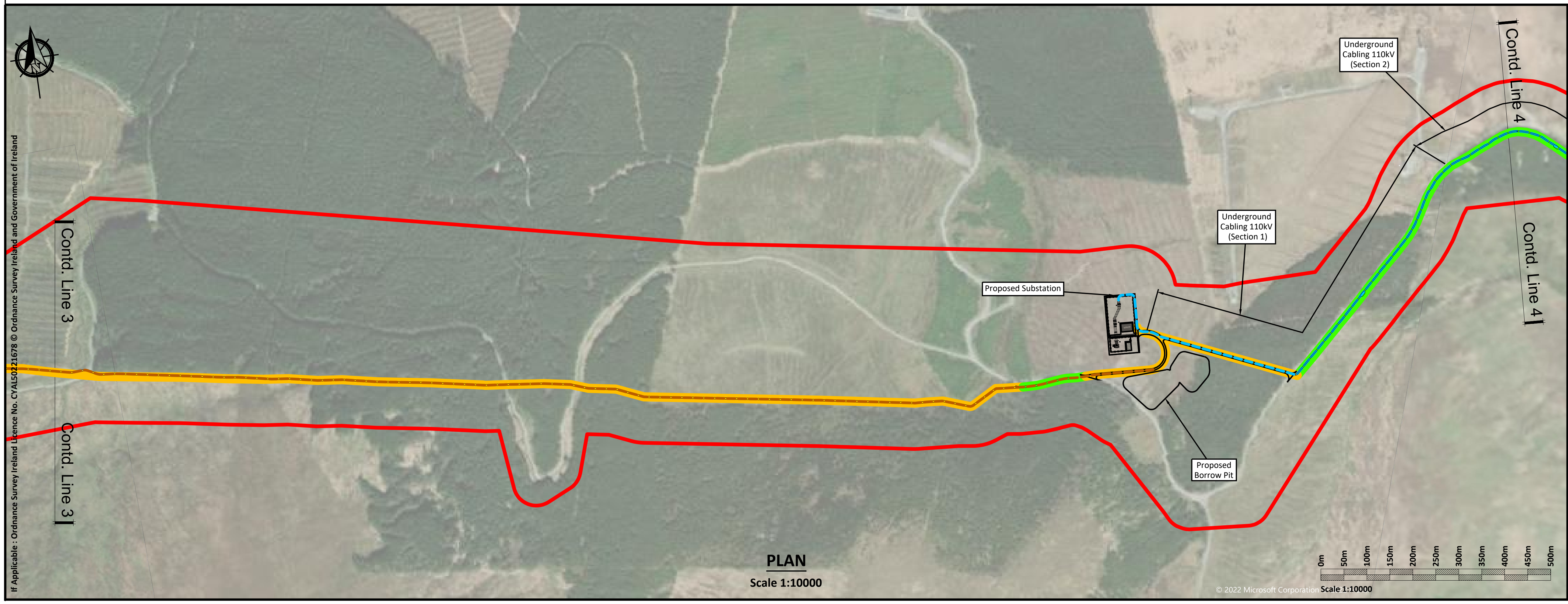
Drawn - POR
Checked - IH
Rev - E

O:\ACAD\2021\P21-199\P21-199-0600-0009

Friday 15 July 2022

FEHILY TIMONEY
Cork | Dublin | Carlow
www.fehilytimoney.ie



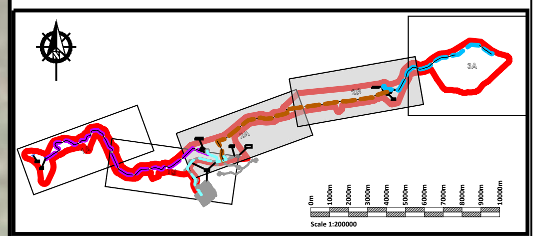


Legend:

- EIAR Planning Boundary
- Proposed Access Track
- Turbine Delivery Route (TDR)
- Underground Cabling 33kV
- Underground Cabling 110 kV
- 33kV Underground Cabling in Permitted Development
- Permitted Development

Road Type Legend:

- Type A - Upgrade of Existing Excavated Access Tracks
- Type B - New Excavate & Replace Access Road
- Type C - New Excavate & Replace Road Alongside Existing Access Road



KEYPLAN

Scale 1:200000

Scale (@ A3) 1:10000		Drawn - POR
	ROAD CONSTRUCTION TYPES PLAN SHEET 2 OF 3	Checked - IH
Date - 13.07.22		Rev - E

O:\ACAD\2021\P21-199\P21-199-0600-0010

Friday 15 July 2022

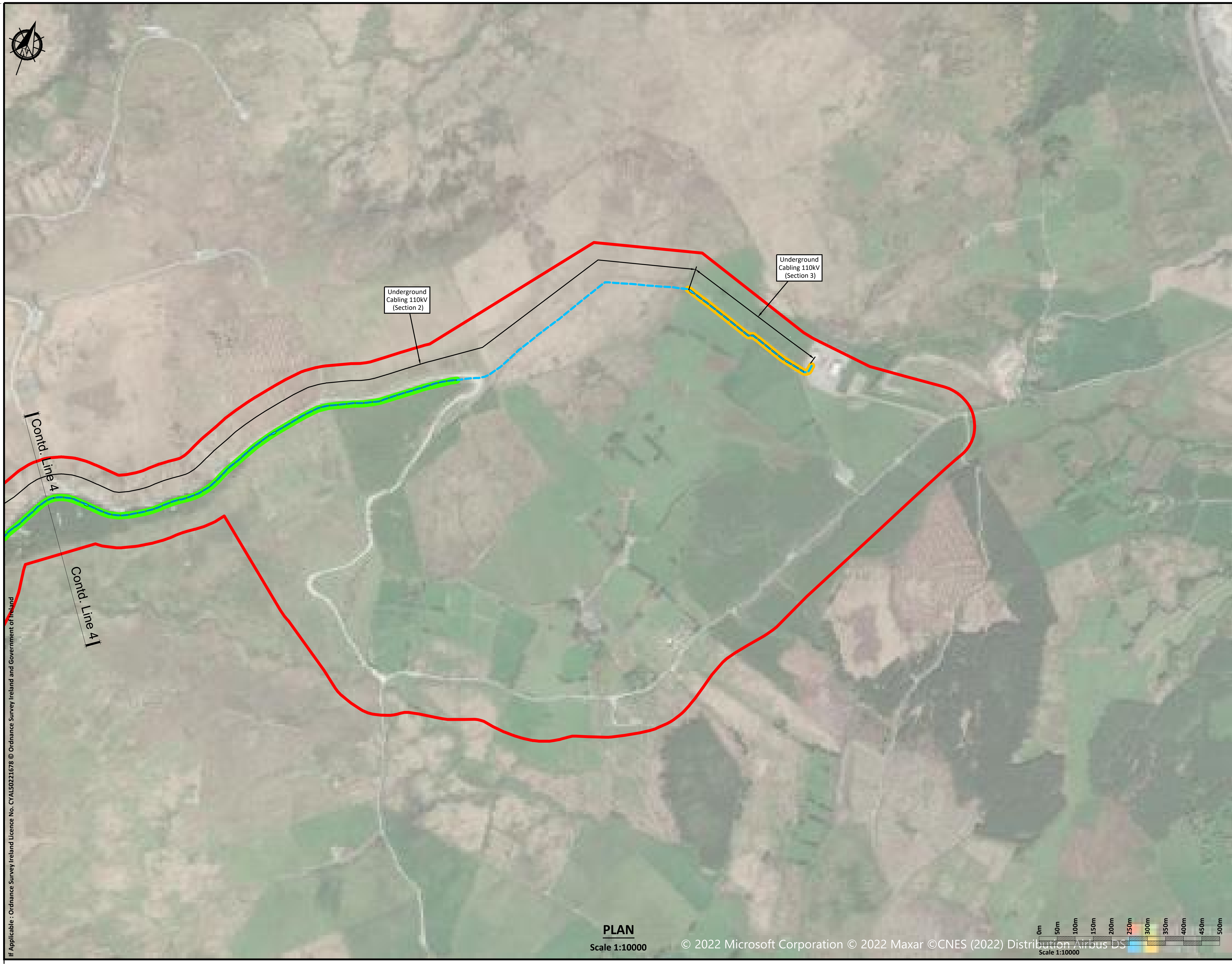
FEHILY TIMONEY
Cork | Dublin | Carlow
www.fehilytimoney.ie

Legend:

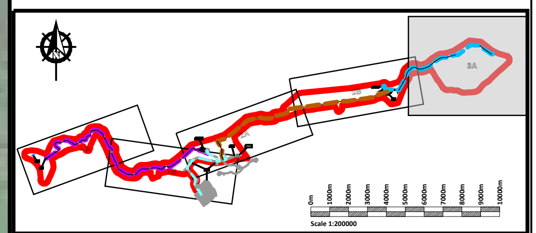
- EIAR Planning Boundary
- Proposed Access Track
- Turbine Delivery Route (TDR)
- Underground Cabling 33kV
- Underground Cabling 110 kV
- 33kV Underground Cabling in Permitted Development
- Permitted Development

Road Type Legend:

- Type A - Upgrade of Existing Excavated Access Tracks
- Type B - New Excavate & Replace Access Road
- Type C - New Excavate & Replace Road Alongside Existing Access Road



PLAN
Scale 1:10000



KEYPLAN
Scale 1:200000

Scale (@ A3) 1:10000

Date - 13.07.22

ROAD CONSTRUCTION TYPES PLAN SHEET 3 OF 3

Drawn - POR
Checked - IH
Rev - E

O:\ACAD\2021\P21-199\P21-199-0600-0011

Thursday 14 July 2022

2. CONSTRUCTION ACTIVITIES COVERED BY PEAT AND SPOIL MANAGEMENT PLAN

2.1 Construction Activities

For the construction phase of the Proposed Development the activities that will generate peat and spoil are as follows:

(1) Upgrade of existing access roads (excavate and replace roads)

(2) Construction of new excavated roads through peat

(3) Excavation and placement of arisings

(4) Stripping of peat and overburden for borrow pits

(5) Excavations in peat for substation platform

(6) Excavations in peat for underground cables

Peat and spoil management of the above construction activities are covered individually in this report.

2.2 Road Construction Types

To provide access within the Proposed Development site and to connect the associated infrastructure existing roads will need to be upgraded and new access roads will need to be constructed. The road construction preliminary design has taken into account the following key factors:

(1) Buildability considerations

(2) Maximising use of existing infrastructure

(3) Minimising excavation arisings

(4) Serviceability requirements for construction and wind turbine delivery and maintenance vehicles

(5) Requirement to minimise disruption to peat hydrology

Whilst the above key factors are used to determine the road design the actual construction technique employed for a particular length of road will be determined by the prevailing ground conditions encountered along that length of road.

The general road construction techniques to be considered are given in Table 2-1.

It should be noted that this report does not include a detailed design for the access roads on the Proposed Development site. This report includes the most suitable type of road construction envisaged for each section of access road based on the ground/site conditions recorded during the site walkovers.

Table 2.1: General Road Construction Techniques

Construction Method	Typical Site Conditions			Comment
	Construction Type	Typical Peat Depth (m)	Typical Slope Inclination (degs)	
Upgrade of existing access roads	Type A	Typically, less than 1m, locally up to 3.25m	Varies	Upgrade existing excavated access roads along the TDR to the required width and finished with a layer of selected granular fill – Figure 1-1
Construction of new excavated roads through peat	Type B	Typically, less than 1.5m, locally up to 3.0m	Varies	New access road construction technique envisaged for various locations on site – Figure 1-1
Construction of new excavated road alongside existing road	Type C	Typically, less than 1.5m	Varies	New access road construction technique envisaged along 33kV and 110kV underground cabling – Figure 1-1

Further details on access road construction types A to C are given in Sections 3 and 4 of this report.

3. UPGRADE OF EXISTING ACCESS ROADS – TYPE A AND TYPE C

Up to 6km of existing access roads requiring upgrade are present across the Proposed Development site and have been in operation for a number of years. The existing access roads were constructed using the excavate and replace construction technique. Based on the site walkover carried out by FT the existing access roads were typically noted as being in relatively good condition. Upgrade works will involve both widening and resurfacing of the existing access road. The proposed locations for upgrade of the existing access roads on site are shown in Figure 1-1 and details are shown in Figure 3-1 and Figure 3-2.

3.1 Upgrading Existing Access Roads Construction Methodology

This methodology includes procedures that are to be included in the construction to minimise any adverse impact on peat stability. The methodology is not intended to cover all aspects of construction such as drainage and environmental considerations.

(1) Access road construction shall be to the line and level requirements as per design/planning conditions.

(2) For upgrading of existing excavated access roads (Type A - Figure 3-1) and construction of excavated road alongside existing roads (Type C – Figure 3-3) the following guidelines apply:

  (a) Excavation of the widened section of access road should take place to a competent stratum beneath the peat (as agreed with the designer) and backfilled with suitable granular fill.

  (b) Benching of the excavation may be required between the existing section of access road and the widened section of access road depending on the depth of excavation required.

  (c) Access roads to be finished with a layer of capping across the full width of the road

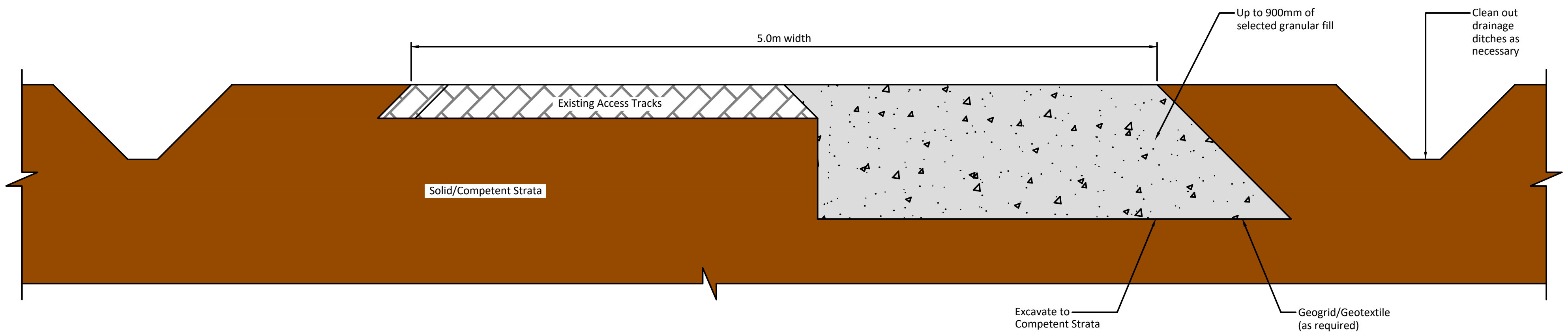
  (d) A layer of geogrid/geotextile may be required at the surface of the existing access road and at the base of the widened section of access road (to be confirmed by the designer).

  (e) For excavations in peat, side slopes shall be not greater than 1 (v): 3 (h). This slope inclination should be reviewed during construction, as appropriate. Should areas of weaker peat be encountered then slacker slopes (1v:4h) will be required to ensure stability.

(3) The finished road width will have a running width of 5m (TDR), with wider sections on bends and corners. The finished width on the sections of excavated road alongside existing roads along the 110kV underground cabling will be 2.5m and along the 33kV underground cabling will be 3m.

(4) On side long sloping ground any road widening works required will be done on the upslope side of the existing access road, where possible.

should be located on the upstream side of the road surface.



Scale 1:40

Scale (@ A3)

Date - 16.06.22

TYPE A - UPGRADE OF EXISTING ACCESS TRACKS

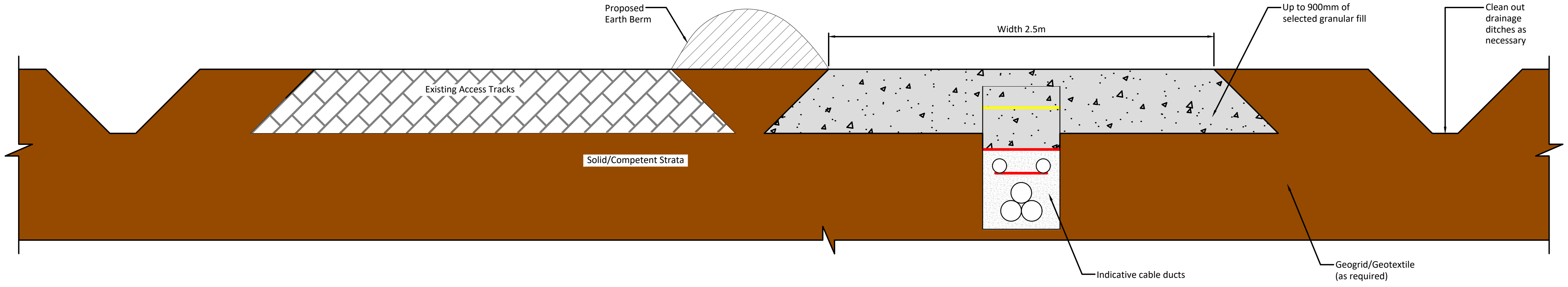
Drawn - POR

Checked - IH

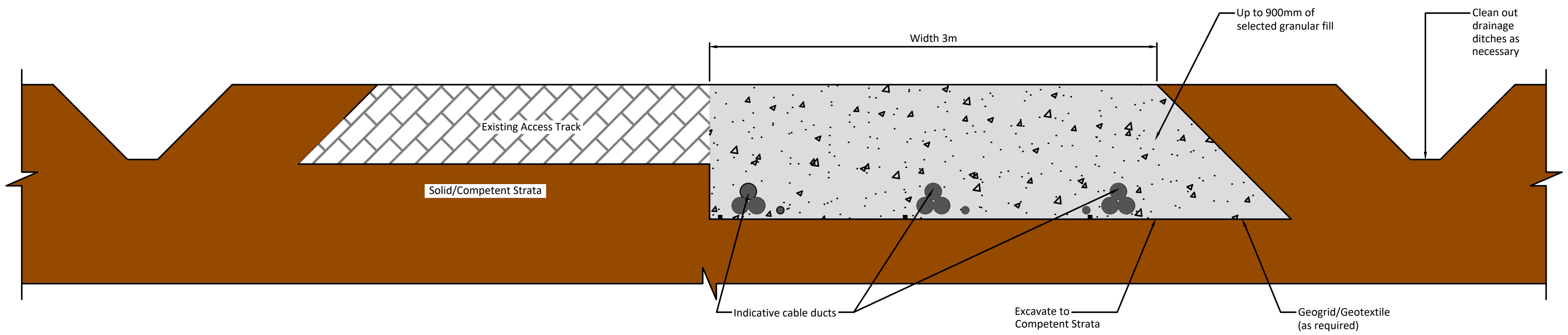
Rev - C

O:\ACAD\2021\P21-199\P21-199-0600-0001

Thursday 14 July 2022



110 kV underground cabling route



33kV underground cabling route.

Scale 1:40

Scale (@ A3)

Date - 18-07-2022

TYPE C - NEW ROAD ALONGSIDE EXISTING ROAD/UPGRADE OF EXISTING ROAD

Drawn - POR

Checked - IH

Rev - D

Tuesday 19 July 2022

O:\MKO\00 Projects - 210732 Enerco - Knocknamork Grid connection and TDR\Drawings\1. Drawings Received\2022.07.18 - FT Sections\P21-199-0600-0014

4. CONSTRUCTION OF NEW EXCAVATED ROADS THROUGH PEAT – TYPE B

The excavation of peat and spoil and founding of access roads on competent stratum (below the peat) for new access roads will be carried out at various locations on the Proposed Development site. The proposed locations for new excavated access roads on site are shown in Figure 1-1 and details are shown in Figure 4-1.

Excavate and replace type access roads are the conventional method for construction of access roads on peatland sites and the preferred construction technique in shallow peat provided sufficient placement/reinstatement capacity is available on site for the excavated peat.

4.1 Excavated Road Construction Methodology

This methodology includes procedures that are to be included in the construction to minimise any adverse impact on peat stability. The methodology is not intended to cover all aspects of construction such as drainage and environmental considerations, which are discussed in the EIAR.

(1) Prior to commencing the construction of the excavated roads movement monitoring posts will be installed in areas where the peat depth is greater than 2.0m.

(2) Interceptor drains will be installed upslope of the access road alignment to divert any surface water away from the construction area.

(3) Excavation of roads will be to the line and level given in the design requirements. Excavation will take place to a competent stratum beneath the peat.

(4) Road construction will be carried out in sections of approximately 50m lengths i.e. no more than 50m of access road should be excavated without re-placement with stone fill.

(5) Once excavated, peat will be temporarily stored in localised areas adjacent to excavations for roads before being placed into the permanent peat storage areas within the borrow pits or reused for landscaping purposes. All temporary storage areas will be upslope of founded roads and will be inspected by a suitably qualified person before material is stored in the area.

(6) Excavation of materials with respect to control of peat stability:

   (a) Acrotelm (to about 0.3 to 0.4m of peat) is generally required for landscaping and will be stripped and temporarily stockpiled for re-use as required. Acrotelm stripping will be undertaken prior to main excavations.

   (b) Where possible, the acrotelm shall be placed with the vegetation part of the sod facing the right way up to encourage growth of plants and vegetation.

   (c) All catotelm peat (peat below about 0.3 to 0.4m depth) shall be transported immediately on excavation to the designated placement areas, unless required for landscaping purposes, such as along the 33kV cable route.

(7) Side slopes in peat shall be not greater than 1 (v): 3 (h). This slope inclination will be reviewed during construction, as appropriate. Where areas of weaker peat are encountered then slacker slopes will be required. Battering of the side slopes of the excavations will be carried out as the excavation progresses.

(8) The excavated access road will be constructed with up to 1200mm of selected granular fill, depending on the section of road. Granular fill to be placed and compacted in layers in accordance with the TII Specification for Road Works.

(9) Access roads to be finished with a layer of capping across the full width of the road.

(10) A layer of geogrid/geotextile may be required at the surface of the competent stratum.

(11) A final surface layer shall be placed over the excavated road and graded to accommodate construction and delivery traffic.

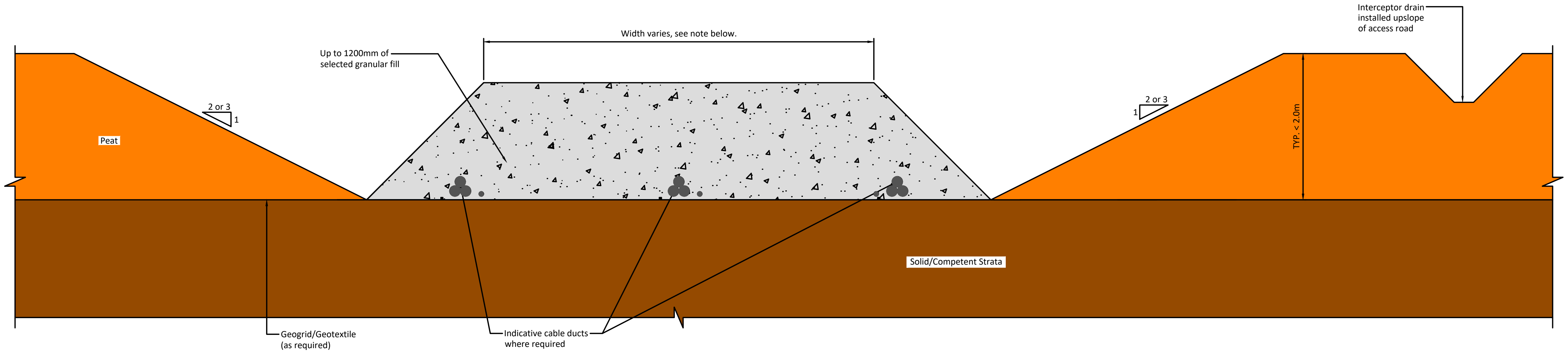
The following general construction guidelines are given for the access roads on site.

(1) Where existing drainage crosses the road then it will be necessary to ensure that this drainage is not affected by settlement of the upgraded access road. Cross drains comprising flexible perforated pipes within a permeable stone fill surround will be used to maintain the existing drainage.

(2) Temporary excavations should be excavated in short lengths and backfilled as soon as practicable.

(3) End-tipping of stone onto the road during the construction/upgrading of the access road should be carefully monitored to ensure that excessive impact loading, which may adversely affect the adjacent peat, is limited.

(4) It is recommended that the construction and upgrading of access roads in areas of deep peat (greater than 2m) is inspected on a routine basis during the works, particularly before/following trafficking by heavy vehicular loads.



Note -
TDR route - width 5m, no underground cabling.
33kV underground cabling route - width 3m.
110 kV underground cabling route - width 2.5m

Scale 1:50

FEHILY TIMONEY Cork | Dublin | Carlow www.fehilytimoney.ie

Scale (@ A3)

TYPE B - NEW EXCAVATE AND REPLACE ACCESS ROAD

Date - 16.06.22

Drawn - POR
Checked - IH
Rev - D

5. EXCAVATION AND STORAGE OF PEAT AND SPOIL

5.1 Excavation and Storage of Arisings Methodology

This methodology includes procedures that are to be included in the construction to minimise any adverse impact on peat stability. The methodology is not intended to cover all aspects of construction such as drainage and environmental considerations.

(1) All excavated peat and spoil not required for landscaping shall be transported immediately on excavation to either the substation borrow pit or already permitted borrow pit (see Figure 1-1).

(2) Further details on the construction and reinstatement of the substation borrow pit are given in Section 5.4.

(3) Further details on the placement of excavated material to designated temporary peat storage areas alongside the access roads are given in Section 5.5.

(4) Some of the peat, in particular the acrotelm (upper layer of the peat), excavated during construction will be used for landscaping purposes.

5.2 Summary of Peat and Spoil Volumes on Site

A summary of the excavated peat and spoil volumes calculated for the Proposed Development site are given in Table 5-1.

Table 5.1: Summary of Excvated Peat and Spoil Volumes on Site

Infrastructure Element (1)	Typical Dimensions	Peat Volume (m^3) (2)	Spoil (non-peat) Volume (m^3) (2)	Comment
Turbine Delivery Route (TDR) plus Site Entrance works	Widening of existing access road to 5m running surface. Construction of new 5m access road. Widening of existing entrance and construction of temporary track from N22.	17,000	2,200	Material to be stored in Permitted Borrow Pit (Increased in size to cater for TDR upgrade).
Access Road for 33kV cabling	Assumed 3m (33kV) and 2.5m (110kV) running surface with 4-5m wide development footprint.	18,000	6,000	Peat on 33kV cable route to be locally sidecast temporarily and used for landscaping once works are complete.
Access Road for 110kV cabling		10,500	2,500	Peat and spoil to be stored in borrow pit adjacent to substation.
Substation Platform	130 x 65m hardstanding area.	19,000	12,000	Peat and spoil to be stored in borrow pit adjacent to substation.
Proposed Borrow Pit	1 no. borrow pit at substation.	3,500	4,800	Excavation of borrow pit will managed to temporarily store overburden within the BP footprint until rock is extracted
Extension to Permitted Borrow Pit	120m x 85m footprint	1,000	2,000	
	Total =	**69,000m^3**	**29,500m^3**	**Total =98,500m^3 (peat and spoil volume) (3)**

Note (1) The location of the infrastructure elements on site are shown on Figure 1-1.

Note (2) A bulking factor of 10% has been applied to the excavated peat and spoil volumes to allow for expected increase in volume upon excavation and to allow for a variation in ground conditions across the site.

Note (3) It should be noted that the excavated rock volume is not included in the total volume quoted above in Table 5-1, see the assessment in Section 11 of this report for further details. It is assumed that the excavated rock volume will be re-used on site as part of the construction works for the development and hence will not require reinstatement on site.

5.3 Summary of Peat and Spoil Placement/Reinstatement Areas on Site

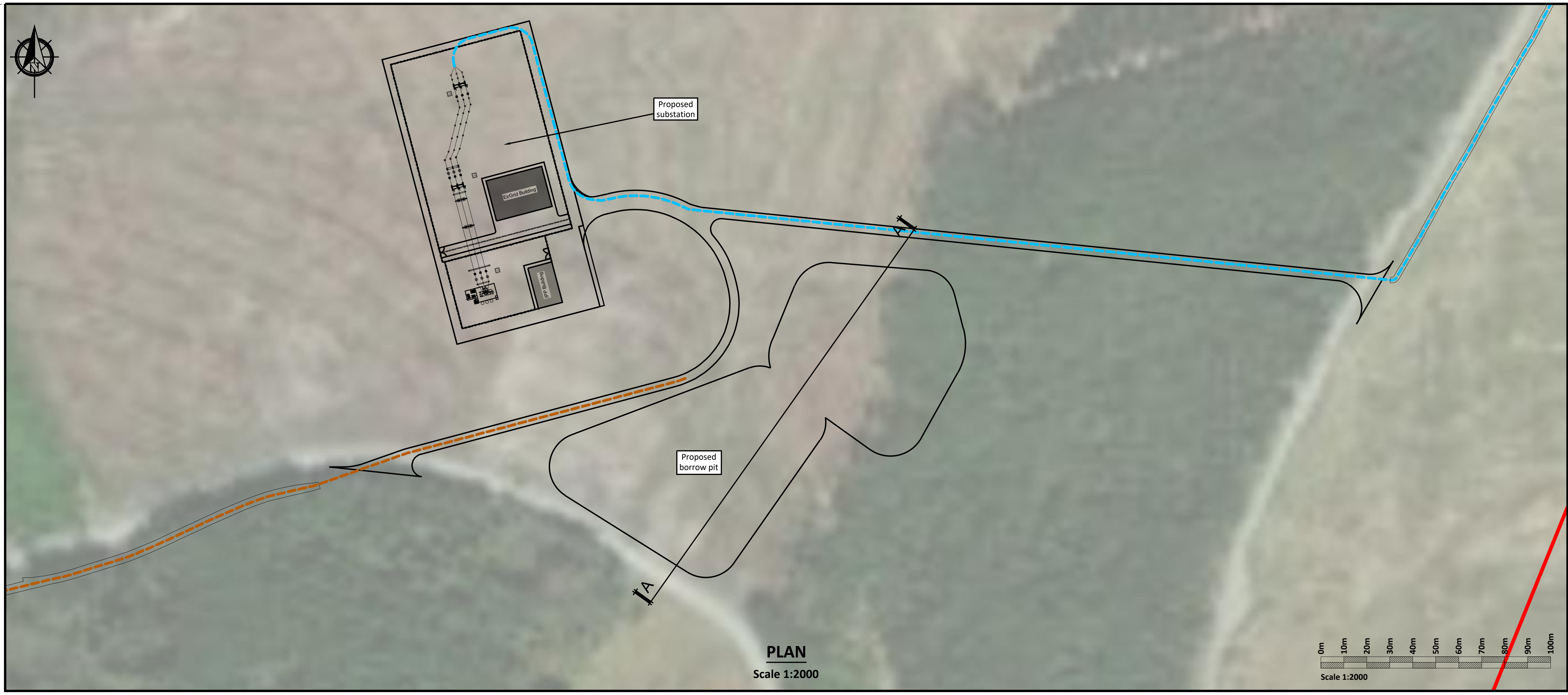
A summary of the potential peat and spoil placement/reinstatement areas at the Proposed Development site are given in Table 5-2.

Table 5.2: Summary of Peat and Spoil Placement/Reinstatement Areas on Site

Location (1)	Peat and Spoil Volume (m^3)	Comment
Proposed Borrow Pit	55,000	See Figure 6.1 for further details
Extension to already Permitted Borrow Pit	29,000	Will require a 2m berm along the low side of the permitted borrow pit and an increase in the plan area of the borrow pit. Quoted volume is additional to material to be stored from the already permitted development.
Landscaping (2)	19,000	Peat excavated along the 33kV underground cabling will be locally sidecast for reuse as landscaping following completion of the works. Approximately 1,000m^3 will also be used in the 110kV trench backfill.
Total =	**103,000m^3**	

Note (1) The location of the proposed borrow pits at the site are shown on Figure 1-1.

Note (2) Some of the acrotelm (upper layer of the peat) excavated during construction will be used for landscaping purposes.



FEHILY TIMONEY
Cork | Dublin | Carlow
www.fehilytimoney.ie

Legend:

- EIAR Planning Boundary
- Proposed Access Track
- Turbine Delivery Route (TDR)
- Underground Cabling 33kV
- Underground Cabling 110 kV
- 33kV Underground Cabling in Permitted Development
- Permitted Development

Borrow Pit Construction Notes:

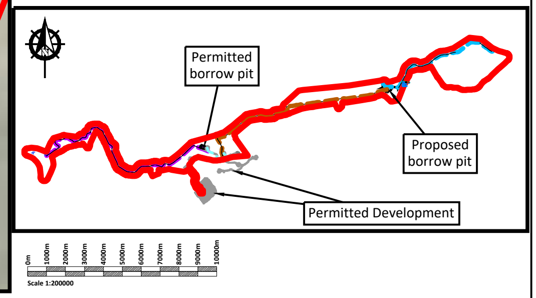
(1) In-situ rock slope formed at stable inclinations to suit local rock conditions.

(2) Localised deepening of quarry floor to suit extraction operations, as required.

(3) The thickness of overburden was based on the trial pits carried out within the footprint of the borrow pit.

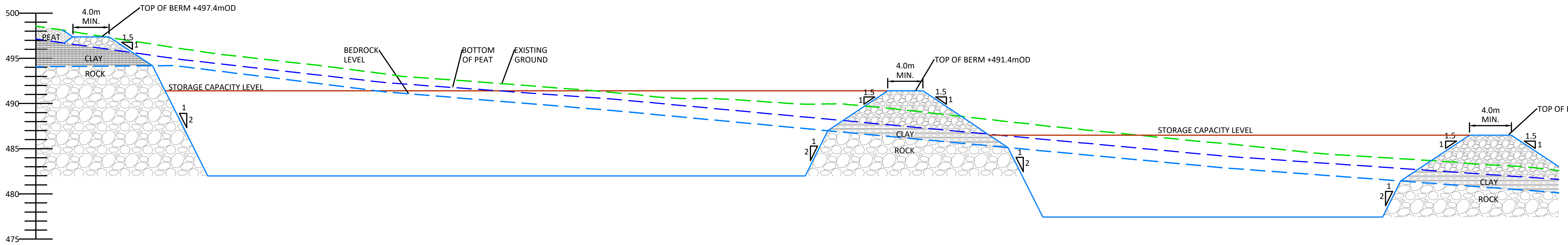
(4) Further guidelines on the construction of the borrow areas is included within the Peat Management Plan.

(5) The design of borrow pit shown on this layout in the form of the plan and section has been carried out by Ionic and is shown for schematic purpose.



KEYPLAN

Scale 1:200000



SECTION A-A

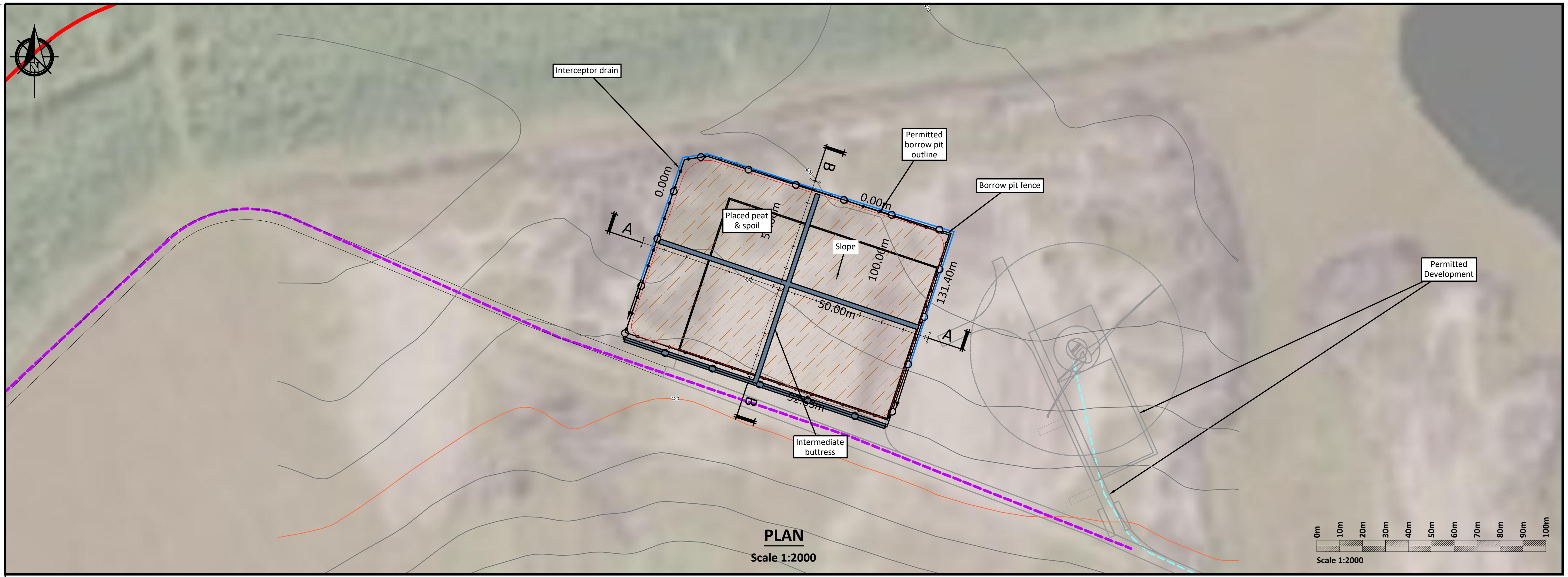
Scale 1:500

Scale (@ A3) 1:2000	BORROW PIT DESIGN	Drawn - POR
		Checked - IH
Date - 28.06.22		Rev - D

O:\ACAD\2021\P21-199\P21-199-0600-0013

Thursday 14 July 2022

FEHILY TIMONEY
Cork | Dublin | Carlow
www.fehilytimoney.ie



PLAN
Scale 1:2000

Legend:

- EIAR Planning Boundary
- Proposed Access Track
- Turbine Delivery Route (TDR)
- Underground Cabling 33kV
- Underground Cabling 110 kV
- 33kV Underground Cabling in Permitted Development
- Permitted Development

Construction Notes Repository Areas:

(1) An interceptor drain should also be installed upslope of the repository areas.

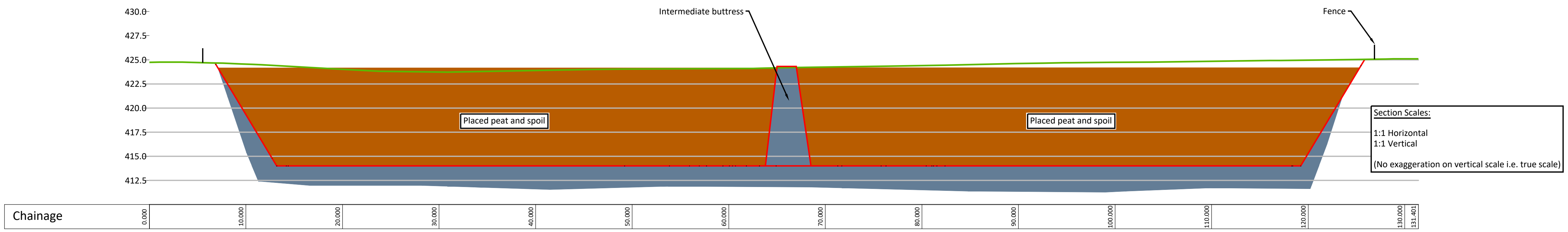
(2) A silting pond will be required at the lower side of the repository areas.

(3) It is important that the surface of the stored spoil be shaped to allow efficient run-off of water from the stored spoil.

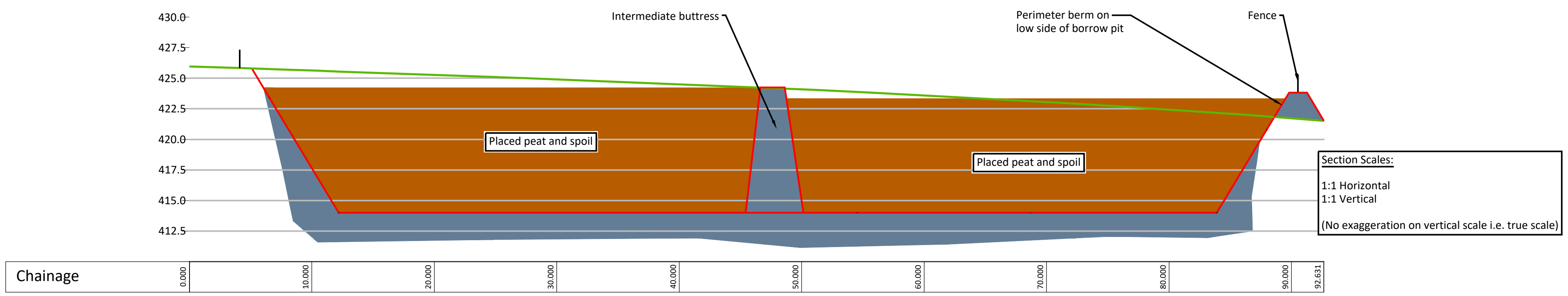
(4) Supervision by a geotechnical engineer or appropriately competent person is recommended for the construction of the repository area.

(5) All the above-mentioned general guidelines and requirements should be confirmed by the designer prior to construction.

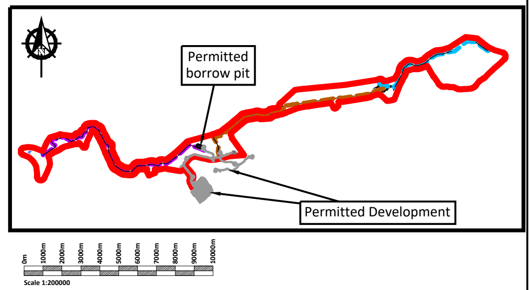
(6) Further guidelines on the construction of the repository area are included within Section 7.6 of the Peat & Spoil Management Plan.



SECTION A-A
Scale 1:500



SECTION B-B
Scale 1:500



KEYPLAN
Scale 1:200000

Scale (@ A3)
1:2000

Date - 13.07.22

EXTENSION TO PERMITTED BORROW PIT

Drawn - POR
Checked - IH
Rev - C

O:\ACAD\2021\P21-199\P21-199-0600-0012

Thursday 14 July 2022

5.4 Guidelines for the Construction and Reinstatement of Borrow Pits

It is proposed to develop a borrow pit adjacent to the proposed substation location as well as extending the permitted borrow pit associated with the Renewable Energy Development. These locations are shown on Figure 1-1. The average peat depth within the development footprint of the borrow pits is less than 1.0m.

Upon removal of the rock from the borrow pits, it is proposed to reinstate the borrow pits using excavated peat and spoil. The excavated rock from the borrow pits will be used in the construction of the infrastructure elements (roads, etc.) associated with the Proposed Development. The contractor excavating the rock will be required to develop the borrow pits in a way which will allow the excavated peat and spoil to be placed safely. It is proposed to construct cells within the borrow pits for the placement of the excavated peat and spoil. This is to allow for the safe placement and grading of the peat and spoil using dumper trucks and excavators. It also eliminates the need to construct above ground retaining structures which increase the development footprint of the Proposed Development. The text below provides design and construction guidelines for the borrow pits.

Figures 5-1 to 5-2 show typical construction details for the borrow pits.

The borrow pits shall be constructed as follows:

(1) The rock within the proposed borrow pit footprints will be removed by either breaking or blasting depending on its excavatability, which will be determined from a ground investigation carried out at the proposed borrow pits. The ground investigation shall comprise rotary core drilling with associated engineering logging including rock quality designation and strength testing, as required.

(2) The borrow pit will be stripped and opened in stages. Any peat/spoil stripped from the area initially opened within the borrow pit will be temporarily stockpiled within the remaining footprint of the borrow pit. This material will be placed and sealed to prevent water ingress and shaped to allow for surface water to run off. If required, a berm will be placed on the downslope side of this stockpiled material to retain the material. Any berm will be founded on competent material below the peat.

(3) It is proposed to construct the borrow pits so that the base of the borrow pits are below the level of the adjacent section of access road. As excavation progresses into the back edge of the borrow pits, the base of the borrow pits may be raised to suit local conditions. Localised deepening of the borrow pit floors may be required depending on extraction operations.

(4) Depending on the depth and type of rock present in the borrow pits it may be possible to excavate the rock from the borrow pits whilst leaving in place upstands/segments of intact rock which will help to retain the placed peat and spoil. The upstands/segments of intact rock will essentially act as engineered rock buttresses within the borrow pits.

(5) Slopes within the excavated rock formed around the perimeter of the borrow pits will be formed at stable inclinations to suit local in-situ rock conditions. Exposed sections of the rock slopes will be left with irregular faces and declivities to promote re-vegetation and provide a naturalistic appearance.

(6) The stability of the rock faces within the borrow pits will be inspected by competent personnel upon excavation to ensure stability during construction works and in the long term. This inspection will allow unfavourable rock conditions to be identified and suitable mitigation measures to be applied such as removal of loose rock.

(7) Where it is not possible to leave upstands/segments of intact rock in place it may be necessary to construct rock buttresses founded on in-situ rock within the borrow pits. The rock buttresses should be constructed of rock fill from the borrow pit excavation. The founding stratum for each rock buttress should be inspected and approved by a competent person.

(8) It may be necessary to construct the rock buttresses within the borrow pits in stages as infilling of peat and spoil behind the buttresses progress. The buttress should be constructed of selected rock

fill and placed and compacted in suitable layers to form a buttress of sufficient stability to retain the placed peat and spoil, as necessary.

(9) Infilling of the peat and spoil should commence at the back edge of the borrow pit and progress towards the borrow pit entrance/rock buttress. The contractor excavating the rock will be required to develop the borrow pits in a way which will allow the excavated peat and spoil to be reinstated safely.

(10) A number of rock buttresses to form cells with the borrow pits may be required to ensure access for trucks and excavators can be achieved. The rock buttresses should be wide enough to allow construction traffic access for tipping and grading during the placement of the excavated peat and spoil. The side slopes of the rock buttress should be constructed between 45 to 60 degrees.

(11) The height of the rock buttresses constructed should be greater than the height of the reinstated peat and spoil to prevent any surface peat and spoil run-off.

(12) The use of temporary access ramps and long reach excavators during the placement of the excavated peat and spoil may be required.

(13) Where possible, the surface of the placed peat and spoil should be shaped to allow efficient run-off of surface water from the placed arisings.

(14) A layer of geogrid to strengthen the surface of the placed peat and spoil within the borrow pits may be required.

(15) An interceptor drain should also be installed upslope of the borrow pit. This drain will divert any surface water away from the borrow pit and hence prevent water from ponding and lodging during construction and also when reinstated.

(16) Control of groundwater within the borrow pits may be required and measures will be determined as part of the ground investigation programme. A temporary pump and suitable outfall locations are likely to be required during construction.

(17) Silting ponds will be required at the lower side/outfall location of the borrow pits.

(18) Where possible, the acrotelm shall be placed with the vegetation part of the sod facing the right way up to encourage growth of plants and vegetation at the surface of the peat and spoil within the borrow pits.

(19) Supervision by a geotechnical engineer or appropriately competent person is recommended for the works.

(20) All the above mentioned general guidelines and requirements will be confirmed by the designer prior to construction. A detailed construction methodology for the borrow pits should be compiled prior to construction.

5.5 Designated Spoil Placement Areas alongside Infrastructure Elements

The following recommendations/best practice guidelines for the placement of peat and spoil alongside the proposed infrastructure elements will be considered and taken into account during construction.

(1) All excavated peat along the proposed 33kV underground cabling route will be temporarily placed/spread alongside the proposed access road, where possible, and then reused as landscaping on either side of the proposed road.

(2) The placement of excavated peat should be restricted to areas where the peat depth is less than 2m.

(3) The peat placed adjacent to the proposed infrastructure elements should be restricted to a maximum height of 1m over a up to 10m wide corridor on the upslope side of the proposed infrastructure elements. It should be noted that the designer should define/confirm the maximum restricted height for the placed peat and spoil.

(4) The placement of excavated peat is to be avoided without first establishing the adequacy of the ground to support the load. The placement of peat within the placement areas will likely require the use of long reach excavators, low ground pressure machinery and possibly bog mats.

(5) Where there is any doubt as to the stability of the peat surface then no material shall be placed on to the peat surface. The risk of peat instability is reduced by not placing any loading onto the peat surface.

(6) Where practical, it should be ensured that the surface of the placed peat and spoil is shaped to allow efficient run-off of surface water. Where possible, shaping of the surface of the peat and spoil should be carried out as placement of peat and spoil within the placement area progresses. This will reduce the likelihood of debris run-off and ensure stability of the placed peat and spoil.

(7) Finished/shaped side slopes in the placed peat and spoil shall be not greater than 1 (v): 2 or 3 (h). This slope inclination will be reviewed during construction, as appropriate. Where areas of weaker peat and spoil are encountered then slacker slopes will be required.

(8) Where possible, the acrotelm shall be placed with the vegetation part of the sod facing the right way up to encourage growth of plants and vegetation at the surface of the placed peat and spoil within the placement areas.

(9) Movement monitoring instrumentation may be required adjacent to the access road where peat has been placed. The locations where monitoring is required will be identified by the designer on site.

(10) Supervision by a geotechnical engineer or appropriately competent person is recommended for the works.

(11) An interceptor drain will be installed upslope of the designated peat placement areas to divert any surface water away from these areas. This will help ensure stability of the placed peat and reduce the likelihood of debris run-off.

(12) All the above mentioned general guidelines and requirements should be confirmed by the designer prior to construction.

6. EXCAVATIONS IN PEAT FOR SUBSTATION PLATFORM

The works require that the substation platform be founded on competent founding strata which will require excavation through peat and possibly overburden. Excavations for the substation borrow pit will also require the removal of peat and non-peat spoil overlying the rock.

6.1 Methodology

This methodology includes procedures that are to be included in the construction to minimise any adverse impact on peat stability. The methodology is not intended to cover all aspects of construction such as drainage and environmental considerations, which are discussed in the CEMP.

(1) With respect to placement of arisings from excavations the guidelines given in Section 6 are to be followed.

(2) All excavations within peat are to be adequately supported or peat slopes are to be battered to a safe slope inclination typically of 1 (v): 3 (h). This slope inclination will be reviewed during construction, as appropriate. Where areas of weaker peat are encountered then slacker slopes will be required.

(3) Excavations shall be kept reasonably free from water at all times. Water should be prevented from being impounded within excavations by either using drainage channels cut into the excavation face or by pumping.

(4) Where water is channelled or pumped from an excavation then this water is to be fed into an established watercourse or drainage ditch following suitable treatment.

7. EXCAVATIONS FOR UNDERGROUND CABLES

The proposed underground cabling methodologies, including proposals for water crossings on the underground cabling routes are described in the EIAR.

The underground cables will be placed at a uniform level at the base of the excavation for the access roads.

The cable trench route is envisaged to encounter peat and till derived from Devonian sandstones.

7.1 Methodology

This methodology includes procedures that are to be included in the construction to minimise any adverse impact on peat stability. The methodology is not intended to cover all aspects of construction such as drainage and environmental considerations.

(1) With respect to placement of arisings from excavations the guidelines given in Section 6 are to be followed.

(2) The proposed underground cabling will be built within the proposed access roads, typically at the base of the peat. A short section of the 110kV underground cabling across an area of peatland will be installed in a trench in the overburden below the peat, using low ground bearing pressure machinery without the construction of an access road.

(3) All excavations within peat are to be adequately supported or peat slopes are to be battered to a safe slope inclination typically of 1 (v): 3 (h). This slope inclination will be reviewed during construction, as appropriate. Where areas of weaker peat are encountered then slacker slopes will be required.

(4) Similarly, all excavations within non-peat overburden for the cable trench are to be adequately supported or battered to a safe slope inclination typically of 1 (v): 1.5 or 2 (h). This slope inclination will be reviewed during construction, as appropriate.

(5) Excavations shall be kept reasonably free from water at all times.

(6) Any material excavated from the cable trench which is deemed suitable for reinstatement of the trench will be used for this purpose i.e. stockpiled locally to the works and reused for backfilling.

8. GENERAL RECOMMENDATIONS FOR GOOD CONSTRUCTION PRACTICE

To minimise the risk of construction activity causing potential peat instability it is recommended that the Construction Method Statements (CMS) for the project will also take into account, but not be limited, to the general recommendations below together with the specific recommendations above.

(1) Avoidance of uncontrolled concentrated water discharge onto peat slopes identified as being unsuitable for such discharge. All water discharged from excavations during work shall be piped over areas specifically assessed as being unsuitable and hence directly into suitable drainage lines.

(2) Avoidance of unstable excavations. All excavations shall be suitably supported to prevent collapse and development of tension cracks.

(3) Avoidance of placing fill and excavations in the vicinity of steeper peat slopes, that is at the crest or toe of the slope.

(4) Installation and regular monitoring of geotechnical instrumentation, as appropriate, during construction in areas of possible poor ground, such as deeper peat deposits (see Section 10).

(5) Site reporting procedures to ensure that working practices are suitable for the encountered ground conditions. Ground conditions to be assessed by suitably experienced geotechnical engineer.

(6) Regular briefing of all site staff (e.g. toolbox talks) to provide feedback on construction and ground performance and to promote reporting of any observed change in ground conditions.

(7) Routine inspection of the Proposed Development by Contractor to include an assessment of ground stability conditions (e.g. cracking, excessive floating road settlement, disrupted surface, closed-up drains) and drainage conditions (e.g. blocked drains, absence of water in previously flowing drains, springs, etc).

9. INSTRUMENTATION

9.1 Movement Monitoring Posts

To monitor possible peat movements, it is proposed to install sighting posts upslope and downslope of the access roads at staggered intervals at locations where the peat depth is greater than 2.0m. Additional monitoring locations may be required at locations with deeper peat deposits. Details of sighting posts are given below.

(1) A line of sighting posts shall comprise:

  (a) A line of wooden stakes (typically 1 to 1.5m long) placed vertically into the peat to form a straight line.

  (b) The sighting line shall comprise 6 no. posts at 5m centres that is a line some 25m long.

  (c) A string line shall be attached to the first and last posts and all intervening posts shall be adjusted so they are just touching the string line.

(2) Lines of sighting posts shall be placed across the existing slope about 5m away from the area to be worked. It is recommended that the posts are located along the road at 10m intervals in areas of deep peat (say greater than 2.0m). Where there are relatively steeper slopes or softer ground a sighting line shall be placed down the slope, or at any location where monitoring would be deemed useful.

(3) Each line of sighting posts shall be uniquely referenced with each post in the line given a reference. The post reference shall be marked on each post (e.g. reference 1-1, 1-2, 1-3, 1-4, 1-5, 1-6 for posts in line 1).

(4) The sighting lines shall be monitored at the beginning of each working day, and during the day where considered appropriate (e.g. when working activity is concentrated at a specific location).

(5) Monitoring of the posts shall comprise sighting along the line and recording any relative movement of posts from the string line.

(6) Where increased movements are recorded the frequency of monitoring shall be increased.

(7) A monitoring record shall be kept of the date, time and relative movement of each post, if any. This record shall be updated and stored as a spreadsheet.

10. CONTINGENCY MEASURES

10.1 Excessive Movement

Where there is excessive movement or continuing peat movement recorded at a monitoring location or identified at any location within the site but no apparent signs of distress to the peat (e.g. cracking, surface rippling) then the following shall be carried out.

(1) All activities (if any) shall cease within the affected area.

(2) Increased monitoring at the location shall be carried out. The area will be monitored, as appropriate, until such time as movements have ceased.

(3) Re-commencement of activities shall only start following a cessation of movement and agreement with all parties.

10.2 Onset of Peat Slide

In the unlikely event where there is the onset or actual detachment of peat (e.g. cracking, surface rippling) then the following shall be carried out.

(1) On alert of a peat slide incident, all activities (if any) in the area should cease and all available resources will be diverted to assist in the required mitigation procedures.

(2) Action will be taken to prevent a peat slide reaching any watercourse. This will take the form of the construction of check barrages on land. Due to the terrain and the inability to predict locations it may not be possible to implement any on-land prevention measures, in this case a watercourse check barrage will be implemented.

(3) All relevant authorities should be notified if a peat slide event occurs on site.

(4) For localised peat slides that do not represent a risk to a watercourse and have essentially come to rest the area will be stabilised initially by rock infill, if required. The failed area and surrounding area will then be assessed by the engineering staff and stabilisation procedures implemented. The area will be monitored, as appropriate, until such time as movements have ceased.

10.3 Check Barrages

Whilst it is not anticipated from the analysis undertaken that a peat slide will occur on site, as a contingency a check barrage procedure is included below.

The check barrage procedure deals with preventing a peat slide from moving downstream within a watercourse.

The most effective method of preventing excessive peat slide debris from travelling downstream in a watercourse is the use of a check barrage. A check barrage comprises the placement of rock fill across a watercourse. The check barrage is a highly permeable construction that will allow the passage of water but will prevent peat debris from passing through. Rock fill should comprise well-graded coarse rock pieces from about 300mm up to typically 1000mm.

The rock fill for the check barrage could be sourced from locally won granular fill material on site.

The size of the barrage will vary depending on the scale of the peat debris to be contained and the geometry of the watercourse at the barrage location. In general, due to the low speed of a peat slide there is generally little impact force and most of the lateral load is due to fluid pressure on the upslope face of the barrage.

Typically, the check barrage should fill the entire channel width of the watercourse up to a height of 3 to 4m with a crest width of typically 2m and side slopes of about 45 degrees depending on the geometry of the barrage location.

The check barrage procedure is as follows:

(1) Access to the check barrage location shall be along the existing access roads on the wind farm site and/or along public roads, where possible. When it is necessary to form the barrage then rock fill will be placed across the watercourse to effectively block the passage of peat debris.

(2) Operatives employed to carry out the construction of the check barrage would need to be inducted by means of a briefing by on-site supervisors as to the proposed location of the check barrage.

(3) The check barrage provides containment for peat debris in the highly unlikely event of a major peat slide. Further remedial measures, should they be required, will be assessed by the Contractor and the Project Geotechnical Engineer and carried out as soon as physically possible when the location and extent of the failure is established.

(4) Where a barrage was constructed as a precaution and no peat debris reached the watercourse then the barrage should be removed as soon as any measures to prevent further peat sliding is agreed with all parties.

11. CUT & FILL EARTHWORKS ASSESSMENT

FT carried out an assessment for the site which quantifies the total volume of cut and fill earthworks required for the construction of the substation platform.

The outputs from the cut & fill earthworks assessment includes the following:

- Plan drawings of the substation platform showing an outline of cut & fill earthworks (Figure 11-1)
- Preliminary cut & fill earthwork volumes (see Table 5-1 of this report)

11.1 Commentary on Earthworks Volumes

It should be noted that the earthwork volumes given in Table 11-1 are indicative and for information purposes only. This section of the report should be read in conjunction with Sections 5.2 and 5.3 of the report which summarise the peat and spoil volumes for site and the placement/reinstatement areas on site.

In summary the following points are given,

1) A total of 98,500m^3 of peat and spoil will be generated during the construction of the proposed development. This material will be excavated and placed/reinstated to the borrow pits (substation and main site), with 18,000m^3 of peat temporarily side cast and reused for landscaping along the 33kV connection.

2) A total of 79,500m^3 of stone is required to construct the access roads and substation hardstand across the Proposed Development.

3) Based on the available ground investigation information the estimated quantity of available rock within the substation borrow pit is 41,500m^3. A further 20,000m^3 of rock will be available from the excavation for the substation platform. Additional rock (a further 18,000m^3) will be provided from an expansion of the already permitted borrow pit that is part of the Renewable Energy Development. Conservative assumptions were made in estimating the quantity of rock available in the borrow pits.

4) A bulking factor of 10% has been applied to all peat and spoil excavation volumes to allow for expected bulking upon excavation.

Table 11.1: Summary of Required Stone Volumes

Infrastructure Element	Description	Stone Volume (m^3)	Comment
Substation Platform	130 x 65m hardstand area	16,500	Material sourced from within cutting at platform location.
Access Roads (TDR and cable routes)	Assumed up to 2.5m (110kV), 3m (33kV) and 5m (TDR) running surface with 5-7m wide development footprint	59,000	Material sourced from permitted borrow pit (for the TDR) and substation borrow pit (33kV and 110kV underground cabling routes)
Borrow Pits	Borrow Pit	4,000	Borrow pit perimeter berms
	Total =	**79,500**	

FEHILY
TIMONEY

CONSULTANTS IN ENGINEERING,
ENVIRONMENTAL SCIENCE and PLANNING

www.fehilytimoney.ie

CORK OFFICE
Core House
Pouladuff Road,
Cork, T12 D773,
Ireland
+353 21 496 4133

Dublin Office
J5 Plaza,
North Park Business Park,
North Road, Dublin 11, D11 PXT0,
Ireland
+353 1 658 3500

Carlow Office
Unit 6
Bagenalstown Industrial Park,
Bagenalstown, Co. Carlow,
R21 XW81, Ireland
+353 59 972 3800

APPENDIX 4-3

CONSTRUCTION AND ENVIRONMENTAL MANAGEMENT PLAN

Planning and Environmental Consultants

Construction and Environmental Management Plan

Proposed Substation, Underground Cabling & Access Roads to Knocknamork Renewable Energy Development

DOCUMENT DETAILS

Client: **Knocknamork Ltd.**

Project Title: **Proposed Substation, Underground Cabling & Access Roads to Knocknamork Renewable Energy Development**

Project Number: **210732**

Document Title: **Construction and Environmental Management Plan**

Document File Name: **CEMP - F - 2022.07**

Prepared By: **MKO**
Tuam Road
Galway
Ireland
H91 VW84

Planning and Environmental Consultants

Rev	Status	Date	Author(s)	Approved By
01	Draft	15.07.2022	KMcG	OC/EOS
02	Final	29.07.2022	KMcG	OC/EOS

Table of Contents

TABLE OF TABLES

TABLE OF PLATES

TABLE OF FIGURES

1. INTRODUCTION

This Construction Environmental Management Plan (CEMP) has been prepared by MKO on behalf of Knocknamork Ltd, who intend to apply to An Bord Pleanála (ABP), Cork County Council (CCC) and Kerry County Council (KCC) for planning permission for works associated with the permitted Knocknamork Renewable Energy Development (Permitted Development) located near Ballyvourney, Co. Cork. The proposed works will consist of a 110kV Electrical Substation, underground electrical cabling (33kV and 110kV), road and junction upgrades, new access roads, borrow pits and associated works.

The CEMP has been prepared in conjunction with the Environmental Impact Assessment Report (EIAR) which will accompany the planning application for the proposed works to be submitted to the competent authorities.

Should the works secure planning permission, the CEMP will be updated, in line with all conditions and obligations which apply to any grant of permission. The CEMP should be read in conjunction with the EIAR and planning drawings. The CEMP will also require updating by the selected contractor in order to identify, assess and satisfy the contract performance criteria as set out by the various stakeholders. The CEMP due to its structure and nature will also require constant updating and revision throughout the construction period as set out below. Therefore, this is a working document and will be developed further prior to and during the construction phase of the Proposed Development.

Triggers for amendments to the CEMP will include:

- When there is a perceived need to improve performance in an area of environmental impact;
- As a result of changes in environmental legislation applicable and relevant to the project;
- Where the outcomes from auditing establish a need for change;
- Where Work Method Statements identify changes to a construction methodology to address high environmental risk; and
- As a result of an incident or complaint occurring that necessitates an amendment.

This CEMP identifies the key planning and environmental considerations that must be adhered to and delivered during site construction and operation. The Contractor, as appointed by the Project Developer, will be required to implement all of the requirements set out in this CEMP. The CEMP may be updated and revised throughout the construction phase of the project, but all future iterations must meet or exceed the standards and requirements set out in this document and the Project Developer must be satisfied that all requirements set out in this document can and will be implemented in full by the appointed contractor.

The CEMP to be prepared by the appointed contractor will be a single, amalgamated document that can be used during the construction phase of the project, as a single consolidated point of reference relating to all construction, environmental and drainage requirements for the Planning Authority, developer and contractors alike. The CEMP may evolve over further iterations as the construction works progress, but at all times must meet or exceed the standards and requirements set out in this document. It will be the contractor's current version of the CEMP, which at any point in time, will guide the construction activities on site and the implementation of which will be audited by an Environmental Clerk of Works (ECoW).

1.1 Scope of the Construction and Environmental Management Plan

This report is presented as a guidance document for the construction of the Proposed Development. Where the term 'site' is used in the CEMP it refers to all works associated with the Proposed Development. The CEMP outlines clearly the mitigation measures and monitoring proposals that are required to be adhered to in order to complete the works in an appropriate manner.

The report is divided into nine sections, as outlined below.

Section 1 provides a brief introduction as to the scope of the report.

Section 2 outlines the Site and Project details, detailing the targets and objectives of this plan along with providing an overview of construction methodologies that will be adopted throughout the project.

Section 3 sets out details of the environmental controls to be implemented on site. Site drainage principles, peat stability monitoring measures and a waste management plan are also included in this section.

Section 4 sets out a fully detailed implementation plan for the environmental management of the project outlining the roles and responsibilities of the project team.

Section 5 outlines the Emergency Response Procedure to be adopted in the event of an emergency in terms of site health and safety and environmental protection.

Section 6 consists of a summary table of all mitigation proposals to be adhered to during the project, categorised into three separate headings, 1) pre-commencement measures; 2) construction-phase measures and 3) operational-phase measures.

Section 7 consists of a summary table of all monitoring requirements and proposals to be adhered to during the project, categorised into three separate headings, 1) pre-commencement measures; 2) construction-phase measures and 3) operational-phase measures.

Section 8 sets out a programme for the timing of the works.

Section 9 outlines the proposals for reviewing compliance with the provisions of this report.

1.2 Targets and Objectives

The following key targets and objectives will inform the final detailed design should the Proposed Development secure planning permission and proceed to the construction phase. This includes consideration of the buildability of the designs that emerge:

- Adopt a sustainable approach to construction and, ensure sustainable sources for materials supply where possible;
- Keeping all watercourses free from obstruction and debris;
- Avoidance of any pollution incident or near miss as a result of working around or close to existing watercourses and having emergency measures in place;
- Correct fuel storage and refuelling procedures to be followed;
- Air and noise pollution prevention to be implemented;
- Construction Methods and designs will be altered where it is found there is an adverse effect on the environment;
- Good waste management and house-keeping to be implemented;
- Using recycled materials if possible, e.g. excavated stone, soil and subsoil material;

- Avoidance of vandalism;
- Monitoring of the works and any adverse effects that it may have on the environment; and
- Provide adequate environmental training and awareness for all project personnel.

The key site objectives are as follows;

- Keep impact of construction to a minimum on the local environment, watercourses and wildlife;
- Comply with all relevant water quality legislation;
- Ensure construction works and activities are completed in accordance with mitigation and best practice approach presented in the EIAR and associated planning documentation;
- Ensure construction works and activities are completed in accordance with any planning conditions for the development;
- Ensure construction works and activities have minimal impact/disturbance to local landowners and the local community; and
- Ensure construction works and activities have minimal impact on the Natural Environment.

2. SITE AND PROJECT DETAILS

2.1 Site Location and Description

The site of the Proposed Development which straddles the county boundary between Co. Kerry and Co. Cork is located approximately 6 kilometres southwest of the town of Millstreet and 3 kilometres northwest of the village of Ballyvourney. The Grid Reference co-ordinates of the approximate start and end points for the Proposed Development site are E514036, N581567 and E525824, N584341 respectively. Land-use on the site and in the wider area comprises a mix of commercial forestry, wind farm development, cutover peat bog and some agricultural pastures.

The Permitted Development comprises 7 no. wind turbines, up to 70,000m^2 of solar panels on ground mounted steel frames, and associated works. Planning permission was granted by Cork County Council on 2nd January 2020 (Ref. No. 19/4972).

The Proposed Development comprises the construction of a 110kV electrical substation and adjacent borrow pit located in the townlands of Cummeennabuddoge and Caherdowney. The proposed underground grid connection cabling consists of two elements, with 110kV underground electrical cabling connecting the proposed 110kV electrical substation to the existing 220kV substation at Ballyvouskill, and 33kV underground electrical cabling connecting the Permitted Development to the proposed 110kV electrical substation. The total length of underground electrical cabling routes will measure approximately 11.9 kilometres (the 110kV and 33kV cable routes are approximately 3.6km and 8.3km respectively), which will be located on existing forest/ agricultural roads (requiring upgrading), forestry land, peatland and agricultural land. Where roads do not exist along the proposed underground cabling routes, new access roads will be provided. No road will be provided across a short section (685m) of peatland habitat along the 110kV cabling route. The proposed 110kV electrical substation is intended to replace the 38kV substation (and associated 38kV underground cabling and battery storage compound) permitted under Pl. Ref. 19/4972. Upgrading of access junctions and existing roads will be required to facilitate the delivery of materials (in particular, turbine components) to the Permitted Development, a short section (209m) of new access road will connect the upgraded access road to the Permitted development, completing the Turbine Delivery Route (TDR). The borrow pit permitted under Pl. Ref. 19/4972 will be extended to facilitate the construction of the TDR. Site drainage measures, forestry felling and all associated site development works and apparatus are also included.

Table 2-1 Townlands within which the Proposed Development is Located

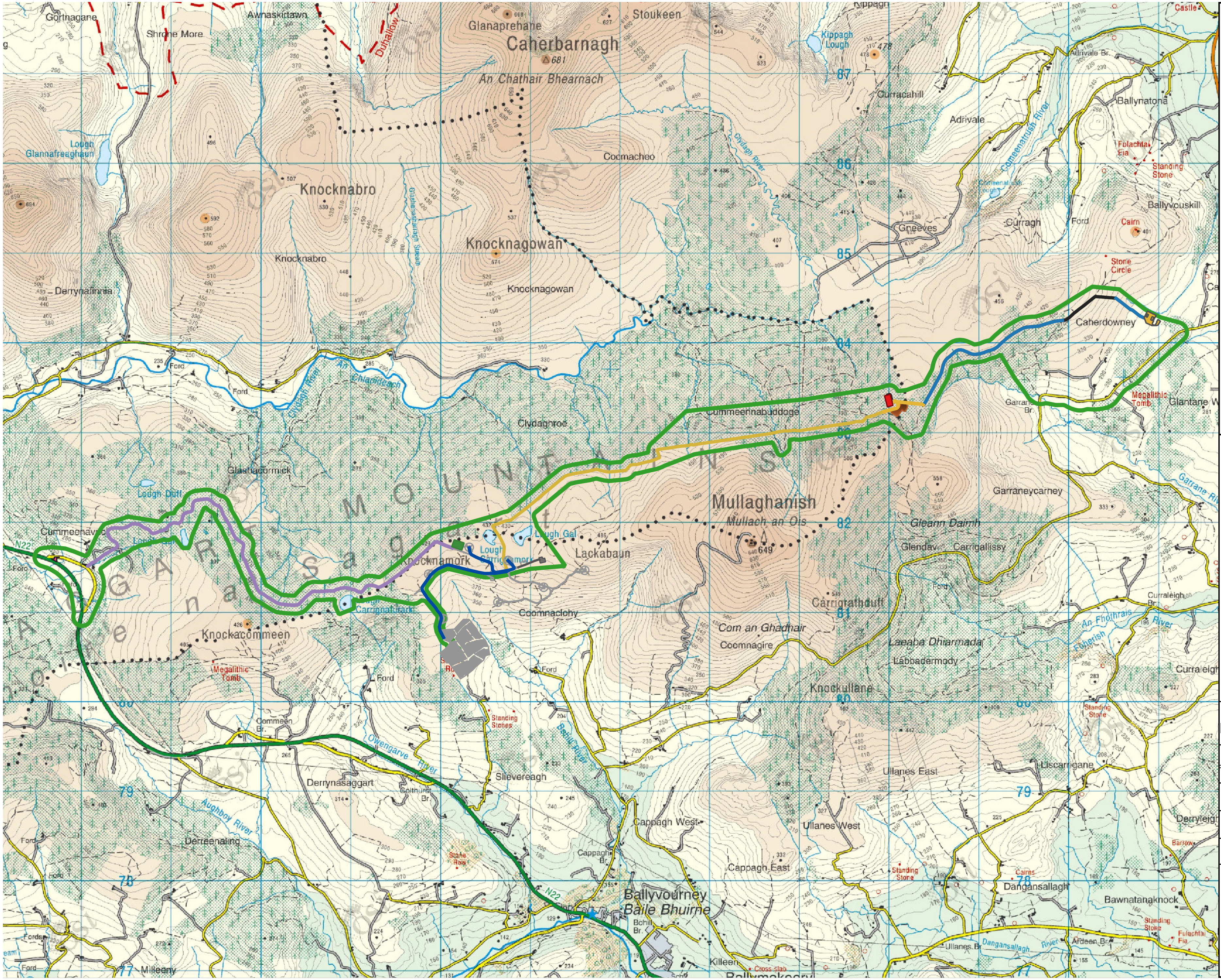
Development Works	Townland	
	Co. Kerry	Co. Cork
Upgrade of existing tracks and roads	Cummeenavrick, Glashacormick, Clydaghroe	Slievereagh, Coomnaclohy
Upgrade of access junctions	Cummeenavrick	
33kv Underground Cabling (Permitted Development to the proposed Substation)	Clydaghroe, Cummeennabuddoge	Slievereagh, Coomnaclohy
110kV Substation & Underground Cabling (Proposed Substation to Ballyvouskill Substation & Access Road) & Borrow pit	Cummeennabuddoge	Caherdowney
Extension to permitted borrow pit		Coomnaclohy

The full description of the Proposed Development is as follows:

Overall Development Description

i. *110 kV electrical substation with 2 no. control buildings with welfare facilities, all associated electrical plant and apparatus, security fencing, underground cabling, waste water holding tank and all ancillary works;*
ii. *Underground electrical cabling (110kV);*
iii. *Underground electrical cabling (33kV);*
iv. *Access Roads (new and upgrade of existing)*
v. *Temporary access road;*
vi. *Upgrade of access junctions;*
vii. *Amendments to the Permitted Development (Ref. No. 19/4972), including extension to the borrow pit and the omission of the 38kV Electrical Substation, 38KV underground cabling and Battery Storage compound;*
viii. *Borrow pit;*
ix. *Site Drainage;*
x. *Forestry Felling; and*
xi. *All associated site development works and apparatus;*

The proposed site layout showing individual elements of the development is shown in Figure 2-1 and in the Site Layout Drawings included with the application.



Map Legend

- EIAR Study Boundary
- Access Road (Upgrade & New)
- Temp Road
- 33kV Underground Cabling and Access Roads
- 33kV Underground Cabling in Permitted Development
- 110kV Underground Cabling
- 110kV Underground Cabling and Access Road
- Ballyvouskill 220kV Substation
- Proposed 110kV Substation Location
- Proposed Borrow Pit
- Permitted Borrow Pit Extension
- Omitted 38kV Electrical Substation and Battery Compound

N

Drawing Title	Proposed Development Layout
Project Title	Proposed Substation, Underground Cabling & Access Roads to Knocknamork Renewable Energy Development
Drawn By: NMcH	Checked By: EOS
Project No.: 210732	Drawing No.: Figure 4-1
Scale: 1:55000	Date: 28.06.2022

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland

2.2 Construction Methodology Overview

2.2.1 Introduction

An experienced main contractor will be appointed to carry the civil works for the construction phase of the Proposed Development. The main contractors will comply with this CEMP and any revisions made to this document throughout the construction phase. An overview of the anticipated Construction Methodologies is provided below.

2.2.2 Overview of Proposed Construction Methodology

The EIAR includes construction methodologies for various elements of work to be undertaken as part of the Proposed Development. These construction methodologies are presented below in a fashion based on their relevance to the proposed aspects of the project. These construction methodologies reproduced in the following sub-sections but will be superseded by an appointed contractor's construction method statements, which will form part of the CEMP. The contractor's construction method statements will be prepared to take account of the detailed engineering, geotechnical and detailed drainage design which will be prepared prior to commencement of construction and all requirements of this CEMP.

The EIAR construction methodologies are provided for the following project elements:

- Borrow Pit
- Site Drainage
- Upgrade of Existing Roads
- Proposed new Site Access Roads
- Watercourse/Culvert Crossing
- Electrical Substation and control buildings
- Underground Cabling (110kV & 33kV)

2.2.2.1 Borrow Pit

The Proposed Development will comprise 1 no. new borrow pit, which is located adjacent to the proposed 110kV electrical substation and the borrow pit that is part of the permitted development will be extended as shown in figure 2-1. The borrow pits will typically be excavated as follows:

- The areas to be used for the borrow pit will be marked out at the corners using ranging rods or timber posts. Drainage runs and associated settlement ponds will be installed around the perimeter;
- The initial borrow pit excavation will involve removal of peat and overburden from the top of bedrock. These materials will be temporarily stockpiled within the borrow pit footprint, and used for permanent borrow pit re-instatement;
- Interceptor drainage ditches will be excavated on all sides of the borrow pit to catch surface water runoff, and direct it to downstream re-distribution locations;
- The bedrock material will be extracted from the borrow pit and stockpiled or used as required;
- The use of material won from the borrow pit will be sequential with new road construction;
- Temporary stockpiling of aggregates will be required to accommodate the cut and fill operations within the borrow pit, and the progression of access roads;
- As the borrow pit excavations progress and become deeper, surface water and groundwater ingress will be removed via pumping to settlement ponds, and re-distribution locally across natural vegetated areas. Where required, additional

specialist treatment will be employed to ensure no deterioration in downstream water quality occurs;
- When extraction ceases within the borrow pit, the uphill face of the rock will be stepped and deposits of soil will be placed which will assist in the re-vegetation of the rock face.
- If borrow pit is not fully re-instated it may have to be permanently secured with a stock-proof fence erected around the borrow pit to prevent access to the area as well as the installation of appropriate health and safety signage

Once the required volume of rock has been extracted from the borrow pit area, it is intended to reinstate this area with peat and overburden excavated from the works areas of the Proposed Development. The total estimated volume of peat and spoil to be excavated and managed during the construction phase of the Proposed Development is 98,500m^3. The borrow pit area within the site of the Proposed Development will undergo restoration with this peat and spoil material after all rock has been excavated from the borrow pit. The volume of excavated peat and overburden will be managed as outlined below:

- Excavators will remove the peat from the permanent development footprint areas i.e. excavated roads.
- Temporary, sealed stockpiling areas, located adjacent to the groundworks areas, will be chosen following onsite discussions between the construction site manager, an ecologist, a geotechnical engineer and hydrologist.
- The excavators will move the excavated peat to the designated temporary stockpiling areas within the construction and soft levelled areas.
- The temporary stockpiling areas will be surrounded by silt fences to ensure sediment-laden run-off does not occur.
- The excavated peat will remain in these areas over a period of time until the volume of the peat has reduced as the water drains out of the mounded peat.
- The excavators will then load the peat directly into dump trucks, to transport the peat to the borrow pit area.
- The material will be backfilled into the borrow pit and will be spread evenly across the area.

This method of managing the volume of surplus peat and other overburden material will ensure that no excavated material will be left on-site, or stockpiled adjacent to access roads following the completion of the construction works.

2.2.2.2 Site Drainage

The early establishment of temporary drainage facilities will manage the risk of impacts on watercourses on and adjacent to the site during construction. In addition, construction operations will adopt best working practices. The development of the site will need to be phased accordingly. The construction of the drainage will start from the downstream sections and progress upstream, connecting conveyance systems with other drainage features as each development phase progresses. They will therefore need to be designed with sufficient flexibility to respond to an early phase incoming flow during the construction phase.

2.2.2.3 Upgrade of Existing Roads

There will be approximately 5km of road upgrades to be installed at the site of the proposed development. The finished road width will have a running width of 5m (TDR), with wider sections on bends and corners. The road widening will be undertaken as follows:

- If it is considered that the current road formation level is adequate to support required bearing, then no upgrade or widening works will be completed;

- Otherwise, where required, the subsoil in the existing road verge will be excavated down to a suitable formation layer and the spoil used for the restoration of the borrow pit or in reinstatement areas and landscaping;
- All drainage measures prescribed in the detailed drainage design for the project will be implemented around the works area
- Well-graded imported granular fill will be spread and compacted in layers with an overall thickness of up to 300mm to provide a homogeneous running surface. The thickness of layers and amount of compaction required will be decided by the Construction Manager based on the characteristics of the material and the compaction plant to be used. These layers of granular fill will be brought to the same level as the top of the existing road surface;
- A layer of geogrid will be installed directly onto the top of the granular fill layer and the existing road surface where required;
- A layer of finer well graded stone for the running surface will be laid on the geogrid and compacted;
- Prior to any works commencing on the upgrade of existing roads, the requirement for additional roadside drainage will be considered by the Project Hydrologist in line with the proposals outlined in Section 4.

2.2.2.4 New Site Access Road

There is approximately 9km of new access roads to be installed at the site to allow access to the Proposed Development. The finished width on the sections of excavated road alongside existing roads along the 110kV underground cabling will have a running width of will be 2.5m and along the 33kV underground cabling the running width will be 3m. The new access roads will be constructed as follows:

- Establish alignment of the new site roads from the construction drawings and mark out the centrelines with ranging rods or timber posts;
- All drainage measures prescribed in the detailed drainage design for the project will be implemented around the works area
- The access tracks will be of single-track design with an overall running width of 5m. There will be some local widening on the bends and junctions for the safe passage of large vehicles;
- Once excavated, peat will be temporarily stored in localised areas adjacent to excavations for roads before being placed into the permanent peat storage areas within the borrow pits or reused for landscaping purposes. All temporary storage areas will be upslope of founded roads and will be inspected by a suitably qualified person before material is stored in the area;
- The subsoil will be excavated down to a suitable formation layer of either firm clay or bedrock;
- The excavated access road will be constructed with up to 900mm of selected granular fill, depending on the section of road. Granular fill to be placed and compacted in layers in accordance with the TII Specification for Road Works
- The new access roads will be constructed with a camber to aid drainage of surface water;
- For excavations in overburden and peat, side slopes shall not generally be greater than 1(V): 2 or 3(H), respectively. Where areas of weaker peat are encountered then slacker slopes will be required. Battering of the side slopes of the excavations will be carried out as the excavation progresses;
- At bends or steep inclines from the road, reflective snow poles will be erected to warn traffic on dark mornings and evenings that there is a turn in the road or a sharp incline beyond the site road.

2.2.2.5 Watercourse/ Culvert Crossing

The routes of any natural drainage features will not be altered as part of the Proposed Development. The underground electrical cabling route has been selected to avoid natural watercourses where possible. Up to 5 no. new watercourse crossings are required over streams along the proposed cable routes (See Chapter 4 of the EIAR). The methodologies for new crossings comprises a selection of clear span bridge, bottomless box culverts or piped culvert. These are required mainly where no crossing currently exists and where it is necessary to traverse watercourse with the cabling ducts.

Any watercourse crossings required will be installed outside of the salmonid spawning season, October to June in any year, in accordance with Inland Fisheries Ireland best practice (IFI, 2016). This will ensure no potential impacts on salmonid spawning habitat. The works will be undertaken in line with NRA (TII) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes.

The typical construction methodology for the installation of a clear-span bridge or bottomless box culverts is presented below:

- The cable track on the approach to the watercourse will be completed to a formation level which is suitable for the passing of plant and equipment required for the installation of the watercourse crossing.
- All drainage measures along the track will be installed in advance of the works.
- Safe access over the stream for this installation will be via a steel walkway & handrail which will span the stream.
- The foundation will consist of concrete footing which will be installed on a concrete lean mix foundation to provide a suitable base. The base will be excavated to rock or competent stratum with a mechanical excavator with the foundation formed in-situ using a semi-dry concrete lean mix. The base will be excavated along the stream bank with no in- stream works required.
- The concrete footing will be installed as per a design engineers specification to a height appropriate to achieve the necessary clearance above the watercourse.
- The clear span bridge structure which will essentially be a precast concrete slab will be lifted in place using a crane. Likewise, where a bottomless box culvert is used it will also be precast and lifted into place on to the footings.
- The watercourse edge will be reinforced with rock armour where necessary to avoid any erosion or deterioration of the watercourse bank. This will be carried out in dry conditions and without the use of in-stream (water) works.

All other new crossings will be completed using piped culvert system at minor channels or manmade drains, the crossing will be installed as follows:

- The access road on the approach to the channel will be completed to a formation level which is suitable for the passing of plant and equipment required for the installation of the culvert and drain crossing.
- The installation of the culvert will take place in low flow conditions.
- Where a flow exists, the water running through the channel will be pumped around the water crossing location and back into the channel downstream of the works area.
- Where over pumping is required, measures will be taken to ensure that the pumped water discharge does not disturb the stream bed with the force of water from the discharge. A steel plate to reduce the force of the flow will be used where appropriate.
- The project engineer will determine the required gradient of the culvert. The pipe must be laid at a gradient that will ensure water is contained within the pipe at all times. Where necessary a rock armour dam will be installed within the stream to reduce flow and ensure an acceptable depth of water remains within the pipe. Where a gradient of 1 – 1.5% is identified, the use of a baffle has been recommended.

- The bed of the channel will be excavated, if necessary, to achieve the correct line and to allow the pipe to be embedded 300mm into the base of the existing drain.
- The embedded section will be allowed to fill naturally with existing material within the base of the drain or with suitable drainage material such as gravel or round shingle where deemed applicable.
- The culvert will be lowered into place using an excavator with a lifting mechanism.
- Large stone boulders (approx. 400mm), sourced from the on-site borrow pits, will be placed over the culvert to create a headwall for the culvert and a suitable sub-base for road construction.
- Smaller 50mm stone, sourced on site will be placed upon the sub-base to construct the road over the water crossing.

All of the above works will be supervised by the ECoW and the project hydrologist.

2.2.2.6 Electrical Substation and Control Buildings

An 110kV electrical substation, associated control buildings, welfare facilities, electrical plant and security fencing are proposed to be constructed within the site in place of the 38kV substation, 38kV underground cabling and battery storage compound which were part of the Permitted Development. The proposed 110kV substation and control buildings will be constructed by the following methodology:

- The area of the onsite substation will be marked out using ranging rods or wooden posts and the soil and overburden stripped and removed to nearby temporary storage area for later use in landscaping. Any excess material will be sent to one of the on-site borrow pits, for reinstatement purposes;
- The dimensions of the substation area have been designed to meet the current requirements of the ESB/ Eirgrid;
- The required level platform will be established and finished with well-graded imported granular fill, compacted in layers and finished with a suitable capping layer to the desired level;
- The substation platform will serve as a construction compound containing welfare facilities, car parking and site offices. Temporary self-contained port-a-loo with an integrated waste holding tank will be used on site for toilet facilities and hand washing. This will be maintained by a licensed service contractor as required and will be removed from the site on completion of the construction phase;
- The electrical substation compound will be bunded appropriately to the volume of oils likely to be stored, and to prevent leakage to groundwater or surface water. The bunded area will be fitted with a storm drainage system and an appropriate oil interceptor;
- Two control buildings will be built within the substation compound;
- The foundations will be excavated down to the level indicated by the designer and appropriately shuttered reinforced concrete will be laid over it. An anti-bleeding admixture will be included in the concrete mix;
- The substation will be constructed with masonry blockwork. The block work walls will be built up from the footings to damp-proof course (DPC) level and the floor slab constructed, having first located any ducts or trenches required by the follow on mechanical and electrical contractors;
- The block work walls will be built up from the footings to damp proof course level and the floor slab constructed, having first located any ducts or trenches required by the follow on mechanical and electrical contractors;
- The block work will then be raised to wall plate level and the gables & internal partition walls formed. Scaffold will be erected around the outside of the building for this operation;
- The concrete roof slabs will be lifted into position using an adequately sized mobile crane;

- The timber roof trusses will then be lifted into position using a telescopic load all or mobile crane depending on site conditions. The roof trusses will then be felted, battened, tiled and sealed against the weather;
- The substation plinths will be shuttered and poured with reinforced concrete. An anti-bleeding admixture will be included in the concrete mix;
- The electrical equipment will be installed on the concrete plinths and commissioned;
- Perimeter fencing will be erected;
- The construction and components of the substation have been designed to ESB/Eirgrid specifications;
- Due to the specific nature of the Proposed Development, there will be a very small water requirement for occasional toilet flushing and hand washing, it is proposed to harvest rainwater from the building roofs; and
- All wastewater from the staff welfare facilities in the control buildings by means of a sealed storage tank which will be fitted with an automated alarm system that will provide sufficient notice that the tank requires emptying.

2.2.2.7 Site Underground Cabling

The proposed underground electrical cabling consists of two elements: (1) 110kV underground electrical cabling connecting the proposed 110kV substation to the existing 220kV substation at Ballyvouskill; and (2) 33kV underground electrical cabling connecting the Permitted Development to the proposed 110kV substation.

The cabling, from the individual turbines and solar array, will be consolidated into three 33kV cable circuits for the purposes of grid connection from the Permitted Development. The underground cabling will connect the Permitted Development to the proposed 110kV substation predominately following proposed and existing forestry roads/firebreaks measuring approximately 8.3km. Approximately 3.6km of 110kV underground electrical cabling will connect the proposed 110kV electrical substation to the existing Ballyvouskill 220kV Substation which will be installed predominantly following existing forest roads / land and agricultural land. Both cabling routes will be served by a new access track along the routes (running width of 2.5 to 3m and localised widenings at changes in direction), refer to section 2.2.2.4 for road construction methodology. A short section of the 110kV cabling across peatland will be installed without an access track and the existing ground will be reinstated following completion of the installation of the cabling.

2.2.2.8 Underground Cable Trench

The top layer of soil is removed and saved so that it is replaced on completion. The cables are bedded with suitable material unless the ground conditions are such that no bedding is required. The 110kV cable circuit will include power ducts, communication fibre ducts and earth wire laid in an excavation depth of approximately 1.3m. The 33kV cable circuits will include power ducts, communication fibre duct and earth wire laid in an excavation depth of approximately 0.95m. A suitable marking tape is installed between the cables and the surface (see Plate 2-1 below).

The underground cabling will be laid beneath the surface of the site and/or road using the following methodology:

- Before works commence, surveying will take place along the proposed cable route, with all existing culverts identified. All relevant bodies i.e. ESB, Cork County Council, Kerry County Council etc. will be contacted and all drawings for all existing services sought.
- When the cable is located on roads, a traffic management plan will be set up prior to any works commencing. A road opening licence will be obtained where required and all plant operators and general operatives will be inducted and informed as to the location of any services.

- The cable ducts will be concrete surrounded where they pass under the road and under drains or culverts.
- A tracked 360-degree excavator will then proceed to dig out the proposed trench, typically to a depth of 1.3m, within which the ducts will be laid.
- Trench supports will be installed, or the trench sides will be benched or battered back where appropriate and any ingress of ground water will be removed from the trench using submersible pumps, fitted with appropriate silt filtration systems, to prevent contamination of any watercourse.
- Once the trench has been excavated, a base-layer will be laid and compacted, comprising Clause 804, or 15 Newton CBM4 concrete as required.
- The ducting will be installed as per specification, with couplers fitted and capped to prevent any dirt etc. entering the duct. In poor ground conditions, the ends of the ducts will be shimmed up off of the bed of the trench, to prevent any possible ingress of water dirt. The shims will be removed again once the next length has been connected. Extreme care will be taken to ensure that all duct collars (both ends) are clean and in good condition prior to ducts being joined.
- As the works progress, the as-built location of the ducting will be recorded using a total station or GPS.
- As per the associated base-layer (Clause 804 material or 15 Newton CBM4 concrete) will be installed and compacted as per approved detail, with care not to displace the ducting.
- Spacers will be used to ensure that the correct cover is achieved at both sides of the ducting.
- The remainder of the trench will be backfilled in two compacted layers with approved engineer's specified material.
- Yellow marker warning tape will be installed across the width of the trench, at 300mm depth,
- The finished surface is to be reinstated, as per original specification. Off-road cabling may be finished with granular fill to facilitate access to the trench for any potential maintenance that is required during the operational phase of the Proposed Development.
- For the section of 110kV underground cabling to be installed in the degraded peatland habitat area, the peatlands will be replaced following the works in this area. The following methodology to be implemented in this area:

    - Temporary fences will be erected surrounding the proposed works area to prevent encroachment outside this area.
    - An existing track and the route of the existing cable that lies adjacent to the proposed cabling will be used as part of the working area in order to minimise impacts on the surrounding peatlands.
    - Low ground pressure wide-track machinery will be used and will be operated adjacent to the proposed 110kV underground cabling trench and existing track, with no access to areas that are not immediately adjacent to the proposed cabling route.
    - At the outset, the turves with their existing vegetation will be stripped and stored the right way up on the adjacent track and disturbed habitat.
    - The cabling will be laid as per the methodology set out in Chapter 4 of this EIAR, Description.
    - The turves will be replaced on top of the newly installed cabling and the temporary fence removed.
    - Temporary fences will be put in place in all areas where works are taking place in close proximity to peatland habitats to avoid temporary or permanent encroachment onto them.

- Marker posts will then be placed at regular intervals (generally at joint bays and any change in direction) to denote the location of the underground power cables.

The contractor will ensure that there are no open excavations at the end of each working day with all trenches backfilled accordingly. Any works areas which have to be secured with will be done so using mobile security fencing which will be erected to secure the works and prevent the general public enter the works area during the works as well as outside normal working hours. It is not proposed to use hoarding as a means of securing the works area.

Plate 2-1 Typical Cable Trench View

2.2.2.8.1 Existing Underground Services

Any underground services encountered along the route will be surveyed for level and the ducting will pass over the service provided adequate cover is available. A minimum clearance of 300 mm will be required between the bottom of the ducts and the service in question. If the clearance cannot be achieved the ducting will pass under the service and again 300 mm clearance between the top of the communications duct and bottom of the service will be achieved. In deeper excavations, an additional layer of marker tape will be installed between the communications layer and yellow top-level marker tape. If the required separation distances cannot be achieved then a number of alternative options are available such as using steel plates laid across the width of the trench and using 35 N/mm2 concrete surrounding the ESB ducts where adjacent services are within 600 mm, with marker tape on the side of the trench. Back fill around any utility services will be with dead sand/pea shingle where appropriate. All excavations will be kept within the roadway boundaries, i.e. in road or grass margin.

2.2.2.8.2 Trenching and Ducting

The proposed cable will be installed in a series of ducts in an excavated trench. Trenching will be achieved using a mechanical excavator. The top layer of soil or road surfacing will be removed and stockpiled separately for reuse or appropriate disposal, subject to validation and waste classification sampling. Material stockpiles should be stored at least 15m back from drains and watercourses on level ground with a silt fence inserted at the base to prevent runoff.

The trench base will be graded and smoothed once the required depth and width is achieved. A layer of bedding material will be placed and compacted to the required specification on the trench floor prior to laying the ducts in trefoil formation.

The ducting surrounds will be carefully backfilled and compacted in accordance with the required specification. Cable protection strips will be placed on compacted material directly above the ducting. A secure cap will be placed at the end of each duct to prevent the ingress of dirt or water.

Ground water and surface water accumulating in the base of trenches will not be pumped directly to roadside drains or watercourses unless it is clean and free from solids. Contaminated water will be either treated onsite prior to discharge or tankered offsite to a suitably licensed disposal facility.

For unsurfaced/grass sections, trenches will be backfilled with suitable excavated material to ground level leaving at least 100 mm topsoil or match existing level at the top to allow for seeding or replace turves as per the specification of the local authority or landowner.

Ducting will be cleaned and tested in accordance with the specification by pulling through a brush and mandrel. A draw rope will be installed in each duct in preparation for cable installation at a later date.

2.2.2.8.3 *Joint Bays*

Joint bays are pre-cast concrete chambers where lengths of cable ducting will be connected. The location of joint bays has been selected to maximise each section length of cable and to satisfy electrical design requirements. They will be located at various points along the underground ducting route generally between 600 to 1000 metres intervals or as otherwise required by ESB/ electrical requirements. An alternative method for cable jointing is to create a localised widening in the cable trench which is supported by sandbags to facilitate the installation of the cabling.

Where off-road joint bay locations are utilised, access tracks from the road to the joint bay locations will be constructed by stripping surface soils, placing geotextile reinforcement at subgrade level followed by a layer of granular material in accordance with the specification to form a working surface for vehicle. This surface will be regularly assessed for damage and additional aggregate added if required. Any roadside drains within the temporary works area will be culverted and check dams made from stone or sandbags covered with terram will be inserted upstream and downstream of these culverts to intercept any solids generated during the insertion or which wash out during the works. Any surplus materials will be stockpiled separately for reuse or appropriate disposal, subject to validation and waste classification sampling.

Joint bay locations will be excavated using conventional mechanical excavators. Joint bay excavations will be advanced to the required depth and width with the excavation floor graded and smoothed. A blinding layer will be placed at the base of the excavation to facilitate the construction of a concrete base and side walls (in-situ or precast).

Ground water and surface water accumulating in the base of excavations will not be pumped directly to roadside drains or watercourses unless it is clean and free from solids. Contaminated water will be either treated onsite prior to discharge or tankered offsite to a suitably licensed disposal facility.

Where joint bays are located under the road surface the joint bay will be backfilled with compacted in accordance with the specification. Road surfaces may be temporarily reinstated as specified by the local authority. Precast concrete covers may be used as temporary reinstatement of joint bays at off road locations. These covers are placed over the constructed joint bay and are then removed at the cable installation stage of the project.

2.2.2.8.4 *Cable Installation*

The installation of cabling normally involves pulling three individual conductors into three separate ducts. The cable pulling winch must be set at a predetermined cut off pulling tension as specified by the designer. The cable will be connected to the winch rope using approved suitably sized and rated cable pulling stocking and swivel or the pulling head fitted by the cable manufacturer. Once the "two sections" of cable are pulled into the joint bay, a jointing container will be positioned over the joint bay and the cable jointing procedure carried out in this controlled environment.

Following the completion of jointing and duct sealing works in the joint bay, place and thoroughly compact cement-bound sand in approximately 200 mm layers to 100mm above the top of the cable joint base to provide vertical support. A cable protection strip will be installed at this depth and the joint bay backfilled with cement-bound sand and reinstated to match surrounding areas. It is noted that once the cable installation is complete, the cables will be permanently covered and will not be perceptible.

2.2.2.8.5 *Underground Cable Watercourse/Culvert Crossings*

There are a total of 36 watercourse and existing culvert crossings along the proposed 33kV and 110kV underground electrical cabling route, of which 6 no. are EPA/OSI mapped crossings. The remaining crossings are classified as culverts over minor channels or manmade drains. The construction methodology for the 6 no. stream crossings has been designed to eliminate the requirement for in-stream works with 5 no. of these locations requiring a crossing to be constructed to traverse the watercourse with the cabling ducts. A general description of the various construction methods employed at watercourse/ culvert/ drain crossings are described in the following paragraphs below. A list of the stream crossings along the underground cable route and the proposed crossing method at each location is provided in Table 2-2 below.

The crossing methodologies employed at the other culvert and manmade drain crossings along the underground cable route, will be selected from the suite of watercourse crossing options outlined below, as appropriate, depending on culvert type, depth, size and local ground conditions.

Should an alternative methodology option be required for individual crossings during the construction process this will be agreed with the relevant authorities including Cork County Council and Kerry County Council prior to works commencing.

Standard Formation Crossing over Culvert – Option A

Where adequate cover exists above a culvert, the standard aforementioned trench arrangement will be used where the cable ducts pass over a culvert without any contact with the existing culvert or water course. The cable trench will pass over the culvert in a standard trench.

Where no crossing currently exists, the cable will pass over the watercourse in a bottomless box culvert or pre-cast concrete slab in a standard trefoil arrangement. Where required existing culvert crossings will be extended using corripipe.

Standard Formation Crossing under Culvert – Option B

Where the culvert consists of a socketed concrete or sealed plastic pipe and sufficient depth is not available over the crossing, a trench will be excavated beneath the culvert and cable ducts will be installed in the standard formation 300mm below the existing pipe.

Shallow Formation Crossing over Culvert – Option C

Where cable ducts are to be installed over an existing culvert and sufficient cover cannot be achieved, the ducts will be laid in a much shallower trench, the depth of which will be determined by the cover available at the culvert crossing location. The ducts within the shallow formation trench will be encased in 6mm thick steel galvanized plates and backfilled with 35N concrete.

Where sufficient deck cover is not available to fully accommodate the required ducts, it may be necessary to locally raise the pavement level. Any addition of a new pavement will be tied back into the existing road pavement at grade.

Where no crossing currently exists, the cable will pass over the watercourse in a clear span bridge or corrugated steel arch bridge.

Where required existing culvert crossings will be extended using corripipe.

Directional Drilling – Option D

In the event that none of the above methods are appropriate, directional drilling (DD) will be utilised.

DD is a method of drilling under obstacles such as bridges, culverts, railways, water courses, etc. in order to install cable ducts under the obstacle. This method is employed where installing the ducts using standard installation methods is not possible.

The DD method of duct installation will be carried out using Vermeer D36 x 50 Directional Drill (approximately 22 tonnes), or similar plant, will be utilised for the horizontal directional drilling at watercourse/culvert crossings listed in Table 2-2 below. The launch and reception pits will be approximately 0.55m wide, 2.5m long and 1.5m deep. The pits will be excavated with a suitably sized excavator. The drilling rig will be securely anchored to the ground by means of anchor pins which will be attached to the front of the machine. The drill head will then be secured to the first drill rod and the operator shall commence to drill into the launch pit to a suitable angle which will enable him to obtain the depths and pitch required to the line and level of the required profile. Drilling of the pilot bore shall continue with the addition of 3.0m long drill rods, mechanically loaded and connected into position.

During the drilling process, a mixture of a natural, inert and fully biodegradable drilling fluid such as Clear Bore™ and water is pumped through the centre of the drill rods to the reamer head and is forced in to void and enables the annulus which has been created to support the surrounding subsoil and thus prevent collapse of the reamed length. Depending on the prevalent ground conditions, it may be necessary to repeat the drilling process by incrementally increasing the size of the reamers. When the reamer enters the launch pit, it is removed from the drill rods which are then passed back up the bore to the reception pit and the next size reamer is attached to the drill rods and the process is repeated until the required bore with the allowable tolerance is achieved.

The use of a natural, inert and biodegradable drilling fluid such as Clear Bore™ is intended to negate any adverse impacts arising from the use of other, traditional polymer-based drilling fluids and will be used sparingly as part of the drilling operations. It will be appropriately stored prior to use and deployed in the required amounts to avoid surplus. Should any excess drilling fluid accumulate in the reception or drilling pits, it will be contained and removed from the site in the same manner as other subsoil materials associated with the drilling process to a licensed recovery facility.

Backfilling of launch & reception pits will be conducted in accordance with the normal specification for backfilling excavated trenches. Sufficient controls and monitoring will be put in place during drilling to prevent frack-out, such as the installation of casing at entry points where reduced cover and bearing pressure exits.

Table 2-2 Underground Cable Route – Watercourse Crossings Methodology

Watercourse Crossing Reference No.	Watercourse Type	Width of Channel (m)	Cover from Road Level to Top of Culvert (m)	Crossing Option Description	Watercourse Crossing Option	Extent of In-Channel Works
1	Open channel	0.5	-	Where no crossing currently exists, the cable will pass over the watercourse over a bottomless box culvert or pre-cast concrete slab in a standard trefoil arrangement.	Option 1/ Option 3	None. No in-stream works required.
2	Open channel	1.2	-	Where no crossing currently exists, the cable will pass over the watercourse over a bottomless box culvert or pre-cast concrete slab in a standard trefoil arrangement.	Option 1/ Option 3	None. No in-stream works required.
3	Open channel	1	-	Where no crossing currently exists, the cable will pass over the watercourse over a bottomless box culvert or pre-cast concrete slab in a standard trefoil arrangement.	Option 1/ Option 3	None. No in-stream works required.
4	Open channel	2.0	-	Where no crossing currently exists, the cable will pass over the watercourse over a bottomless box culvert or pre-cast concrete slab in a standard trefoil arrangement.	Option 1/ Option 3	None. No in-stream works required.
5	Open Channel	1.5		Where no crossing currently exists, the cable will pass over the watercourse over a bottomless box culvert or pre-cast concrete slab in a standard trefoil arrangement.	Option 1/ Option 3	None. No in-stream works required.

Watercourse Crossing Reference No.	Watercourse Type	Width of Channel (m)	Cover from Road Level to Top of Culvert (m)	Crossing Option Description	Watercourse Crossing Option	Extent of In-Channel Works
6	600 mm diameter concrete pipe		1.6	Where cable ducts are to be installed over an existing culvert and sufficient cover cannot be achieved, the ducts will be laid in a much shallower trench, the depth of which will be determined by the cover available at the culvert crossing location. The ducts within the shallow formation trench will be encased in 6mm thick steel galvanized plates and backfilled with 35N concrete.	Option C	None. No in-stream works required.

2.2.2.8.6 General Construction Measures

Prior to any works commencing a dilapidation survey will be conducted of the entire route, photographing and noting any existing damage or defects to structure or road surfaces. A copy of this survey will be submitted to Cork and Kerry County Councils prior to works commencing.

Communication with the public, local residences and businesses along the route will be an important responsibility of the Project Supervisor. Keeping all affected parties up to date and informed both shortly prior and during the construction period at all times. Two to three weeks before any work commencing reasonable efforts will be made to inform all affected parties of the oncoming works.

Signage will be erected in the weeks prior to any works commencing along and on adjacent roads to the route notifying the public of the forthcoming construction. Contact details for the contractor and details of license will also be posted along the cable route during construction.

Every effort will be made to minimise the impact of the above works on local residences and traffic. Consideration will also be given to the agricultural community and works will be organised and sequenced so as not to inconvenience any such activities. Additional construction health and safety measures include the following:

- All personnel will be inducted and made familiar with the method statements, risk assessments and traffic management plans involved.
- All site-specific safety rules will be adhered to.
- All plant operators will have appropriate Construction Skills Certification Scheme (CSCS) training.
- All personnel on-site will be required to have a current Solas Safe Pass training card.
- Fire extinguishers and first aid supplies will be available in the work area.
- The roadway will be maintained in a clean condition at all times.
- Helmets, high visibility clothing, and safety footwear will be worn at all times.
- A competent foreman will be on site at all times.
- Excavations are back filled at the end of each working day.
- The trench will not be over-crowded.
- Unauthorised access will be monitored and prevented.
- Pipe work will be lifted into position manually.
- Hand dig will be used to expose any services detected during the survey.

3. ENVIRONMENTAL MANAGEMENT

3.1 Introduction

This CEMP has been prepared and presented as a standalone document and includes all drainage measures required to construct the Proposed Development. The drainage proposals will be developed further prior to the commencement of construction however, any such improvements will be in line with the principles set out here and will also be in full compliance with the planning consent and mitigation measures as presented in the EIAR, NIS, and all other relevant planning documents. The following sections give an overview of the drainage design, dust and noise control measures and a waste management plan for the site.

3.2 Protecting Water Quality

3.2.1 Environmental Management in the Construction Phase

Timing of civil works (road construction, excavation, rock-breaking, etc.) can significantly influence the potential impact upon the groundwater environment. Operations during wetter periods of the year pose a greater risk of causing erosion and siltation, which can be particularly severe following major rainfall or snow events. Traditionally, construction activity undertaken during the drier summer months would result in less erosion and siltation. Construction activities in the hydrological buffer zones shall be avoided during or immediately after a prolonged or intense rainfall event and work will cease entirely near watercourses when it is evident that water quality is being impacted.

3.2.2 Site Drainage Principles

The site drainage features for this site have been outlined in Section 4.5 of Chapter 4 of the EIAR and are further developed in this section of the CEMP. The protection of the watercourses within and surrounding the site, and downstream catchments that they feed is of utmost importance in considering the most appropriate drainage proposals for the site of the Proposed Development. No routes of any natural drainage features will be altered as part of the Proposed Development as new watercourse crossings are kept to a minimum to facilitate the Proposed Development. Roadways were originally selected to avoid natural watercourses and existing roads are to be used wherever possible. The Proposed Development has where possible, been kept a minimum of 50 metres from natural watercourses. There will be no direct discharges to any natural watercourses, with all drainage waters being dispersed as overland flows. Buffer zones around the existing natural drainage features have informed the layout of the Proposed Development.

Existing artificial drains in the vicinity of existing site roads will be maintained in their present location where possible. If it is expected that these artificial drains will receive drainage water from works areas, check dams will be added (as specified below) to control flows and sediment loads in these existing artificial drains. If road widening or improvement works are necessary along the existing roads, where possible, the works will take place on the opposite side of the road to the drain.

3.2.3 Legislation and Best Practice Guidelines

The drainage design presented in the EIAR and Planning Application documents has been prepared based on experience of the project team of other renewable energy sites in peat-dominated environments, and the number of best practice guidance documents.

The drainage design employs the various measures further described below and is cognisant of the following guidance documents:

- Institute of Geologists Ireland (2013): Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements;
- National Roads Authority (2008): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes;
- Department of Environment, Heritage and Local Government (2006): Wind Energy Development Guidelines for Planning Authorities;
- Institute of Geologists Ireland (2013): Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements;
- Forestry Commission (2004): Forests and Water Guidelines, Fourth Edition. Publ. Forestry Commission, Edinburgh;
- Coillte (2009): Forest Operations & Water Protection Guidelines;
- Forest Services (Draft) Forestry and Freshwater Pearl Mussel Requirements – Site Assessment and Mitigation Measures;
- Forest Service (2000): Forestry and Water Quality Guidelines. Forest Service, DAF, Johnstown Castle Estate, Co. Wexford;
- COFORD (2004): Forest Road Manual – Guidelines for the Design, Construction and Management of Forest Roads;
- Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (Inland Fisheries Ireland, 2016);
- Inland Fisheries Ireland (2016): Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters;
- Scottish Natural Heritage (2010): Good Practice During Wind Farm Construction;
- CIRIA (Construction Industry Research and Information Association) (2006): Guidance on 'Control of Water Pollution from Linear Construction Projects' (CIRIA Report No. C648, 2006);
- CIRIA 2006: Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors (CIRIA C532, 2006).
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (DoHPLG, 2018); and,
- Guidance on the preparation of the EIA Report (Directive 2011/92/EU as amended by 2014/52/EU), (European Union, 2017).

3.2.4 Site Drainage Design and Management

The proposed site drainage features for this site are outlined in Section 4.5 of Chapter 4 of the EIAR. As this CEMP is a working document and is presented as an Appendix to the EIAR, the drainage measures are not included in this document. When the final CEMP report is prepared, and presented as a standalone document, all drainage measures will be included in that document. These drainage proposals will be developed further prior to the commencement of construction as part of the detailed drainage design. The following sections give an outline of drainage management arrangements in terms of pre-construction, construction and operational phases of the Proposed Development.

3.2.4.1 Pre-Construction Drainage

There is an existing drainage network across the site, and due to the sloping nature of the area, surface water drains relatively freely to local watercourses and streams. This existing drainage system will continue to function as it is during the pre-construction phase.

Prior to commencement of works in sub-catchments across the site, main drain inspections will be competed to ensure ditches and streams are free from debris and blockages that may impede drainage. It is proposed to complete these inspections on a catchment-by-catchment basis as the construction works develop across the site, as works in all areas will not commence simultaneously.

Drainage and associated pollution control measures will be implemented onsite before the main construction works commence. Where possible drainage controls will be installed during seasonally dry ground conditions. This will reduce the possibility of impact on surface waters by suspended sediment released during construction and entrained in surface run-off.

3.2.4.2 Construction Phase Drainage

The Project Hydrologist will complete a detailed drainage design and maintenance plan before construction commences and will attend the site to set out and assist with micro-siting of proposed drainage controls as outlined in Section 4.5 of Chapter 4 of the EIAR. The drainage system will be excavated and constructed in conjunction with the road construction. Drains will be excavated and stilling ponds constructed to eliminate any suspended solids within surface water running off the site. Drainage infrastructure will include:

- Interceptor drains will be maintained up-gradient of all proposed infrastructure to collect clean surface runoff, in order to minimise the amount of runoff reaching areas where suspended sediment could become entrained. It will then be directed to areas where it can be re-distributed over the ground by means of a level spreader;
- Swales/roadside drains will be maintained to intercept and collect runoff from access roads and hardstanding areas of the site, likely to have entrained suspended sediment, and channel it to stilling ponds for sediment settling;
- Check dams will be maintained at regular intervals along interceptor drains and swales/roadside drains in order to reduce flow velocities and therefore minimise erosion within the system during storm rainfall events; and,
- Stilling ponds/settlement ponds, emplaced downstream of swales and roadside drains, will buffer volumes of runoff discharging from the drainage system during periods of high rainfall, by retaining water until the storm hydrograph has receded, thus reducing the hydraulic loading to watercourses. The stilling ponds will be sized according to the size of the area they will be receiving water from but will be sufficiently large to accommodate peak flows storm events. Inspection and maintenance of all settlement ponds will be ongoing through the construction period.

Best practice and practical experience on other similar projects suggests that in addition to the drainage plans that are included in the EIAR, there are additional site based decisions and plans that can only be made in the field through interaction between the Site Construction Manager, the Project Hydrologist and the Project Geotechnical Engineers. The mechanisms for interaction between these are outlined within Section 4 of this CEMP.

In relation to decisions that are made on site it is important to stress that these will be implemented in line with the associated drainage controls and mitigation measures outlined in Section 6 below, and to ensure protection of all watercourses.

3.2.4.3 Operational Phase Drainage

The Project Hydrologist will inspect and review the drainage system after construction has been completed to provide guidance on the requirements of an operational phase drainage system. This operational phase drainage system will have been installed during the construction phase in conjunction with the road and hardstanding construction work as described above and in Section 4.5 of the EIAR.

The drainage system will be monitored in the operational phase until such a time that all areas that have been reinstated become re-vegetated and the natural drainage regime has been restored.

3.2.4.4 Preparative Site Drainage Management

The detailed drainage design will specify all materials and equipment necessary to implement the drainage measures effectively, which will be brought on site in advance of any works commencing.

An adequate quantity of straw bales, clean stone, terram, stakes, etc. will be kept on site at all times to implement the detailed drainage design measures as necessary. The detailed drainage measures will be installed prior to, or at the same time as the works they are intended to drain.

3.2.4.5 Pre-emptive Site Drainage Management

The works programme for the groundworks part of the construction phase of the Proposed Development will also take account of weather forecasts and predicted rainfall. The site Construction Manager is responsible for making the decision to postpone or abandon works. Large excavations and movements of overburden or large-scale overburden or soil stripping will be suspended or scaled back if heavy rain is forecast. The extent to which works will be scaled back or suspended will relate directly to the amount of rainfall forecast.

3.2.4.6 Reactive Site Drainage Management

In line with the requirements of the EIAR, the final drainage design prepared for the site must provide for reactive management of drainage on site. The effectiveness of drainage measures designed to minimise runoff entering works areas and capture and treat silt-laden water from the works areas, will be monitored continuously by the ECoW on-site.

The contractor is solely responsible for the implementation of the detailed drainage design on site. The ECoW is responsible for monitoring the effectiveness of the drainage design as it is implemented on-site.

The ECoW with the support of the Project Hydrologist, will monitor the effectiveness of the on-site drainage during changing weather, ground or drainage conditions encountered on site. Where it appears that additional drainage measures will be required to ensure the drainage system remains effective, the ECoW will notify the contractor, the developer and project design team including the Project Hydrologist.

This may require the revisions to the detailed drainage design, including but not limited to the installation of additional check dams, interceptor drains or swales as deemed necessary on-site. The drainage design may have to be modified on the ground as necessary, and the modifications will draw on the various features outlined above in whatever combinations are deemed to be most appropriate to situation on the ground at a particular time.

In the event that works are giving rise to siltation of watercourses, the ECoW or Project Hydrologist will have the necessary authority to instruct the Construction Manager to stop all works in the immediate area around where the siltation is evident. The source of the siltation will be identified and additional drainage measures such as those outlined above will be installed in advance of works recommencing.

3.2.4.7 Rainfall Forecasting and Monitoring

Accurate forecasting and monitoring of rainfall is critical to the successful pre-emptive and reactive site drainage management as outlined in the subsections above.

Rainfall forecasts will be obtained for the nearest forecast reference point available via the https://www.met.ie/forecasts/national-forecast weather forecasting website. The reference location will be that of Sherkin Island

Construction personnel will be required to check the forecasted rainfall for the days ahead and plan for or suspend planned works accordingly. The forecasted rainfall should be recorded for reference and comparison with the rainfall levels to be recorded on-site.

Actual rainfall will be monitored on site, ideally via an automated rain gauge with regular recording intervals recommended by the Project Hydrologist and a means of alerting the construction personnel of rainfall trigger levels. The recorded rainfall data should be available on site at all times for review by the ECoW, Project Hydrologist or any regulatory authorities. The appointed contractor will be required to outline their proposed means of recording rainfall on site to the satisfaction of the ECoW and the Project Hydrologist prior to commencement of works.

3.3 Cable Trench Drainage

Cable trenches are typically developed in short sections, thereby minimising the amount of ground disturbed at any one time and minimising the potential for drainage runoff to pick up silt or suspended solids. Each short section of trench is excavated, ducting installed and bedded, and backfilled with the appropriate materials, before work on the next section commences.

To efficiently control drainage runoff from cable trench works areas, excavated material is stored on the upgradient side of the trench. Should any rainfall cause runoff from the excavated material, the material is contained in the downgradient cable trench. Excess subsoil is removed from the cable trench works area immediately upon excavation, and in the case of the Proposed Development, would be used for landscaping and reinstatements of other areas elsewhere on site.

On steeper slopes, silt fences, as detailed in Section 4.5 of the EIAR will be installed temporarily downgradient of the cable trench works area, or on the downhill slope below where excavated material is being temporarily stored to control run-off.

3.4 Refuelling, Fuel and Hazardous Materials

The following mitigation measures are proposed to avoid release of hydrocarbons at the site:

- Road-going will be refuelled off site wherever possible;
- On-site refuelling will take carried out at designated refuelling areas at various locations throughout the site. Machinery will be refuelled directly by a fuel truck that came to site as required
- All other refuelling was carried out using a mobile double skinned fuel bowser which will be parked on a level area in the construction compound when not in use;
- Only designated trained and competent operatives will be authorised to refuel plant on site. Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations.
- Fuels volumes stored on site should be minimised. Any fuel storage areas will be bunded appropriately for the fuel storage volume for the time period of the construction and fitted with a storm drainage system and an appropriate oil interceptor;

- The electrical substation compound will be bunded appropriately to the volume of oils likely to be stored, and to prevent leakage to groundwater or surface water. The bunded area will be fitted with a storm drainage system and an appropriate oil interceptor;
- The plant used will be regularly inspected for leaks and fitness for purpose; and,
- An emergency plan for the construction phase to deal with accidental spillages will be developed (refer to Section 5) Spill kits will be available to deal with and accidental spillage in and outside the refuelling area.
- A programme for the regular inspection of plant and equipment for leaks and fitness for purpose will be developed at the outset of the construction phase.

The emergency response plan for the construction phase has been provided in section 5 of this CEMP which sets out the procedure for dealing with accidental spillages will be maintained throughout the construction phase of the Proposed Development

3.5 Tree Felling

Mitigation measures will reduce the risk of entrainment of suspended solids and nutrient release in surface watercourses. These measures are derived from best practice guidance documents as outlined below and in Section 8 of the EIAR. A Harvest Management Plan is included in Appendix 4-5 of the EIAR to include peatland restoration to be undertaken in areas where permanent felling is proposed.

3.5.1 Forestry Felling Drainage Measures

Tree felling to facilitate the Proposed Development will not be undertaken simultaneously with construction groundworks. Felling to facilitate construction works will take place prior to groundworks commencing.

During tree felling there is a potential to generate peat particles and silts in surface water runoff due to tracking of machinery and disturbance of the peat surface etc, however mitigation is provided in Section 8.5.2.1 of Chapter 8 Hydrology and Hydrogeology with regard surface water quality protection for this activity which is summarised below. Also, prior to the commencement of tree felling for subsequent road construction the following key temporary drainage measures will be installed:

- All existing dry forestry drains that intercept the proposed works area will be temporarily blocked down-gradient of the works using forestry check dams/silt traps;
- Clean water interceptor drains will be installed upgradient of the works areas;
- Check dams/silt fence arrangements (silt traps) will be placed in all existing forestry drains that have surface water flows and also along existing forestry roadside drains; and,
- A double silt fence perimeter will be placed down-slope of works areas that are located inside the watercourse 50m buffer zone.

Before the commencement of any felling works, an Environmental Clerk of Works (ECoW) shall be appointed to oversee the felling works. The ECoW shall be experienced and competent, and shall have the following functions and operate their record using a Schedule of Works Operation Record (SOWOR), as proposed in the planning application:

- Attend the site for the setup period when drainage protection works are being installed and be present on site during the remainder of the forestry felling works.
- Prior to the commencement of works, review and agree the positioning by the Operator of the required Aquatic Buffer Zones (ABZs), silt traps, silt fencing (see below), water crossings and onsite storage facilities for fuel, oil and chemicals (see further below).

- Be responsible for preparing and delivering the Environmental Tool Box Talk (TBT) to all relevant parties involved in site operations, prior to the commencement of the works.
- Conduct daily and weekly inspections of all water protection measures and visually assess their integrity and effectiveness in accordance with Section 3.4 (Monitoring and Recording) and Appendix 3 (Site Monitoring Form (Visual Inspections)) of the Forestry & Freshwater Pearl Mussel Requirements.
- Take representative photographs showing the progress of operation onsite, and the integrity and effectiveness of the water protection measures.
- Collect water samples for analysis by a 3rd party accredited laboratory, adhering to the following requirements:
  - Surface water samples shall be collected upstream and downstream of the keyhole felling site at suitable sampling locations.
  - Sampling shall be taken from the stream / riverbank, with no in-stream access permitted.
  - The following minimum analytical suite shall be used: pH, EC, TSS, BOD, Total P, Ortho-P, Total N, and Ammonia.
- Review of operator's records for plant inspections, evidence of contamination and leaks, and drainage checks made after extreme weather conditions.
- Prepare and maintain a contingency plan.
- Suspend work where potential risk to water from siltation and pollution is identified, or where operational methods and mitigation measures are not specified or agreed.
- Prepare and maintain a Water Protection Measure Register. This document is to be updated weekly by the ECoW.

All relevant measures set out in the Forestry & Freshwater Pearl Mussel Requirements, Forestry & Water Quality Guidelines, Forest Harvesting & the Environment Guidelines and the Forest Protection Guidelines will apply. To protect watercourses, the following measures will be adhered to during all keyhole/tree felling activities.

- Works will be overseen by an ECoW as described above.
- The extent of all necessary tree felling will be identified and demarcated with markings on the ground in advance of any felling commencing.
- Machine combinations (i.e. handheld or mechanical) will be chosen which are most suitable for ground conditions and which will minimise soils disturbance;
- Checking and maintenance of roads and culverts will be on-going through any felling operation. No tracking of vehicle through watercourses will occur, as vehicles will use road infrastructure and existing watercourse crossing points. Where possible, existing drains will not be disturbed during felling works;
- Ditches which drain from the proposed area to be felled towards existing surface watercourses will be blocked, and temporary silt traps will be constructed. No direct discharge of such ditches to watercourses will occur. Drains and sediment traps will be installed during ground preparation. Collector drains will be excavated at an acute angle to the contour (~0.3%-3% gradient), to minimise flow velocities. Main drains to take the discharge from collector drains will include water drops and rock armour, as required, where there are steep gradients, and avoid being placed at right angles to the contour;
- Sediment traps will be sited in drains downstream of felling areas. Machine access will be maintained to enable the accumulated sediment to be excavated. Sediment will be carefully disposed of in the borrow pits All new silt traps will be constructed on even ground and not on sloping ground;
- In areas particularly sensitive to erosion or where felling inside the 50 metre buffer is required, it will be necessary to install double or triple sediment traps;
- All drainage channels will taper out before entering the 50m buffer zone. This ensures that discharged water gently fans out over the buffer zone before entering the aquatic zone, with sediment filtered out from the flow by ground vegetation within

the zone. On erodible soils, silt traps will be installed at the end of the drainage channels, to the outside of the buffer zone;

- Drains and silt traps will be maintained throughout all felling works, ensuring that they are clear of sediment build-up and are not severely eroded. Correct drain alignment, spacing and depth will ensure that erosion and sediment build-up are minimized and controlled;
- Brash mats will be used to support vehicles on soft ground, reducing peat and mineral soils erosion and avoiding the formation of rutted areas, in which surface water ponding can occur. Brash mat renewal will take place before they become heavily used and worn. Provision will be made for brash mats along all off-road routes, to protect the soil from compaction and rutting. Where there is risk of severe erosion occurring, extraction will be suspended during periods of high rainfall;
- Timber will be stacked in dry areas, and outside a local 50 metre watercourse buffer. Straw bales and check dams will be emplaced on the down gradient side of timber storage/processing sites;
- Works will be carried out during periods of no, or low rainfall, in order to minimise entrainment of exposed sediment in surface water run-off;
- Checking and maintenance of roads and culverts will be on-going through the felling operation;
- Refuelling or maintenance of machinery will not occur within 100m of a watercourse. Mobile bowser, drip kits, qualified personnel will be used where refuelling is required;
- A permit to refuel system will be adopted:
- Trees will be cut manually from along streams and using machinery to extract whole trees;
- Travel only perpendicular to and away from stream.
- Please refer to Harvest Management Plan included in Appendix 4-5.

Table 3-1 Minimum Buffer Zone Widths (Forest Service, 2000)

Average slope leading to the aquatic zone		Buffer zone width on either side of the aquatic zone	Buffer zone width for highly erodible soils
Moderate	(0 – 15%)	10 m	15 m
Steep	(15 – 30%)	15 m	20 m
Very steep	(>30%)	20 m	25 m

3.6 Cement Based Products Control Measures

The following mitigation measures are proposed to avoid release of cement leachate from the site:

- No batching of wet-cement products will occur on site;
- The arrangements for concrete deliveries to the site will be discussed with suppliers before work starts, agreeing routes, prohibiting on-site washout of trucks and discussing emergency procedures.
- Ready-mixed supply of wet concrete products and where possible, emplacement of pre-cast elements, will take place. Where possible pre-cast elements for culverts and concrete works will be used;
- No washing out of any plant used in concrete transport or concreting operations will be allowed on-site;
- Where concrete is delivered on site, only chute cleaning will be permitted, using the smallest volume of water possible. No discharge of cement contaminated waters to

the construction phase drainage system or directly to any artificial drain or watercourse will be allowed.
- Use weather forecasting to plan dry days for pouring concrete;
- Ensure pour site is free of standing water and plastic covers will be ready in case of sudden rainfall event;
- The small volume of water that will be generated from washing of the concrete lorry's chute will be directed into a concrete washout area, typically built using straw bales and lined with an impermeable membrane. below. The areas are generally covered when not in use to prevent rainwater collecting. In periods of dry weather, the areas can be uncovered to allow much of the water to be lost to evaporation. At the end of the concrete pours, any of the remaining liquid contents is tankered off-site. Any solid contents that will have been cleaned down from the chute will have solidified and can be broken up and disposed of along with other construction waste.

The 50m wide river buffer zone will be in place for the duration of the construction phase. No construction activity will occur within the buffer zone with the exception of bridge and culvert construction. The buffer zone will:

- Prevent any cement-based products accidentally entrained in the construction phase drainage system entering directly into watercourses, achieved in part by ending drain discharge outside the 50 m buffer zone and allowing percolation across the vegetation of the buffer zone;
- Provide a buffer against accidental direct pollution of surface waters by any pollutants, or by pollutants entrained in surface water run-off.

Plate 3-1 Typical concrete wash out areas

3.7 Peat Management

3.7.1 Peat and Spoil Usage in Restoration of Borrow Pits

Once excavated, peat will be temporarily stored in localised areas adjacent to excavations for roads and hardstands before being placed into the permanent peat storage areas within the borrow pits or reused for landscaping purposes. All temporary storage areas will be upslope of founded roads/hardstands and will be inspected by a suitably qualified person before material is stored in the area.

Once the required volume of rock has been extracted from the borrow pit areas, it is intended to reinstate these areas with any surplus peat and overburden excavated from the works areas of the Proposed Development.

The general construction methodology for the construction of the borrow pits, as presented in Fehily Timoney's *Peat & Spoil Management Plan* in Appendix 4-2 of the EIAR, is summarised below. This methodology includes procedures that are to be included in the construction to minimise any adverse impact on peat stability.

As rock is being extracted from the borrow pit, upstands of rock will be left in place, depending on the type of rock, to act as intermediate retaining buttresses. Where this is not achievable, stone buttresses will be constructed within the borrow pit. The upstands or buttresses will form individual restoration areas within the borrow pit which will be filled once the required volume of rock has been extracted from each individual area. The buttresses will be wide enough to allow construction traffic access for the tipping of peat and spoil into the individual cells.

A temporary access track will be placed around the perimeter of the borrow pit area to allow for the tipping of material over the edge of the borrow pit area. The placement of peat and spoil within the borrow pits will likely require the use of long reach excavators, low ground pressure machinery and possibly bog mats in particular for drainage works.

The following particular recommendations/best practice guidelines for the placement of peat & in borrow pits should be considered and taken into account during construction.

- The borrow pits will be enclosed depressions and drainage from these areas will be managed effectively using temporary pumping arrangements and settlement ponds.
- Where possible, the surface of the placed peat & spoil should be shaped to allow efficient run-off of surface water from borrow pit areas.
- Silting ponds (settlement ponds) may be required at the lower side/outfall location of the borrow pits.
- The settlement ponds at the borrow pits will be designed to allow 24hr retention.
- A layer of geogrid to strengthen the surface of the placed peat & spoil within the borrow pits may be required.
- Infilling of the peat & spoil should commence at the back edge of the borrow pit and progress towards the borrow pit entrance/rock buttress. The contractor excavating the rock will be required to develop the borrow pits in a way which will allow the excavated peat & spoil to be placed safely.
- The height of the rock buttresses constructed should be greater than the height of the placed peat & spoil to prevent any surface peat & spoil run-off.

3.7.2 Placement of Peat & Spoil along access Roads

In some areas of the site of the Proposed Development excavated materials will be placed alongside the access roads. The following recommendations/best practice guidelines for the placement of peat and spoil alongside the access road will be adhered to during the construction of the Proposed Development:

- All excavated peat along the proposed 33kV underground cabling route will be temporarily placed/spread alongside the proposed access road, where possible, and then reused as landscaping on either side of the proposed road.
- The placement of excavated peat should be restricted to areas where the peat depth is less than 2m.
- The peat placed adjacent to the proposed infrastructure elements should be restricted to a maximum height of 1m over a up to 10m wide corridor on the upslope side of the proposed infrastructure elements. It should be noted that the designer should define/confirm the maximum restricted height for the placed peat and spoil.
- The placement of excavated peat is to be avoided without first establishing the adequacy of the ground to support the load. The placement of peat within the placement areas will likely require the use of long reach excavators, low ground pressure machinery and possibly bog mats.

- Where there is any doubt as to the stability of the peat surface then no material shall be placed on to the peat surface. The risk of peat instability is reduced by not placing any loading onto the peat surface.
- Where practical, it should be ensured that the surface of the placed peat and spoil is shaped to allow efficient run-off of surface water. Where possible, shaping of the surface of the peat and spoil should be carried out as placement of peat and spoil within the placement area progresses. This will reduce the likelihood of debris run-off and ensure stability of the placed peat and spoil.
- Finished/shaped side slopes in the placed peat and spoil shall be not greater than 1 (v): 2 or 3 (h). This slope inclination will be reviewed during construction, as appropriate. Where areas of weaker peat and spoil are encountered then slacker slopes will be required.
- Where possible, the acrotelm shall be placed with the vegetation part of the sod facing the right way up to encourage growth of plants and vegetation at the surface of the placed peat and spoil within the placement areas.
- Movement monitoring instrumentation may be required adjacent to the access road where peat has been placed. The locations where monitoring is required will be identified by the designer on site.
- Supervision by a geotechnical engineer or appropriately competent person is recommended for the works.
- An interceptor drain will be installed upslope of the designated peat placement areas to divert any surface water away from these areas. This will help ensure stability of the placed peat and reduce the likelihood of debris run-off.
- All the above mentioned general guidelines and requirements should be confirmed by the designer prior to construction.

The management of excavated peat and overburden and the methods of placement and/or reinstatement are described in detail in FT's Peat and Spoil Management Plan in Appendix 4-2 of the EIAR and should be considered when preparing Construction Method Statements for the Proposed Development.

3.8 Peat Stability Management

Peat instability or failure refers to a significant mass movement of a body of peat that would have an adverse impact on the development and the surrounding environment. Peat failure excludes localised movement of peat that could occur below an access road, creep movement or erosion type events. In the absence of appropriate mitigation, the consequence of peat failure at the study area may result in:

- Death or injury to site personnel;
- Damage to machinery;
- Damage or loss of access tracks;
- Drainage disrupted;
- Site works damaged or unstable;
- Contamination of watercourses, water supplies by sediment particulates; and,
- Degradation of the environment.

3.8.1 General recommendations for Good Construction Practice

The peat stability assessment undertaken at the planning application stage indicated that there is insignificant risk of peat failure, although drainage mitigation measures would be required to prevent the build-up of water in the peat and reduce the risk of failure (FT, 2022).

The following geotechnical control measures were recommended in the Geotechnical and Peat Stability Report (FT, 2022) included in Appendix 4-2 of the EIAR, and should be factored into the detailed design and geotechnical risk registers being prepared for the construction stage of the project.

- Maintain hydrology of area as far as possible;
- Use of experienced geotechnical staff for site investigation;
- Use of experienced contractors and trained operators to carry out the work;
- Detailed ground investigation to determine peat, mineral soil and bedrock condition and properties.
- Use of low ground pressure machinery for areas where works directly on peatland are required

The project design engineer/ geotechnical engineer will be responsible for bringing forward all peat stability and peat and spoil management recommendations/requirements from the planning application documents and incorporating them into the geotechnical and engineering designs for the construction phase of the project. The geotechnical and peat stability design requirements of the project are not within the scope of the CEMP.

3.9 Traffic Management Plan

This section of the CEMP provides an outline of the traffic management proposals for the construction phase of the Proposed Development. In the event planning permission is granted for the Proposed Development, the final Traffic Management Plan will address the requirements of any relevant planning conditions, including any additional mitigation measures which are conditioned.

It is proposed to access the site of the Proposed Development via an existing access track off the remaining section of the old N22 alignment to the southwest of the site. This entrance will be widened to facilitate the delivery of the construction materials and turbine components to the Permitted Development. A temporary access road will also be required from the N22 to the old N22 alignment to facilitate the delivery of abnormally large wind turbine vehicle loads. The use of this temporary access road will be carefully managed and the route will be blocked with traffic bollards when not in use for turbine deliveries. It is also proposed that general HGV construction traffic will access the east of the site via the L5226 Local Road.

- **Traffic Management Coordinator** – a competent Traffic Management Co-Ordinator will be appointed for the duration of the construction of the Proposed Development and this person will be the main point of contact for all matters relating to traffic management.
- **Delivery Programme** – a programme of deliveries will be submitted to Cork and Kerry County Councils in advance of deliveries of turbine components to site.
- **Information to locals** – Locals in the area will be informed of any upcoming traffic related matters e.g. delivery of turbine components at night, via letter drops and posters in public places. Information will include the contact details of the Contract Project Co-Ordinator, who will be the main point of contact for all queries from the public or local authority during normal working hours. An "out of hours" emergency number will also be provided.
- **A Pre and Post Construction Condition Survey** – A pre-condition survey of roads associated with the Proposed Development will be carried out prior to construction commencement to record the condition of the road. A post construction survey will be carried out after works are completed. Where required the timing of these surveys will be agreed with the local authority.
- **Liaison with the relevant local authorities** - Liaison with the relevant local authorities including the roads sections of local authorities that the delivery routes traverse and An Garda Siochana, during the delivery phase of the large turbine vehicles, when an escort for all convoys will be required.

- **Identification of delivery routes** – These routes will be agreed and adhered to by all contractors.
- **Travel plan for construction workers** – While the assessment above has assumed the worst case that construction workers will drive to the site, the construction company will be required to provide a travel plan for construction staff, which will include the identification of a routes to / from the site and identification of an area for parking.
- **Temporary traffic signs** – As part of the traffic management measures temporary traffic signs will be put in place at all key junctions, including the access junction on the N22. All measures will be in accordance with the "Traffic Signs Manual, Section 8 – Temporary Traffic Measures and Signs for Road Works" (DoT now DoTT&S) and "Guidance for the Control and Management of Traffic at Roadworks" (DoTT&S). A member of construction staff (flagman) will be present at key junctions during peak delivery times.
- **Additional measures** - Various additional measures will be put in place in order to minimise the effects of the Proposed Development traffic on the surrounding road network including wheel washing facilities on site and sweeping / cleaning of local roads as required.
- **Re-instatement works** - All road surfaces and boundaries will be re-instated to pre-development condition, as agreed with the local authority engineers.

3.10 Dust Control

Construction dust can be generated from many on-site activities such as excavation and backfilling. The extent of dust generation will depend on the type of activity undertaken, the location, the nature of the dust, i.e. soil, sand, peat, etc. and the weather. In addition, dust dispersion is influenced by external factors such as wind speed and direction and/or, periods of dry weather. Construction traffic movements also have the potential to generate dust as they travel along the haul route.

Proposed measures to control dust include:

- In periods of extended dry weather, dust suppression may be necessary along haul roads, site roads, around borrow pit areas and other infrastructure to ensure dust does not cause a nuisance. If necessary, water will be taken from stilling ponds in the site's drainage system and will be pumped into a bowser or water spreader to dampen down haul roads and borrow pit to prevent the generation of dust where required. Water bowser movements will be carefully monitored to avoid, insofar as reasonably possible, increased runoff.
- All plant and materials vehicles shall be stored in dedicated areas (on site).
- Areas of excavation will be kept to a minimum, and stockpiling will be minimised by coordinating excavation, spreading and compaction.
- Construction materials will be transported to the site on specified haul routes only.
- The agreed haul route roads adjacent to the site will be regularly inspected for cleanliness and cleaned as necessary.
- The site access roads will be checked weekly for damage/potholes and repaired as necessary.
- The transport of construction materials to the site that have significant potential to cause dust, will be undertaken in tarpaulin or similar covered vehicles where necessary.
- All construction related traffic will have speed restrictions on un-surfaced roads to 15 kph;
- The transport of dry peat and spoil, which has the significant potential to generate dust, to the on-site borrow pits will be minimised. If necessary, excavated peat and spoil will be dampened prior to transport to the borrow pit.

3.11 Noise Control

The operation of plant and machinery, including construction vehicles, is a source of potential impact that will require mitigation at all locations within the site. Proposed measures to control noise include:

- Limiting the hours during which site activities likely to create high levels of noise or vibration are permitted.
- Establishing channels of communication between the contractor/developer, Local Authority and residents.
- Appointing a site representative responsible for matters relating to noise and vibration.
- Monitoring typical levels of noise and vibration during critical periods and at sensitive locations.
- Keeping the surface of the site access roads even to mitigate the potential for vibration from lorries.
- The best means practicable, including proper maintenance of plant, will be employed to minimise the noise produced by on site operations.
- All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the contract.
- Compressors will be attenuated models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers.
- Machinery that is used intermittently will be shut down or throttled back to a minimum during periods when not in use.
- Selection of plant with low inherent potential for generation of noise and/ or vibration;
- Placing of noisy / vibratory plant as far away from sensitive properties as permitted by site constraints
- Any plant, such as generators or pumps, which is required to operate outside of general construction hours will be surrounded by an acoustic enclosure or portable screen.
- During the course of the construction programme, supervision of the works will include ensuring compliance with the limits detailed in Chapter 10 using methods outlined in British Standard BS 5228-1:2014+A1:2019 Code of practice for noise and vibration control on construction and open sites – Noise.
- The hours of construction activity will be limited to avoid unsociable hours where possible. Construction operations shall generally be restricted to between 7:00hrs and 19:00hrs Monday to Saturday. However, to ensure that optimal use is made of good weather periods or at critical periods within the programme (i.e. concrete pours,) it could occasionally be necessary to work out of these hours.

Where rock breaking is employed in relation to the proposed borrow pit location, the borrow pit extension and other infrastructure excavations, the following are examples of measures that will be employed, where necessary, to mitigate noise emissions from these activities:

- Fit suitably designed muffler or sound reduction equipment to the rock breaking tool to reduce noise without impairing machine efficiency.
- Ensure all leaks in air lines are sealed.
- Use a dampened bit to eliminate ringing.
- Erect acoustic screen between compressor or generator and noise sensitive area. When possible, line of sight between top of machine and reception point needs to be obscured.
- Enclose breaker or rock drill in portable or fixed acoustic enclosure with suitable ventilation.

3.12 Invasive Species Management

A baseline invasive species survey will be carried out at the site to identify the presence and location of any invasive species (listed under the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011) by a suitably qualified ecologist. If the presence of such species is found at or adjacent to the site, particularly in areas where its excavation may be required, an invasive species management plan will be prepared for the site to prevent the introduction or spread of any invasive species within the footprint of the works. An invasive species management plan, if required, will set out best practice control methods as summarised in the following sections.

3.12.1 General Best Practice Control Methods

The following general best practice guidelines in the treatment and control of invasive species during construction works are outlined in Section 3.12.2 below and the site ISMP having regard to guidance document issued by Transport Infrastructure Ireland – Invasive Alien Plant Species on National Roads – Technical Guidance (TII 2020).

3.12.2 Good Practice on Site Management

Careful preparation of the site and planning of the works is crucial for the successful treatment of invasive species. The below list of guidelines, which is not exhaustive, shall be followed by all on-site personnel. Only those who have been inducted into biosecurity measures on-site may enter the contaminated zones within the works areas. Should any risk of contaminated material escaping be observed by the site supervisor, the management plan for the site must be amended by an appropriately qualified person to mitigate against the risk.

3.12.3 Establish Good Site Hygiene

The following measures are proposed to establish good site hygiene to ensure the control of any potential spread of invasive species during construction works:

- A risk assessment and method statement must be provided by the Contractor prior to commencing works.
- Fences will be erected around areas of infestation, as confirmed by test pits, and warning signs shall be erected.
- A designated wash-down area will be created, where power-washed material from machinery can be contained, collected and disposed of with other contaminated material. This area will contain a washable membrane or hard surface.
- Stockpile areas will be chosen to minimise movement of contaminated soil.
- Stockpiles will be marked and isolated.
- Contaminated areas which will not be excavated will be protected by a root barrier membrane if they are likely to be disturbed by machinery. Root barrier membranes will be protected by a layer of sand above and below and topped with a layer of hardcore.
- The use of vehicles with caterpillar tracks within contaminated areas will be avoided to minimise the risk of spreading contaminated material.
- An ECoW/suitably qualified ecologist will be on site to monitor and oversee the implementation of invasive species management plans.

Plant and equipment which is operated within an area for the management of materials in contaminated areas should be decontaminated prior to relocating to a different works area. The decontamination procedures should take account of the following:

- Personnel may only clean down if they are familiar with the plant and rhizome material and can readily identify it.
- Decontamination will only occur within designated wash-down areas.
- Vehicles will be cleaned using stiff-haired brush and pressure washers, paying special attention to any areas that might retain rhizomes e.g. wheel treads and arches.
- All run-off will be isolated and treated as contaminated material. This will be disposed of in already contaminated areas.

3.13 Waste Management

This section of the CEMP provides a waste management plan (WMP) which outlines the best practice procedures during the excavation and construction phases of the project. The WMP will outline the methods of waste prevention and minimisation by recycling, recovery and reuse at each stage of construction of the Proposed Development. Disposal of waste will be seen as a last resort.

3.13.1 Legislation

The Waste Management Act 1996 and its subsequent amendments provide for measures to improve performance in relation to waste management, recycling and recovery. The Act also provides a regulatory framework for meeting higher environmental standards set out by other national and EU legislation.

The Act requires that any waste related activity has to have all necessary licenses and authorisations. It will be the duty of the Waste Manager on the site of the development to ensure that all contractors hired to remove waste from the site have valid Waste Collection Permits. It will then be necessary to ensure that the waste is delivered to a licensed or permitted waste facility. The hired waste contractors and subsequent receiving facilities must adhere to the conditions set out in their respective permits and authorisations.

The Department of the Environment provides a document entitled, '*Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects' (2006).* It is important to emphasise that no demolition will take place at this site, however, this document was referred to throughout the process of completing this WMP.

3.13.2 Waste Management Hierarchy

The waste management hierarchy sets out the most efficient way of managing in the following order:

Prevention and Minimisation:

The primary aim of the WMP will be to prevent and thereby reduce the amount of waste generated at each stage of the project.

Reuse of Waste:

Reusing as much of the waste generated on site as possible will reduce the quantities of waste that will have to be transported off site to recovery facilities or landfill.

Recycling of Waste:

There are a number of established markets available for the beneficial use of Construction and Demolition waste such as using waste concrete as fill for new roads.

At all times during the implementation of the WMP, disposal of waste to landfill will be considered only as a last resort.

3.13.3 Construction Phase Waste Management

The construction of the Proposed Development will involve the construction of new and upgrade of site access roads, underground cabling routes, 110kV electrical substation, control buildings, and all associated infrastructure.

The construction of the substation will comprise of a concrete foundation with concrete masonry blocks and a timber roof structure with roof tile or slate covering. The roof structure will be made up of prefabricated roof trusses manufactured off site to minimise timber cutting on site.

The site roads will be constructed with rock won from on-site borrow pits.

The underground cabling route will be fully reinstated with material generated during the excavation of the trenches for the cable ducting. Any excess material will be used for localised landscaping or restoration

The waste types arising from the construction phase of the development are outlined in Table 3-2 below.

Table 3-2 Expected waste types arising during the Construction Phase

Material Type	Example	EWC Code
Cables	Electrical wiring	17 04 11
Cardboard	Boxes, cartons	15 01 01
Composite packaging	Containers	15 01 05
Metals	Copper, aluminium, lead, iron and steel	17 04 07
Inert materials	Sand, stones, plaster, rock, blocks	17 01 07
Mixed municipal waste	Daily canteen waste from construction workers, miscellaneous	20 03 01
Plastic	PVC frames, electrical fittings	17 02 03
Plastic packaging	Packaging with new materials	15 01 02
Tiles and ceramics	Slates and tiles	17 01 03
Wooden packaging	Boxes, pallets	15 01 03

Hazardous wastes that may occur on site during the construction phase of the development may include oil, diesel fuel, chemicals, paints, preservatives etc. All hazardous wastes will be stored in bunded containers/areas before being collected by an authorised waste contractor and brought to an EPA licensed waste facility. As mentioned above, hazardous wastes will be kept separate from non-hazardous wastes so that contamination does not occur.

3.13.3.1 Waste Arisings and Proposals for Minimisation, Reuse and Recycling of Construction waste

Construction waste will arise on the project mainly from excavation and unavoidable construction waste including material surpluses and damaged materials and packaging waste.

Appropriate measures should be taken to ensure excess waste is not generated during construction, including;

- Ordering of materials should be on an 'as needed' basis to prevent over supply to site. Co-ordination is required with suppliers enabling them to take/buy back surplus stock.
- Purchase of materials pre-cut to length to avoid excess scrap waste generated on site.
- Request that suppliers use least amount of packaging possible on materials delivered to the site.
- Ensuring correct storage and handling of goods to avoid unnecessary damage that would result in their disposal
- Ensuring correct sequencing of operations.
- Use reclaimed materials in the construction works.

Hazardous waste will be kept separate from all other construction waste to prevent contamination and removed appropriately.

3.13.3.2 Waste Arising from Construction Activities

All waste generated on site will be contained in waste skips at a waste storage area on site. This waste storage area will be kept tidy with skips clearly labelled to indicate the allowable material to be disposed of therein.

The expected waste volumes generated on site are unlikely to be large enough to warrant source segregation at the Proposed Development site. Therefore, all wastes streams generated on site will be deposited into a single waste skip. This waste material will be transferred to a Materials Recovery Facility (MRF) by a fully licensed waste contractor where the waste will be sorted into individual waste streams for recycling, recovery or disposal.

It is not envisaged that there will be any waste material arising from the materials used to construct the site roads as only the quantity of stone necessary will be sourced from local quarries and brought on site on an 'as needed' basis.

Site personnel will be instructed at induction that under no circumstances can waste be brought to site for disposal in the on-site waste skip. It will also be made clear that the burning of waste material on site is forbidden.

3.13.3.3 Waste Arising from Decommissioning

The relevant components will be removed from site for re-use, recycling or waste disposal. Any structural elements that are not suitable for recycling will be disposed of in an appropriate manner. All lubrication fluids will be drained down and put aside for appropriate collection, storage, transport and disposal. Any materials which cannot be re-used or recycled will be disposed of by an appropriately licenced contractor.

The waste types arising from the decommissioning of the Proposed Development are outlined in Table 3-3 below.

Table 3-3 Expected waste types arising during the Decommissioning Phase

Material Type	Example	EWC Code
Cables	Electrical wiring	17 04 11
Metals	Copper, aluminium, lead and iron	17 04 07

3.13.3.4 Reuse

Many construction materials can be reused a number of times before they have to be disposed of:

- Concrete can be reused as aggregate for roads cable trench backfilling material.
- Plastic packaging etc. can be used to cover materials on site or reused for the delivery of other materials.
- Excavated material can be reused for reinstatement of the areas adjacent to site roads.

3.13.3.5 Recycling

If a certain type of construction material cannot be reused onsite, then recycling is the most suitable option.

All waste that is produced during the construction phase including dry recyclables will be deposited in the on-site skip initially and sent for subsequent segregation at a remote facility. The anticipated volume of all waste material to be generated at the development is low which provides the justification for adopting this method of waste management.

3.13.4 Implementation

3.13.4.1 Roles and Responsibilities

Prior to the commencement of the development a Construction Waste Manager will be appointed by the Contractor. The Construction Waste Manager will be in charge of the implementation of the objectives of the plan, ensuring that all hired waste contractors have the necessary authorisations and that the waste management hierarchy is adhered to. The person nominated must have sufficient authority so that they can ensure everyone working on the development adheres to the management plan.

3.13.4.2 Training

It is important for the Construction Waste Manager to communicate effectively with colleagues in relation to the aims and objectives of the waste management plan. All employees working on site during the construction phase of the project will be trained in materials management and thereby, should be able to:

- Distinguish reusable materials from those suitable for recycling;
- Ensure maximum segregation at source;
- Co-operate with site manager on the best locations for stockpiling reusable materials;
- Separate materials for recovery; and
- Identify and liaise with waste contractors and waste facility operators.

3.13.4.3 Record Keeping

The WMP will provide systems that will enable all arisings, movements and treatments of construction waste to be recorded. This system will enable the contractor to measure and record the quantity of waste being generated. It will highlight the areas from which most waste occurs and allows the measurement of arisings against performance targets. The WMP can then be adapted with changes that are seen through record keeping.

The fully licensed waste contractor employed to remove waste from the site will be required to provide documented records for all waste dispatches leaving the site. Each record will contain the following:

- Consignment Reference Number
- Material Type(s) and EWC Code(s)
- Company Name and Address of Site of Origin
- Trade Name and Collection Permit Ref. of Waste Carrier
- Trade Name and Licence Ref. of Destination Facility
- Date and Time of Waste Dispatch
- Registration no. of Waste Carrier vehicle
- Weight of Material
- Signature of Confirmation of Dispatch detail
- Date and Time of Waste Arrival at Destination
- Site Address of Destination Facility

3.13.5 Waste Management Plan Conclusion

The WMP will be properly adhered to by all staff involved in the project which will be outlined within the induction process for all site personnel. The waste hierarchy should always be employed when designing the plan to ensure that the least possible amount of waste is produced during the construction phase. Reuse of certain types of construction wastes will cut down on the cost and requirement of raw materials therefore further minimising waste levels.

This preliminary WMP has been prepared to outline the main objectives that are to be adhered to for the preparation of a more detailed WMP to be completed after the planning phase of the Proposed Development.

4. ENVIRONMENTAL MANAGEMENT IMPLEMENTATION

4.1 Roles and Responsibilities

The Project Developer will appoint a design team to prepare the detailed design for the Proposed Development prior to the commencement of construction and ensure all planning and environmental obligations are met. The developer will appoint a project contractor who will be responsible for the construction of the Proposed Development in accordance with this CEMP which will be updated by the contractor as required during the construction phase of the project. Any updated CEMP must meet or exceed the standards and requirements set out in this document.

The ECoW will be nominated by the Project Developer to oversee the project contractor's effective implementation of the project's environmental requirements and obligations, as captured in the CEMP. The ECoW will be responsible for monitoring the works of the project contractor from an environmental perspective on behalf of the Project Developer. For the sake of expediency, the ECoW will report their ongoing audit findings, monitoring results and site observations to both the Project Developer and the project contractor, having been nominated by the developer to fulfil the role.

The ECoW will have the power to halt the works, should the need arise and will be supported by the developer to ensure the contractor adheres to such an instruction.

The ECoW will also have to call upon the project ecologist, Project Hydrologist, or other members of the Project Developer's design team, as required, to oversee the contractor's works on-site.

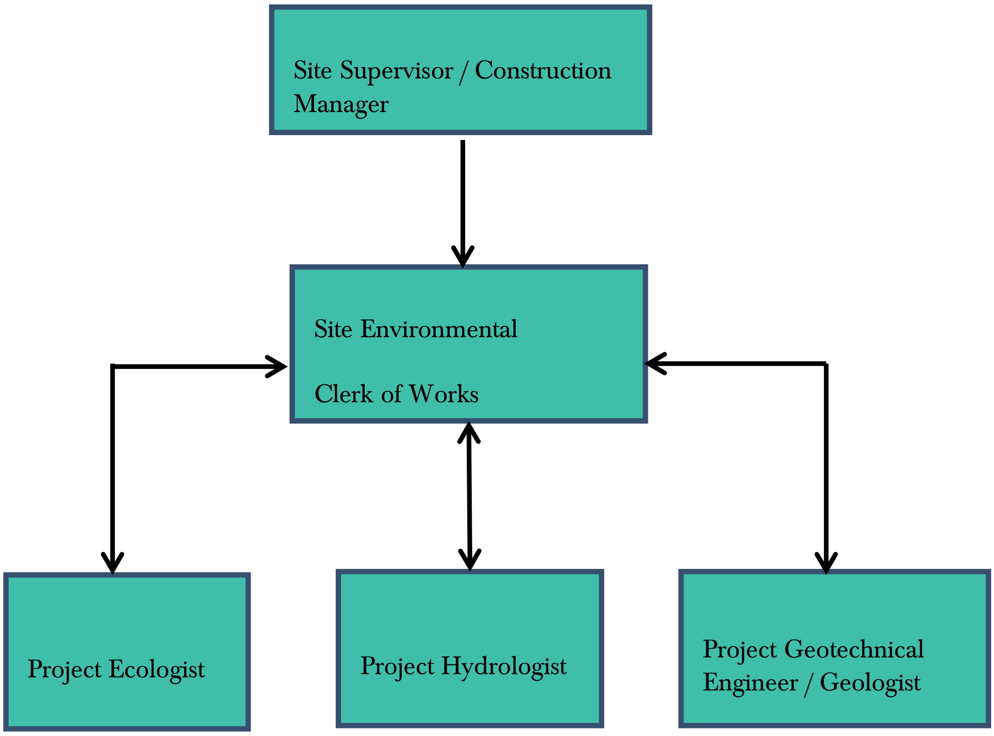


Figure 4-1 Construction Phase Environmental Management Roles

Any requirement of the granted permission, for the works to be supervised by an engineer with professional indemnity insurance, who upon completion of the works, including site stability, shall certify the said works, will be adhered to. Such an engineer will be appointed to oversee and supervise the construction phase of the project.

4.1.1 Construction Manager

The Construction Manager will have overall responsibility for the organisation and execution of all related environmental activities as appropriate, in accordance with regulatory and project environmental requirements. The duties and responsibilities of the Construction Manager will include:

- Ensure that all works are completed safely and with minimal environmental risk;
- Approve and implement the CEMP and supporting environmental documentation, and ensure that all environmental standards are achieved during the construction phase of the project;
- Take advice from the Site Engineer and ECoW legislation, codes of practice, guidance notes and good environmental working practice relevant to their work;
- Ensure compliance through audits and management site visits;
- Ensure timely notification of environmental incidents; and,
- Ensure that all construction activities are planned and performed such that minimal risk to the environment is introduced

4.1.2 Site Engineer

The main contractor will engage a qualified site engineer who will have input into the environmental management of the site.

The Site Engineer will report to the Construction Manager and liaise with the ECoW. The responsibilities and duties of the Site Engineer will include the following:

- Undertake inspections, including visual inspections at watercourse crossings, and reviews to ensure the works are carried out in compliance with the CEMP;
  - Advise site management/contractor/sub-contractors regarding: Prevention of environmental pollution and improvement to existing working methods;
  - Suitability and use of plant, equipment and materials to prevent pollution;
  - Environmentally sound methods of working and systems to identify environmental hazards

4.1.3 Site Environmental Clerk of Works

The main contractor will be required to engage a qualified Environmental Engineer, Environmental Scientist, or equivalent, with experience in wind farm construction to fulfil the role of Site ECoW, and to monitor all site works and to ensure that methodologies and mitigation are followed throughout construction to avoid negatively impacting on the receiving environment.

The ECoW will report to the Construction Manager. The responsibilities and duties of the ECoW will include the following:

- Preparation of the CEMP and supporting environmental documentation and review/approval of contractor method statements;
- Undertake inspections and reviews to ensure the works are carried out in compliance with the CEMP;
- Monitor the implementation of the CEMP, particularly all proposed/required environmental monitoring;

- Generate environmental reports as required to show environmental data trends and incidents and ensure environmental records are maintained throughout the construction period;
- Advise site management/contractor/sub-contractors on:
  - Prevention of environmental pollution and improvement to existing working methods;
  - Changes in legislation and legal requirements affecting the environment;
  - Suitability and use of plant, equipment and materials to prevent pollution;
  - Environmentally sound methods of working and systems to identify environmental hazards;
- Ensure proper mitigation measures are initiated and adhered to during the construction phase;
- Liaise with Project Ecologist, Project Hydrologist and Project Geotechnical Engineer to ensure regular site visits and audits/inspections are completed;
- Ensure adequate arrangements are in place for site personnel to identify potential environmental incidents;
- Ensure that details of environmental incidents are communicated in a timely manner to the relevant regulatory authorities, initially by phone and followed up as soon as is practicable by e-mail;
- Support the investigation of incidents of significant, potential or actual environmental damage, and ensure corrective actions are carried out, recommend means to prevent recurrence and communicate incident findings to relevant parties; and,
- Identify environmental training requirements and arrange relevant training for all levels of site-based staff/workers.

The level, detail and frequency of reporting expected from the ECoW for the Construction Manager, developer's project manager, and any Authorities or other Agencies, will be agreed by all parties prior to commencement of construction, and may be further adjusted as required during the course of the project.

4.1.4 Project Ecologist

The Project Ecologist will be available to support the ECoW on matters relating to the protection of sensitive habitats and species encountered prior to or during the construction phase of the Proposed Development. The Project Ecologist will not be full time on site but will undertake pre-commencement surveys and visit the site as required.

The responsibilities and duties of the Project Ecologist will include the following:

- Review and input to the final construction phase CEMP in respect of ecological matters;
- In liaison with ECoW, oversee and provide advice on all relevant ecology mitigation measures set out in the planning documents for the Proposed Development;
- Regular inspection and monitoring of the development, through all phases of construction/operation and provide ecological advice as required;
- Carry out ecological monitoring and survey work as may be required by the planning authority; and,
- Complete a pre-commencement invasive species survey at the site.

4.1.5 Project Hydrologist

The Project Hydrologist is part of the design team that will prepare the detailed drainage design for the construction phase of the project, but will also support the ECoW in monitoring, overseeing and auditing the effective implementation of the detailed drainage design by the project contractor. The

Project Hydrologist will not be full time on site but will be required to visit as necessary to oversee the implementation of their drainage design.

The responsibilities and duties of the Project Hydrologist will include the following:

- Preparation of detailed drainage design before construction commences;
- Input to the CEMP in respect of drainage design and water quality management
- Attend site to support ECoW and oversee and audit the effective implementation of the detailed drainage design.
- Complete ongoing inspection and monitoring of the development, particularly in areas of drainage control in support of the ECoW in monitoring the effectiveness of the drainage design as it is implemented on-site.

4.1.6 Geotechnical Engineer/Civil Engineer

The Geotechnical Engineer will report to the Construction Manager and is responsible for inspection and review of geotechnical aspects associated with construction of the proposed renewable energy development. The Geotechnical Engineer will not be full time on site but will visit site at least once a month during the construction phase civil works and on a weekly basis during site preparation/groundworks.

The responsibilities and duties of the Geotechnical Engineer will include the following:

- Visit site regularly, or at least once a month during the construction phase, to complete geotechnical audits and reviews and report any issues to the Construction Manager;
- Ensuring that identified hazards are listed in the Geotechnical Risk Register and that these are subject to ongoing monitoring; and,
- Ongoing inspection and monitoring of the development, particularly in areas of peatland and the temporary stockpile areas, through all phases of construction (including pre, during and post construction) and ensure construction is carried out as specified in the EIAR, NIS and in relevant planning conditions.

4.2 Water Quality and Monitoring

4.2.1 Pre-Construction Baseline Monitoring

Baseline water quality field testing and laboratory analysis will be undertaken where required prior to commencement of felling and construction at the site. The baseline monitoring programme will be subject to agreement with Kerry and Cork County Councils.

Analysis will be for a range of parameters with relevant regulatory limits along with Environmental Quality Standards (EQSs) and sampling will be undertaken for each watercourse e.g. at SW1, SW2 etc. as outlined in Figure 8-3 of the EIAR on a monthly basis.

Baseline sampling will be completed on at least two occasions and these should coincide with low flow and high flow stream conditions. The high flow sampling event will be undertaken after a period of sustained rainfall, and the low flow event will be undertaken after a dry spell.

4.2.2 Construction Phase Monitoring

4.2.2.1 Surface Water Baseline Monitoring

During the construction phase field testing and laboratory analysis of a range of parameters with relevant regulatory limits and EQSs will be undertaken for each primary watercourse, and specifically following heavy rainfall events. As a minimum the monitoring will be undertaken at the locations outlined in Figure 8-3 of the EIAR

4.2.2.2 Daily Visual Inspections

Daily visual inspections of drains and outfalls will be performed during the construction period to ensure suspended solids are not entering streams and rivers on site, to identify any obstructions to channels and to allow appropriate maintenance of the drainage regime. Should the suspended solids levels measured during construction be higher than the existing levels, the source will be identified and additional mitigation measures implemented.

Inspection sheets and photographic records will be kept on site. Inspection points will include the in-situ field monitoring point locations and the laboratory analysis sampling points. Inspection points will depend on works being completed within the catchment upstream of the identified monitoring locations. Visual inspections will also be completed after major rainfall events, i.e. after events of >25mm rainfall in any 24-hour period and data including photographs will be collected by visual inspections and independently assessed by the Project Hydrologist who will monitor and advise on the records being received.

The following periodic inspection regime will be implemented:

- Daily general visual inspections of site operations and inspections of all watercourses within the site and in the surrounding area by the ECoW or a suitably qualified and competent person as delegated by the ECoW;
- Inspections to include all elements of drainage infrastructure to ensure the system is operating correctly and to identify any maintenance that is required. Any changes, such as discolouration, odour, oily sheen or litter will be noted and corrective action will be implemented. High risk locations such as settlement ponds will be inspected daily. Daily inspections checks will be completed on plant and equipment, and whether materials such as straw bales or oil absorbent materials need replacement;
- Event based inspections by the ECoW as follows:
    - >10 mm/hr (i.e. high intensity localised rainfall event);
    - >25 mm in a 24-hour period (heavy frontal rainfall lasting most of the day); or,
    - Rainfall depth greater than monthly average in 7 days (prolonged heavy rainfall over a week).
- Monthly site inspections by the Project Hydrologist/ ECoW during construction phase;
- Quarterly site inspections by the Project Hydrologist/ ECoW after construction for a period of one year following the construction phase; and,
- A written record will be maintained or available on-site within this Construction Environmental Management Plan (CEMP) which will be maintained on-site during the construction phase.

4.2.2.3 Continuous Turbidity Monitoring

Turbidity monitors or sondes can be installed where required at locations surrounding the Proposed Development site. The sondes will provide continuous readings for turbidity levels in the watercourse.

This equipment will be supplemented by daily visual monitoring at their locations as outlined in the sections below.

4.2.2.4 Monthly Laboratory Analysis

Baseline laboratory analysis of a range of parameters with relevant regulatory limits and EQSs will be undertaken as per water monitoring programme for the Proposed Development. This will not be restricted to just these locations around the proposed renewable energy development site with further sampling points added as deemed necessary by the ECoW in consultation with the Project Hydrologist and Site Manager.

4.2.2.5 Field Monitoring

Field chemistry measurements of unstable parameters, (pH, conductivity, temperature) will be taken at the surface water monitoring locations, as per water monitoring programme for the proposed renewable energy development and each primary watercourse along the route along with at all installed sonde locations. These analyses will be carried out by either the ECoW or the Project Hydrologist. In-situ field monitoring will be completed on a Monthly basis. In-situ field monitoring will also be completed after major rainfall events, i.e. after events of >25mm rainfall in any 24-hour period. The Project Hydrologist will monitor and advise on the readings collected by in-situ field monitoring.

4.2.2.6 Monitoring Parameters

The analytical determinants of the monitoring programme (including limits of detection and frequency of analysis) will be as per S.I. No. 272 of 2009 European Communities Environmental Objectives (Surface Waters) Regulations and European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009. The likely suite of determinants will include:

- pH (field measured)
- Electrical Conductivity (field measured)
- Temperature (field measured)
- Dissolved Oxygen (field measured)
- Total Phosphorus
- Chloride
- Nitrate
- Nitrite
- Total Nitrogen
- Ortho-Phosphate
- Ammonia N
- Biochemical Oxygen Demand
- Total Suspended Solids
- Turbidity

4.2.3 Construction Phase Drainage Inspections & Maintenance

Drainage performance will form part of the civil works contract requirements. During the construction phase, the project contractor will be responsible for the effectiveness of drainage measures. This responsibility extends to drainage maintenance, to ensure that the installed drainage measures continue to perform as intended by the detailed drainage design. Silt fences, check dams, level spreaders and other drainage measures likely to form part of the detailed drainage design, require regular maintenance to ensure they continue to function effectively, and the project contractor is entirely responsible for this maintenance.

Regular inspections of all existing and installed drainage measures should be undertaken by the project contractor, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water within the system. The contractor will devise a system of recording the findings of these inspections. Any excess build-up of silt levels at check dams, the settlement ponds, or any other drainage features that may decrease the effectiveness of the drainage feature, will be removed. For this reason, the drainage measures installed on-site should be inspected at least weekly by the contractor and maintained as required during the construction phase of the project to ensure good performance. Maintenance checks will also ensure the centre elevation of the dam remains lower than the sides of the dam.

The ECoW will monitor the effectiveness of the on-site drainage during changing weather, ground or drainage conditions encountered on site, through their regular visual inspections of on-site watercourses and water monitoring programme. Where it appears that additional drainage measures will be required to ensure the drainage system remains effective, the ECoW will notify the contractor, the developer and project design team including the Project Hydrologist. The ECoW's role in this regard does not replace the need for the weekly (at least) inspections of the drainage system's measures by the project contractor.

On completion of the civil and excavations works at the site, the frequency of inspections and monitoring of the drainage infrastructure to be undertaken by the contractor can reduce to monthly.

4.2.4 Surface Water Monitoring Reporting

Visual inspection and laboratory analysis results of water quality monitoring shall assist in determining requirements for any necessary improvements in drainage controls and pollution prevention measures implemented on site.

It will be the responsibility of the ECoW to present the ongoing results of water quality and weather monitoring at or in advance of regular site meetings.

Reports on water quality will consider all field monitoring and visual inspections, and results of laboratory analysis completed for that period. Reports will describe how the results compare with baseline data as well as previous reports on water quality. The reports will also describe whether any deterioration or improvement in water quality has been observed, whether any effects are attributable to construction activities and what remedial measures or corrective actions have been implemented. Any proposed alteration to sampling frequency will be agreed with Kerry and Cork County Councils in advance

4.2.5 Post Construction Monitoring

4.2.5.1 Monthly Laboratory Analysis Sampling

Monthly sampling for laboratory analysis for a range of parameters adopted during pre-commencement and construction phases will continue for six months after construction, in particular after large excavation and heavy civils works. The Project Hydrologist will monitor and advise on the readings being received from the testing laboratory.

4.3 Environmental Awareness and Training

4.3.1 Environmental Induction

The Environmental Induction will be integrated into the general site induction on a case by case basis for each member of staff employed on-site depending on their assigned roles and responsibilities on site. Where necessary, the Environmental Induction will as a minimum include:

- A copy of the Environmental Management Site Plans and discussion of the key environmental risks and constraints;
- An outline of the CEMP structure;
- A discussion of the applicable Works Method Statement;
- The roles and responsibilities of staff, including contractors, in relation to environmental management; and,
- An outline of the Environmental Incident Management Procedure.

4.3.2 Toolbox Talks

Toolbox talks would be held by the ECoW or Construction Manager at the commencement of each day, or at the commencement of new activities. The aims of the toolbox talks are to identify the specific work activities that are scheduled for that day or phase of work. In addition, the necessary work method statements and sub plans would be identified and discussed prior to the commencement of the day's activities. The toolbox talks will include training and awareness on topics including:

- On-site Ecological Sensitivities
- Buffers to be upheld – watercourses, archaeology, ecology
- Sediment and Erosion Control
- Good site practice
- On-site Traffic Routes and Rules
- Keeping to tracks – vehicle rules
- Strictly adhering to the development footprint
- Fuel Storage
- Materials and waste procedures

Site meetings would be held on a regular basis involving all site personnel. The objectives of a site meeting are to discuss the coming weeks proposed activities and identify the relevant work method statements and sub-plans that will be relevant to that week's activities. In the event of any non-compliance identified during the previous week which may not have required immediate action, these would also be discussed to ensure they are closed out in a timely manner as well as confirming the necessary corrective action to remove the potential of any non-compliance reoccurring has been implemented.

5. EMERGENCY RESPONSE PLAN

An Emergency Response Plan (ERP) is presented in this section of the CEMP. It provides details of procedures to be adopted in the event of an emergency in terms of site health and safety and environmental protection.

5.1 Emergency Response Procedure

The Emergency Response Plan (ERP) is presented in this section of the CEMP. It provides details of procedures to be adopted in the event of an emergency. The site ERP includes details on the response required and the responsibilities of all personnel in the event of an emergency. The ERP will require updating and submissions from the contractor/PSCS and suppliers as the project progresses. Where sub-contractors that are contracted on site are governed by their own emergency response procedure a bridging arrangement will be adopted to allow for inclusion of the sub-contractor's ERP within this within this document.

This is a working document that requires updating throughout the various stages of the project.

5.1.1 Roles and Responsibilities

The chain of command during an emergency response sets out who is responsible for coordinating the response. The Construction Manager will lead the emergency response which makes him responsible for activating and coordinating the emergency response procedure. The other site personnel who can be identified at this time who will be delegated responsibilities during the emergency response are presented in Figure 5-1. In a situation where the Construction Manager is unavailable or incapable of coordinating the emergency response, the responsibility will be transferred to the next person in the chain of command outlined in Figure 5-1. This will be updated throughout the various stages of the project.

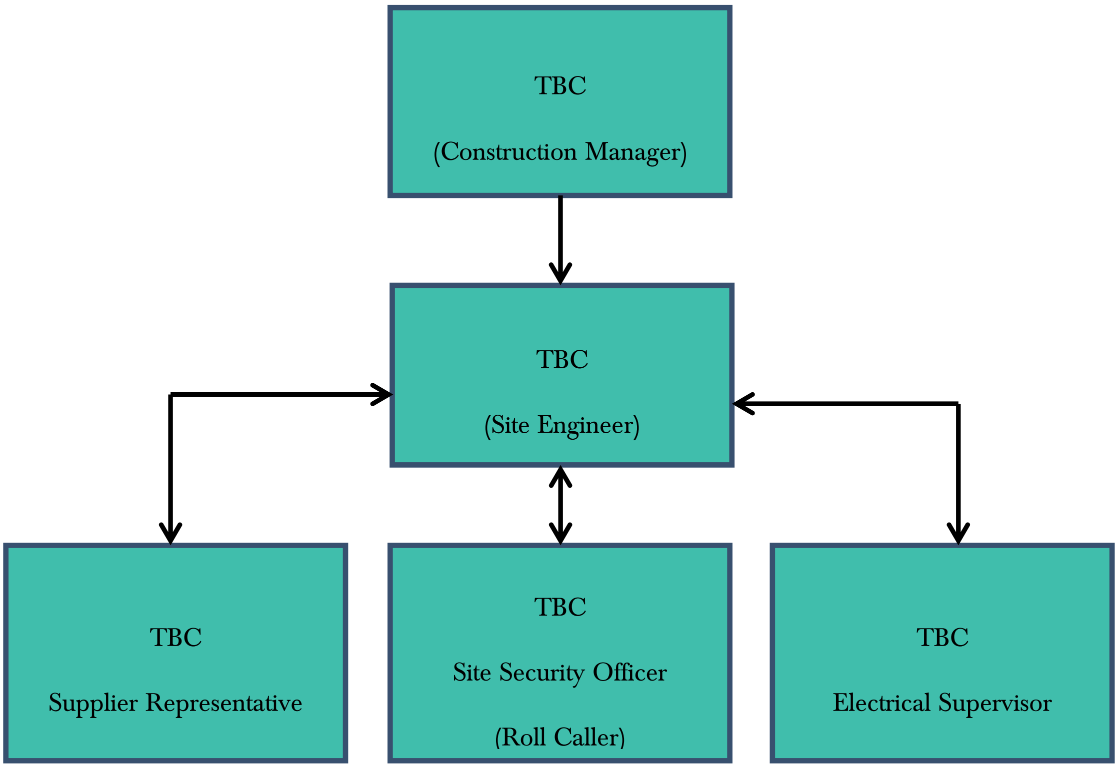


Figure 5-1 Emergency Response Procedure Chain of Command

5.1.2 Initial Steps

In order to establish the type and scale of potential emergencies that may occur, the following hazards have been identified as being potential situations that may require an emergency response in the event of an occurrence.

Table 5-1 Hazards associated with potential emergency situations

Hazard	Emergency Situation
Construction vehicles: dump trucks, tractors, excavators, cranes etc.	Collision or overturn which has resulted in operator or third-party injury.
Abrasive wheels/ portable tools	Entanglement, amputation or electrical shock associated with portable tools.
Contact with services	Electrical shock or gas leak associated with an accidental breach of underground services.
Fire	Injury to employee through exposure to fire or smoke.
Falls from heights including falls from scaffold towers, scissor lifts, and ladders.	Injury to employee after a fall from a height.
Sickness	Illness unrelated to site activities of an employee e.g. heart attack, loss of consciousness, seizure.

In the event of an emergency situation associated with, but not restricted to, the hazards outlined in Table 5-1 the /Construction Manager will carry out the following:

- Make safe the area if possible and ensure that there is no identifiable risk exists with regard to dealing with the situation e.g. if a machine has turned over, ensure that it is in a safe position so as not to endanger others before assisting the injured.
- Contact the required emergency services or delegate the task to someone if he is unable to do so. If delegating the task, ensure that they follow the procedures for contacting the emergency services as set out in Section 5.2.1.
- Take any further steps that are deemed necessary to make safe or contain the emergency incident e.g. cordon off an area where an incident associated with electrical issues has occurred.
- Contact any regulatory body or service provider as required e.g. ESB Networks the numbers for which as provided in Section 5.2.2.
- Contact the next of kin of any injured personnel where appropriate. The procedure for this is outlined in Section 5.2.3.

5.1.3 Site Evacuation/Fire Drill

A site evacuation/fire drill procedure will provide basis for carrying out the immediate evacuation of all site personnel in the event of an emergency. The following steps will be taken:

- Notification of the emergency situation. Provision of a siren or fog-horn to notify all personnel of an emergency situation.
- An assembly point will be designated in the construction compound area and will be marked with a sign. All site personnel will assemble at this point.

- A roll call will be carried out by the Site Security Officer to account for all personnel on site.
- The Site Security Officer will inform the Construction Manager when all personnel have been accounted for. The Construction Manager will decide the next course of action, which be determined by the situation that exists at that time and will advise all personnel accordingly.

All personnel will be made aware of the evacuation procedure during site induction. The Fire Services Acts of 1981 and 2003 require the holding of fire safety evacuation drills at specified intervals and the keeping of records of such drills.

5.1.4 Excessive Peat Movement

The emergency measures to be followed in the event of any excessive peat movement will be stipulated by the geotechnical designer for the project and should be outlined in their geotechnical risk register.

Where there is excessive peat movement or continuing peat movement recorded at a monitoring location, or identified at any location within the site, but no apparent signs of distress to the peat (e.g. cracking, surface rippling) then the following shall be carried out.

- All construction activities shall cease within the affected area.
- Increased monitoring at the location shall be carried out. The area will be monitored, as appropriate, until such time as movements have ceased.
- Re-commencement of limited construction activity shall only start following a cessation of movement and the completion of a geotechnical risk assessment by a geotechnical engineer.

5.1.5 Onset of Peat Slide

Where there is the onset or actual detachment of peat (e.g. cracking, surface rippling) then the following shall be carried out.

- On alert of a peat slide incident, all construction activities will cease and all available resources will be diverted to assist in the required mitigation procedures.
- Where considered possible action will be taken to prevent a peat slide reaching any watercourse. This will take the form of the construction of check barrages on land. Due to the terrain, the possible short run-out length to watercourses, speed of movement and the inability to predict locations it may not be possible to implement any on-land prevention measures, in this case a watercourse check barrage will be implemented.
- For localised peat slides that do not represent a risk to a watercourse and have essentially come to rest the area will be stabilised initially by rock infill, if required. The failed area and surrounding area will then be assessed by the engineering staff and stabilisation procedures implemented. The area will be monitored, as appropriate, until such time as movements have ceased.

5.1.6 Spill Control Measures

Every effort will be made to prevent an environmental incident during the construction and operational phase of the project. Oil/fuel spillages are one of the main environmental risks that will exist on the site which will require an emergency response procedure. The importance of a swift and effective response in the event of such an incident occurring cannot be over emphasised. The following steps provide the procedure to be followed in the event of such an incident:

- Stop the source of the spill and raise the alarm to alert people working in the vicinity of any potential dangers.
- If applicable, eliminate any sources of ignition in the immediate vicinity of the incident.
- Contain the spill using the spill control materials, track mats or other material as required. Do not spread or flush away the spill.
- If possible, cover or bund off any vulnerable areas where appropriate such as drains, watercourses or sensitive habitats.
- If possible, clean up as much as possible using the spill control materials.
- Contain any used spill control material and dispose of used materials appropriately using a fully licensed waste contractor with the appropriate permits so that further contamination is limited.
- Notify the ECoW immediately giving information on the location, type and extent of the spill so that they can take appropriate action.
- The ECoW will inspect the site and will assist by providing any advice possible to ensure the necessary measures are in place to contain and clean up the spill and prevent further spillage from occurring.
- The Construction Manager will notify the appropriate regulatory body such as Kerry and Cork County Councils, Inland Fisheries Ireland, National Parks and Wildlife Service, etc. if deemed necessary.

The importance of a swift and effective response in the event of such an incident occurring cannot be over emphasised. Environmental incidents are not limited to just fuel spillages. Therefore, any environmental incident must be investigated in accordance with the following steps.

- The ECoW must be immediately notified.
- If necessary, the Construction Manager will inform the appropriate regulatory authority. The appropriate regulatory authority will depend on the nature of the incident.
- The details of the incident will be recorded on an Environmental Incident Form which will provide information such as the cause, extent, actions and remedial measures used following the incident. The form will also include any recommendations made to avoid reoccurrence of the incident.
- If the incident has impacted on an ecologically sensitive receptor, such as a sensitive habitat, protected species or designated conservation site (pSPA or cSAC), the ECoW will liaise with the Project Ecologist.
- If the incident has impacted on a sensitive receptor such as an archaeological feature the ECoW will liaise with the Project Archaeologist.

A record of all environmental incidents will be kept on file by the ECoW and the Project Contractor. These records will be made available to the relevant authorities such as Kerry and Cork County Councils, IFI, NPWS, etc. if required. The ECoW will be responsible for any corrective actions required as a result of the incident e.g. an investigative report, formulation of alternative construction methods or environmental sampling, and will advise the Main Contractor as appropriate.

5.2 Contact the Emergency Services

5.2.1 Emergency Communications Procedure

In the event of requiring the assistance of the emergency services the following steps should be taken:

Stay calm. It is important to take a deep breath and not get excited. Any situation that requires 999/112 is, by definition, an emergency. The dispatcher or call-taker knows that and will try to move things along quickly, but under control.

Know the location of the emergency and the number you are calling from. This may be asked and answered a couple of times but do not get frustrated. Even though many emergency call centres have enhanced capabilities meaning they are able to see your location on the computer screen they are still required to confirm the information. If for some reason you are disconnected, at least emergency crews will know where to go and how to call you back.

If you reach a recording, listen to what it says. If the recording says your call cannot be completed, hang up and try again. If the recording says all call takers are busy, WAIT. When the next call-taker or dispatcher is available to take the call, it will transfer you.

Let the call-taker guide the conversation. He or she is typing the information into a computer and may seem to be taking forever. There is a good chance, however, that emergency services are already being sent while you are still on the line.

Follow all directions. In some cases, the call-taker will give you directions. Listen carefully, follow each step exactly, and ask for clarification if you do not understand.

Keep your eyes open. You may be asked to describe victims, suspects, vehicles, or other parts of the scene.

Do not hang up the call until directed to do so by the call taker.

Due to the remoteness of the site it may be necessary to liaise with the emergency services on the ground in terms of locating the site. This may involve providing an escort from a designated meeting point that may be located more easily by the emergency services. This should form part of the site induction to make new personnel and sub-contractors aware of any such arrangement or requirement if applicable.

5.2.2 Contact Details

A list of emergency contacts is presented in Table 5-2. A copy of these contacts will be included in the Site Safety Manual and in the site offices and the various site welfare facilities.

Table 5-2 Emergency Contacts

Contact	Telephone no.
Emergency Services – Ambulance, Fire, Gardaí	999/112
Doctor –Millstreet Medical Centre	029 70124
Hospital –Millstreet Community Hospital	029 70003
ESB Emergency Services	1850 372 999
Gas Networks Ireland Emergency	1850 20 50 50
Gardaí –Millstreet Garda Station	029 70003
Health and Safety Co-ordinator - Health & Safety Services	TBC
Health and Safety Authority	1890 289 389
Inland Fisheries Ireland (IFI)	1890 347 424
Project Supervisor Construction Stage (PSCS): TBC	TBC

Contact	Telephone no.
Project Supervisor Design Stage (PSDS): TBC	TBC

5.2.3 Procedure for Personnel Tracking

All operatives on site without any exception will have to undergo a site induction where they will be required to provide personal contact details which will include contact information for the next of kin.

In the event of a site operative becoming in an emergency situation where serious injury has occurred and hospitalisation has taken place, it will be the responsibility of the Site Manager or next in command if unavailable to contact the next of kin to inform them of the situation that exists.

5.2.4 Induction Checklist

Table 5-3 provides a list of items highlighted in this ERP which must be included or obtained during the mandatory site induction of all personnel that will work on the site. This will be updated throughout the various stages of the project.

Table 5-3 Emergency Response Plan Items Applicable to the Site Induction Process

ERP Items to be included in Site Induction	Status
All personnel will be made aware of the evacuation procedure during site induction	
Due to the remoteness of the site it may be necessary to liaise with and assist the emergency services on the ground in terms of locating the site. This may involve providing an escort from a designated meeting point that may be located more easily by the emergency services. This should form part of the site induction to make new personnel and sub-contractors aware of any such arrangement or requirement if applicable.	
All operatives on site without any exception will have undergo a site induction where they will be required to provide personal contact details which will include contact information for the next of kin.	

6. MITIGATION PROPOSALS

All mitigation measures relating to the pre-commencement, construction, operational and decommissioning phases of the Proposed Development were set out in the relevant chapters of the Environmental Impact Assessment (EIAR) and Natura Impact Statement (NIS) as part of the planning permission application to KCC, CCC and An Bord Pleanála.

This section of the Construction and Environmental Management Plan groups together all of the mitigation measures presented in the above documents. The mitigation measures are presented in Table 6-1 below.

By presenting the mitigation proposals in the below format, it is intended to provide an easy to audit list that can be reviewed and reported on during the future phases of the project. The tabular format in which the below information is presented, can be further expanded upon during the course of future project phases to provide a reporting template for site compliance audits.

Table 6-1 Site Preparation and Mitigation Measures

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
Pre-Commencement Phase				
MM1	EIAR Section 4	All proposed site activities will be provided for in a Construction Environmental Management Plan (CEMP), prepared prior to the commencement of any operations onsite. The CEMP will set out all measures necessary to ensure works are carried out in accordance with the mitigation measures set out in the EIAR and will set out the monitoring and inspections procedures and frequencies.		
MM2	EIAR Section 4	The ECoW will maintain responsibility for monitoring the construction works and audit the implementation of the CEMP. In addition, a Project Ecologist, Project Hydrologist, Project Archaeologist, Project Geotechnical Engineer will visit the site regularly and report to the ECoW.		
MM3	CEMP Section 4	A Site ECoW will oversee the site works and implementation of the CEMP, and provide on-site advice on the mitigation measures necessary as necessary to ensure the project proceeds as intended. The level, detail and frequency of reporting expected from the ECoW for the Construction Manager, developer's project manager, and any Authorities or other Agencies, will be agreed by parties where required prior to commencement of construction, and may be further adjusted as required during the course of the project.		
MM4	CEMP Section 4	Baseline water quality field testing and laboratory analysis will be undertaken where required prior to commencement of felling and construction at the site. The baseline monitoring programme will be subject to agreement with Kerry and Cork County Councils. Baseline laboratory analysis of a range of parameters with relevant regulatory limits and EQSs will also be undertaken as per water monitoring programme for the Proposed Development and each primary watercourse along the route.		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
MM5	CEMP Section 5	A Project Ecologist will be appointed. The responsibilities and duties of the Project Ecologist are set out in section 4.1.4.		
MM6	EIAR Section 4 CEMP Section 3	The arrangements for concrete deliveries to the site will be discussed with suppliers before work starts, agreeing routes, prohibiting on-site washout of trucks and discussing emergency procedures.		
MM7	EIAR Section 4 CEMP Section 4	The Project Hydrologist will prepare detailed drainage design before construction commences.		
MM8	EIAR Section 4 CEMP Section 3	The detailed drainage design will specify all materials and equipment necessary to implement the drainage measures effectively, which will be brought on site in advance of any works commencing. An adequate quantity of straw bales, clean stone, terram, stakes, etc. will be kept on site at all times to implement the detailed drainage design measures as necessary. The detailed drainage measures will be installed prior to, or at the same time as the works they are intended to drain.		
MM9	EIAR Section 9 CEMP Section 3	The works programme for the groundworks part of the construction phase of the project will also take account of weather forecasts and predicted rainfall in particular.		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
MM10	CEMP Section 3	Prior to commencement of works in sub-catchments across the site main drain inspections will be competed to ensure ditches and streams are free from debris and blockages that may impede drainage.		
MM11	EIAR Section 4 CEMP Section 4	An inspection and maintenance plan for the drainage system on site will be prepared in advance of commencement of any works. Regular inspections of all installed drainage systems will be necessary, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water at parts of the systems where it is not intended. The inspection of the drainage system will be the responsibility of the site ECoW or the Project Hydrologist.		
MM12	CEMP Section 3	Drainage and associated pollution control measures will be implemented onsite before the main construction works commence. Where possible drainage controls will be installed during seasonally dry ground conditions. This will reduce the possibility of impact on surface waters by suspended sediment released during construction and entrained in surface run-off.		
MM13	EIAR Section 8 NIS Section 5	A 50-metre buffer zone will be maintained around hydrological features during construction where possible. With the exception of road crossings of streams and associated culvert construction, no development infrastructure, vehicle or plant movement, construction activity or stock-piling of construction materials or construction waste will take place within this zone, and no vegetation will be removed from within this zone.		
MM14	EIAR Section 4	Construction will not commence during the Breeding Bird season from March to August inclusive. If breeding activity is identified, the nest site will be located, and no works shall be undertaken within a 500m buffer (Forestry Commission Scotland 2006; Ruddock & Whitfield 2007). No works shall be permitted within the buffer until it can be demonstrated that the nest is no longer occupied.		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
MM15	EIAR Section 6 CEMP Section 3	A pre-construction invasive species survey will be undertaken a part of the proposed project. This will provide updated data in advance of any construction given the intervention time period between the original survey work and any future grant of permission/ construction. Measures will be in place to prevent the spread of these species during the proposed works. In addition, all necessary precautions will be taken to prevent the introduction of invasive species to the site from elsewhere.		
MM16	EIAR Section 4	The proposed procedures for the implementation of the mitigation measures outlined in such a CEMP and their effectiveness and completion is typically audited by way of a Construction and Environmental Management Plan Audit Report. The CEMP Audit Report effectively lists all mitigation measures prescribed in any of the planning documentation and all conditions attached to the grant of planning permission and allows them to be audited on a systematic and regular basis.		
MM17	EIAR Section 11	Archaeological monitoring of all ground works associated with the Proposed Development during the construction stag. A report on the results of the monitoring shall be compiled and submitted to the relevant authorities on completion of the project.		
Construction Phase				
Construction Management				
MM18	EIAR Section 4 CEMP Section 3 NIS Section 5	On-site refuelling will be carried out using a mobile double skinned fuel bowser. The fuel bowser, a double axel custom-built refuelling trailer, will be re-filled off site and will be towed around the site by a 4x4 jeep to where machinery is located. It is not practical for all vehicles to travel back to a single refuelling point, given the size of the cranes, excavators, etc. that will be used during the construction of the Proposed Development. The 4x4 towing vehicle will also carry fuel absorbent material and pads in the event of any accidental spillages. The fuel bowser will be parked on a level area in the construction when not in use		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
MM19	EIAR Section 4 CEMP Section 3 NIS Section 5	No batching of wet-cement products will occur on site. Ready-mixed supply of wet concrete products and where possible, emplacement of pre-cast elements, will take place. Only ready-mixed concrete will be used during the construction phase, with all ready-mixed concrete being delivered from local batching plants in sealed concrete delivery trucks.		
MM20	EIAR Section 4, CEMP Section 3 NIS Section 5	No washing out of any plant used in concrete transport or concreting operations will be carried out onsite. When concrete is delivered to site, only the chute of the delivery truck will be cleaned, using the smallest volume of water necessary, before leaving the site. Concrete trucks will be directed back to their batching plant for washout.		
MM21	EIAR Section 4	No concrete will be transported around the site in open trailers or dumpers so as to avoid spillage while in transport.		
MM22	EIAR Section 4	Clearly visible signs in prominent locations will be placed close to concrete pour areas specifically stating washout of concrete lorries is not permitted on the site.		
MM23	EIAR Section 4	Main pours will be planned days or weeks in advance. Large pours will be avoided when prolonged periods of heavy rain are forecast.		
MM24	EIAR Section 4	Concrete pumps and machine buckets will be restricted from slewing over watercourses while placing concrete.		
MM25	EIAR Section 4	Excavations will be sufficiently dewatered before concreting begins. Dewatering will continue while concrete sets.		
MM26	EIAR Section 4	Covers will be available for freshly placed concrete to avoid the surface washing away in heavy rain.		
MM27	EIAR Section 4	Disposing of surplus concrete after completion of a pour in suitable off-site locations away from any watercourse or sensitive habitats.		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
MM28	EIAR Section 4 & 5 CEMP Section 3	If necessary, water will be taken from stilling ponds in the site's drainage system and will be pumped into a bowser or water spreader to dampen down haul roads and site compounds to prevent the generation of dust. Silty or oily water will not be used for dust suppression.		
MM29	EIAR Section 5 CEMP Section 3	All construction related traffic will have speed restrictions on un-surfaced roads to 15 kph.		
MM30	CEMP Section 4	A road sweeper will be available if any section of the public roads were to be dirtied by trucks associated with the Proposed Development		
MM31	EIAR Section 5	During construction of the Proposed Development, all staff will be made aware of and adhere to the Health & Safety Authority's *'Safety, Health and Welfare at Work (Construction) Regulations 2013 (S.I. 291 of 2013), as amended'.* This will encompass the use of all necessary Personal Protective Equipment and adherence to the site Health and Safety Plan		
MM32	CEMP Section 2	Any area where excavations are planned will be surveyed and all existing services will be identified prior to commencement of any works. Liaison will be held with the relevant sections of the Local Authority including all the relevant area engineers to ensure all services are identified. Excavation permits will be completed and all plant operators and general operatives will be inducted and informed as to the location of any services.		
Drainage Design and Management				
MM33	EIAR Section 8	A 50-metre buffer zone will be maintained around watercourses during the windfarm construction. With the exception of road crossings of streams and associated culvert construction, no development infrastructure, vehicle or plant movement, construction activity or stockpiling of construction materials or		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
	CEMP Section 3 NIS Section 5	construction waste will take place within this zone, and no vegetation will be removed from within this zone.		
MM34	EIAR Section 4 CEMP Section 3 NIS Section 5	Swales will be used to intercept and collect run off from relevant construction areas of the site during the construction phase, and channel it to stilling ponds for sediment attenuation.		
MM35	EIAR Section 4	Interceptor drains will be installed upgradient of relevant works areas to collect surface flow runoff and prevent it reaching excavations and construction areas of the site. It will then be directed to areas where it can be re-distributed over the ground as sheet flow.		
MM36	EIAR Section 4 CEMP Section 3 NIS Section 5	Check dams will not be used in any natural watercourses, only artificial drainage channels and interceptor drains. The check dams will be left in place when the interceptor drains are backfilled at the end of the construction phase to limit linear flow in the backfilled drain. The check dams will be installed at regular intervals along interceptor drains to restrict flow velocity, minimise channel erosion and promote sedimentation behind the dam. The check dams will be installed as the interceptor drains are being excavated. The spacing and frequency of the check dams will be dependent on the gradient of the interceptor drain or swale in which they are being installed.		
MM37	EIAR Section 4 CEMP Section 3	A level spreader will be constructed at the end of each interceptor drain to convert concentrated flows in the drain, into diffuse sheet flow on areas of vegetated ground. The levels spreaders will be located downgradient of any proposed works areas where possible in locations where they are not likely to contribute further to water ingress to construction areas of the site. The water carried in interceptor drains will not have come in contact with works areas of the site, and therefore		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
	NIS Section 5	should be free of silt and sediment. The level spreaders will distribute clean drainage water onto vegetated areas where the water will not be re-concentrated into a flow channel immediately below the point of discharge. The discharge point will be on level or only very gently sloping ground rather than on a steep slope so as to prevent erosion.		
MM38	EIAR Section 4	Vegetation filters are the existing vegetated areas of land that will be used to accept surface water runoff from upgradient areas. The selection of suitable areas to use as vegetation filters will be determined by the size of the contributing catchment, slope and ground conditions.		
MM39	EIAR Section 4 NIS Section 5	Stilling ponds will be used to attenuate runoff from works areas of the site of the Proposed Development during the construction phase and will remain in place to handle runoff from roads and hardstanding areas of the Proposed Development during the operational phase. The purpose of the stilling ponds is to intercept runoff potentially laden with sediment and to reduce the amount of sediment leaving the disturbed area by reducing runoff velocity. Reducing runoff velocity will allow larger particles to settle out in the stilling ponds, before the run-off water is redistributed as diffuse sheet flow in filter strips downgradient of any works areas.		
MM40	CEMP Section 4	Baseline laboratory analysis of a range of parameters with relevant regulatory limits and EQSs will be undertaken as per water monitoring programme for the Proposed Development. This will not be restricted to just these locations around the Proposed Development site with further sampling points added as deemed necessary by the ECoW in consultation with the Project Hydrologist and Site Manager.		
MM41	EIAR Section 4, 8. NIS Section 5	- Off-site refuelling will occur at a controlled fuelling station where possible. - On-site refuelling will be carried out using a mobile double skinned, bunded fuel bowser. The fuel bowser will be re-filled off site and will be towed around the site by a 4x4 jeep to where machinery is located. The 4x4 jeep will also carry fuel absorbent material and pads in the event of any accidental spillages. The		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
		fuel bowser will be parked on a level area in the construction when not in use. Refuelling operations will be carried out only by designated trained and competent operatives. Mobile anti-pollution measures such as drip trays and fuel absorbent mats will be used during all refuelling operations. › Fuels stored on site will be minimised. Storage areas where required will be bunded appropriately for the fuel storage volume for the time period of the construction and fitted with a storm drainage system and an appropriate oil interceptor; › The plant used during construction will be regularly inspected for leaks and fitness for purpose; An emergency plan for the construction phase to deal with accidental spillages is contained within Section 5.1.6 of this CEMP.		
MM42	EIAR Section 4	Silt fences will be installed as single, double or a series of triple silt fences, depending on the space available and the anticipated sediment loading. The silt fence designs follow the technical guidance document '*Control of Water Pollution from Linear Construction Projects'* published by Construction Industry Research and Information Association (CIRIA, No. C648, 1996). Up to three silt fences may be deployed in series. All silt fencing will be formed using Terrastop Premium or equivalent silt fence product. Silt fences will be inspected regularly to ensure water is continuing to flow through the fabric, and the fence is not coming under strain from water backing up behind it.		
MM43	EIAR Section 8 CEMP Section 4	During the construction phase field testing and laboratory analysis of a range of parameters with relevant regulatory limits and EQSs will be undertaken for each primary watercourse, and specifically following heavy rainfall events. See section 4.2.2.4 above		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
MM44	EIAR Section 8	Mitigation measures which will reduce the risk of entrainment of suspended solids and nutrient release in surface watercourses comprise best practice methods, which are outlined in section 8.5.2.1 in the EIAR, include using suitable machinery, 50 metre buffer zones, sediment and silt traps downstream of felling areas, use of brash mats, working during periods of low rainfall and ensuring that refuelling occurs more than 100 metres away from watercourses:		
MM45	EIAR Section 4	Piped slope drains will be used to convey surface runoff from diversion drains safely down slopes to flat areas without causing erosion. Once the runoff reaches the flat areas it will be reconverted to diffuse sheet flow. Level spreaders will only be established on slopes of less than 6% in grade. Piped slope drains will be used to transfer water away from areas where slopes are too steep to use level spreaders. The piped slope drains will be semi-rigid corrugated pipes with a stabilised entrance and a rock apron at the outlet to trap sediment and dissipate the energy of the water. The base of drains leading into the top of the piped slope drain will be compacted and concavely formed to channel the water into the corrugated pipe. The entrance at the top of the pipe will be stabilised with sandbags if necessary. The pipe will be anchored in place by staking at approximately 3-4 metre intervals or by weighing down with compacted soil. The bottom of the pipe will be placed on a slope with a grade of less than 1% for a length of 1.5 metres, before outflowing onto a rock apron. Piped drains will be inspected weekly and following rainfall events. Inlet and outlets will be checked for sediment accumulation and blockage.		
MM46	EIAR Section 4 CEMP Section 3	The effectiveness of drainage measures designed to minimise runoff entering works areas and capture and treat silt-laden water from the works areas, will be monitored continuously by the ECoW or supervising hydrologist on-site. See section 3.2.4.6 above for more details		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
	NIS Section 5			
MM47	EIAR Section 4	A "siltbuster" or similar equivalent piece of equipment will be available to filter any water pumped out of excavation areas if necessary, prior to its discharge to stilling ponds or swales.		
MM48	EIAR Section 8	The mitigation measures proposed for the completion of Proposed Development culvert upgrades are outlined in section 8.5.2.8 and include no instream excavation works, incorporating guidance proposed by OPW and Inland Fisheries Ireland such as conducting such works between May and September and installing double row silt fencing downstream of works areas when necessary. The following mitigation in particular will be undertaken along off-road sections of the 33kV and 110kV underground cabling routes where the cabling and proposed access roads will cross open watercourses including the use of bog mats, a 10 metre vegetative buffer (if present), double silt fencing upslope of the buffer, clay bunds within the trenching backfill to prevent ingress of water and ensuring that disturbance of bankside soils and watercourse sediments are kept to a minimum. Mitigation Measures relating to the use of a mixture of a natural, inert and fully biodegradable drilling fluid such as Clear Bore™ and water for directional drilling include: › The area around the Clear Bore™ batching, pumping and recycling plants will be bunded using terram and sandbags in order to contain any spillages; › One or more lines of silt fences will be placed between the works area and adjacent rivers and streams on both banks; › Accidental spillage of fluids will be cleaned up immediately and transported off site for disposal at a licensed facility; and, › Adequately sized skips will be used for temporary storage of drilling arisings during directional drilling works.		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
MM49	EIAR Section 4	Sediment that is removed from settlement ponds, check dams, silt bags etc. as part of routine maintenance will be carefully disposed of away from all aquatic zones or will be transported off-site for disposal		
MM50	EIAR Section 8	Ground works excavations may lead to seepage of groundwater or surface water. Mitigation measures that will be taken to deal with this are outlined in section 8.5.2.4 of the EIAR and these include appropriate interceptor drainage, to prevent upslope surface runoff from entering excavations, pumping of excavation inflows into sediment ponds adjacent to excavations and daily monitoring of excavations by the ECoW during the construction phase. If high levels of seepage inflow occur, excavation work will immediately be stopped and a geotechnical assessment undertaken;		
Felling				
MM51	EIAR Section 4	Felling will be carried out under the terms of a licence application to the Forest Service, as per the Forest Service's policy on granting felling licenses for wind farm developments.		
MM52	EIAR Section 8	Silt traps will be strategically placed down-gradient within forestry drains near streams. The main purpose of the silt traps and drain blocking is to slow water flow, increase residence time, and allow settling of silt in a controlled manner		
MM53	EIAR Section 8	The following items, will be carried out during pre-felling inspections and after: - Communication with tree felling operatives in advance to determine whether any areas have been reported where there is unusual water logging or bogging of machines; - Inspection of all areas reported as having unusual ground conditions; - Inspection of main drainage ditches and outfalls. During pre-felling inspections, the main drainage ditches will be identified.		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
		Ideally the pre-felling inspection will be carried out during rainfall; - Following tree felling all main drains will be inspected to ensure that they are functioning; - Extraction tracks within 10m of drains will be broken up and diversion channels created to ensure that water in the tracks spreads out over the adjoining ground; - Culverts on drains exiting the site, if impeded by silt or debris, will be unblocked; and, - All accumulated silt will be removed from drains and culverts, and silt traps, and this removed material will be deposited away from watercourses to ensure that it will not be carried back into the trap or stream during subsequent rainfall		
MM54	EIAR Section 8	Sampling will be completed before, during (if the operation is conducted over a protracted time) and after the felling activity. The 'before' sampling will be conducted within 4 weeks of the felling activity commencing, preferably in medium to high water flow conditions. The "during" sampling will be undertaken once a week or after rainfall events. The 'after' sampling will comprise as many samplings as necessary to demonstrate that water quality has not been impacted by the felling activity. - Avoid man-made ditches and drains, or watercourses that do not have year round flows - Select sampling points upstream and downstream of the forestry activities; - It is advantageous if the upstream location is outside/above the forest in order to evaluate the impact of land-uses other than forestry; - Downstream locations will be selected: one immediately below the forestry activity, the second at exit from the forest, and the third some distance from the second (this allows demonstration of		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
		no impact through dilution effect or contamination by other land-uses) - The above sampling strategy will be undertaken for all on-site sub-catchments streams where tree felling is proposed Also, daily surface water monitoring forms will also be utilised at every works site near any watercourse. These will be taken daily and kept on site for record and inspection		
Peat, Subsoils and Bedrock				
MM55	EIAR Section 8	The works programme for the entire construction stage of the development will also take account of weather forecasts, and predicted rainfall in particular. Large excavations and movements of soil/subsoil or vegetation stripping will be suspended or scaled back if heavy rain is forecast. The extent to which works will be scaled back or suspended will relate directly to the amount of rainfall forecast.		
MM56	EIAR Section 7	A Peat Management Plan has been prepared for the development which details management of peat during construction works and long-term storage thereafter. Peat removed during the excavation works will be deposited in the proposed on-site borrow pits and also used for landscaping around the site. Drainage and erosion prevention measures will be put in place at the peat storage areas		
MM57	EIAR Section 4	Mitigation proposed for the completion of peat and subsoil extraction on the Proposed Development site is included in the Risk Assessments for the Proposed Development (FT, July 2022). The measures outlined involve: - Placement of infrastructure in areas with shallower peat; - Localising the peat and subsoil which will be removed during the construction phase to the infrastructure location; - Avoiding sensitive habitats within the application area as much as possible;		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
		- Reusing excavated peat and soil from the site for landscaping; - Construction of settlement pond bunds with excess material from the settlement pond construction - Reinstating peat removed from the development locations and access roads within the Proposed Development site; - Re-seeding and spreading/planting will also be carried out in the peat storage areas.		
MM58	EIAR Section 7	Incorporate lessons learned from previous known peat slide events. These lessons show for example that it is important that the existing site drainage is maintained. The following control measures incorporated into the construction phase of the project are expanded on in the Risk Assessments for the Proposed Development (FT, July 2022) and they include the appointment of experienced and competent contractors, allocating sufficient time for the project, prevent undercutting of slopes and unsupported excavations, maintain a managed robust drainage system, prevent placement of loads/overburden on marginal ground, set up and maintain monitoring systems, ensure construction method statements are developed and agreed before commencement of construction and revise the Construction Risk Register as construction progresses;		
Biodiversity				
MM59	EIAR Section 6	Areas of partially degraded and cut over Upland blanket bog (PB2)/ Wet heath (HH3) habitat will be disturbed during the laying of the 110kV cabling. The 110kV cable will be located immediately adjacent to an existing track and will follow disturbed ground along its edge and will closely follow degraded habitats that lie adjacent to the existing cable and the degraded peatland that surrounds it. Whilst no significant habitat loss or deterioration is predicted, the following mitigation will be employed to minimise the impact of the proposed works in peatland habitats:		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
		- Temporary fences will be erected surrounding the proposed works area to prevent encroachment outside this area. - An existing track and the route of the existing cable that lies adjacent to the proposed cabling will be used as part of the working area in order to minimise impacts on the surrounding peatlands. - Suitable machinery will be used and will be operated adjacent to the cabling trench and existing track. - At the outset, the turves with their existing vegetation will be stripped and stored the right way up on the adjacent track and disturbed habitat. - The cable will be laid as per the methodology set out in Chapter 4 of this EIAR, Description. - The turves will be replaced on top of the newly installed cabling and the temporary fence removed.		
MM60	EIAR Section 6	Whilst no significant effects on bird species are anticipated, in order to minimise any effect all felling and cutting of woody vegetation will take place in strict accordance with Section 40 of the Wildlife Acts, which refers to the protection of wild birds. Additionally, a pre-commencement ecological walkover of the site will be undertaken to determine if any protected faunal species have moved into the site in the intervening period between the submission of the EIAR and the commencement of construction. Should any such species be present at that stage, they will be treated in accordance with the relevant guidelines and legislation (e.g. the Wildlife Acts and the NRA Guidance		
MM61	EIAR Section 6	The welfare of Otters will be ensured primarily through the provision of continued safe access for Otters along the river corridor. Adequate provision for Otters at the River crossing is required to allow the species to retain continued access to their foraging areas.		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
MM62	CEMP Section 3	The measures proposed to establish good site hygiene in the event of discovering invasive species and to ensure the control of any potential spread of them during construction works are outlined in section 3.12.2 above and include erecting fences around infested areas, marking and isolating stockpiles of material and the use of a designated wash down area to contain contaminated material.		
Noise				
MM63	EIAR Section 10	Measures to control noise levels associated with the works include: - Limiting the hours during which site activities likely to create high levels of noise or vibration are permitted; - Establishing channels of communication between the contractor/developer, Local Authority and residents; - Appointing a site representative responsible for matters relating to noise and vibration; - Monitoring typical levels of noise and vibration during critical periods and at sensitive locations; and - Keeping the surface of the site access roads even to mitigate the potential for vibration from lorries. Furthermore, a variety of practicable noise control measures will be employed. These include: - Selection of plant with low inherent potential for generation of noise and/ or vibration; - Placing of noisy / vibratory plant as far away from sensitive properties as permitted by site constraints.		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
MM64	EIAR Section 10	The most appropriate method used to minimise effects of blasting shall be identified by the engineers responsible for the blasting and may consist of some or all the following: - Restriction of hours within which blasting can be conducted. - A publicity campaign undertaken before any work and blasting starts (e.g., 48 hours written notification) to all properties within 1km of the proposed blast location. - The firing of blasts at similar times to reduce the 'startle' effect. - On-going circulars informing people of the progress of the works. - The implementation of an onsite documented complaints procedure. - The use of independent monitoring by external bodies for verification of results. - Trial blasts in less sensitive areas to assist in blast designs and identify potential zones of influence.		
MM65	EIAR Section 10 CEMP Section 3	Plant will be selected taking account of the characteristics of noise emissions from each item. The timing of on- and off-site movements of plant near occupied properties will be controlled. Plant machinery will be turned off when not in use and all plant and equipment for use will comply with the Construction Plant and Equipment Permissible Noise Levels Regulations (SI 359/1996).		
MM66	EIAR Section 5 & 10 CEMP Section 3	The operation of plant and machinery, including construction vehicles, is a source of potential impact that will require mitigation at all locations within the site. Proposed measures to control noise are outlined in section 3.11 above and include limiting the hours of construction, turning off vehicles and machinery when not in use, fitting and using silencers on vehicle exhausts and maintaining the haul route. Measures will also be implemented in relation to rock breaking:		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
MM67	EIAR Section 10	All construction operations shall comply with guidelines set out in British Standard documents British Standard 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Noise.		
Air Quality and Dust				
MM68	EIAR Section 4, 5 & 10 CEMP Section 3	Measures to control dust levels associated with the works and activities that could potentially impact on air quality include: - Truck wheels will be washed to remove mud and dirt before leaving the site where appropriate. - All plant and materials vehicles shall be stored in the dedicated compound area. - Areas of excavation will be kept to a minimum, and stockpiling will be minimised by coordinating excavation, spreading and compaction. - Construction traffic will be restricted to defined routes and a speed limit will be implemented. - Water misting or bowsers will operate on-site as required to mitigate dust in dry weather conditions.		
MM69	EIAR Section 10	All construction machinery will be maintained in good operational order while on-site, minimising any emissions that are likely to arise.		
MM70	EIAR Section 10	In periods of extended dry weather, dust suppression may be necessary along haul roads and around the overburden storage areas to ensure dust does not cause a nuisance. If necessary, water will be taken from settlement ponds in the site's drainage system and will be pumped into a bowser or water spreader to dampen down haul roads and site compounds to prevent the generation of dust. Silty or oily water will not be used for dust suppression, because this would transfer the pollutants to the haul roads and generate polluted runoff or more dust. Water		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
		bowser movements will be carefully monitored, as the application of too much water may lead to increased runoff.		
Landscape and Visual				
MM71	EIAR Section 12	The following measures have been included in the project design in order to avoid or reduce direct effects on habitats: • In all circumstances, excavation depths and volumes will be minimised, and excavated material will be re-used where possible. • Where the borrow pits are constructed, subsoil excavated from the site should be piled on site and re-used after construction works. Should any medium planting be removed, it should be replaced with the same or similar species whenever it is not possible to salvage and reinstate. • Where the cable trench is to be located in vehicular track's verge, subsoil should be piled on site and re-used after cabling works. Should any medium planting be removed, it should be replaced with the same or similar species whenever it is not possible to salvage and reinstate. • If required, new topsoil should be provided should the existing topsoil not be of sufficient standard (to comply with BS 3882:2015). • Any areas of bare soil remaining after the landscaping phase will be reinstated by natural revegetation. • Poor drainage on site to be considered when excavating ditches for cabling works.		
Traffic				

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
MM72	EIAR Section 5	A Traffic Management Plan will be developed and implemented to ensure any impact is short term in duration and slight in significance during the construction of the Proposed Development. Prior to commencement of any works, the occupants of dwellings in the vicinity of the proposed works will be contacted and the scheduling of works will be made clear A programme of deliveries will be submitted to Cork and Kerry County Councils in advance of deliveries of oversized component loads to site. Aggregate materials for the construction phase will be obtained from onsite borrow pits. This will significantly reduce the number of delivery vehicles required to access the site.		
MM73	EIAR Section 13	Selection of the most appropriate delivery route to transport development components and material supplies, requiring the minimum remedial works to accommodate the vehicles. Construction traffic will need to adhere to the agreed upon routes		
Cultural Heritage				
MM74	EIAR Section 11	One recorded monument KE076-086— Fulacht Fia is located in the vicinity of the southern end of the proposed TDR and associated works. It is located c. 77m to the east of the proposed temporary access road and 210m west-north-west of the proposed temporary hardstand area at the south end of the TDR › Archaeological monitoring of ground works of the temporary access road during the construction stage of the development. A report on the results of the monitoring shall be compiled and submitted to the relevant authorities on completion of the project.		
MM75	EIAR Section 11	Three standing stones (St st 3, 4 and 5) are located c. 15m-17m to the north-west of the proposed 33kV underground grid connection cable route which extends along an existing track. The stones were noted during a previous archaeological walk-over survey of the Permitted Development (Ref. No. 19/4972		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
		- A 10m buffer zone should be established around the stones prior to the commencement of development. The buffer shall comprise durable temporary fencing with 'Keep Out' signage and should be maintained for the duration of the construction stage of the project. - Archaeological monitoring of ground works associated with the 33kV underground grid connection route where it extends past the standing stones. A report on the results of the monitoring shall be compiled and submitted to the relevant authorities on completion of the project		
Operational Phase				
MM76	EIAR Section 4 CEMP Section 2	The removal and disposal of wastewater from the Electrical Substation will be carried out by a fully permitted waste collector holding valid Waste Collection Permits as issued under the Waste Management (Collection Permit) Regulations, 2007.		
MM77	EIAR Section 4 & 8 CEMP Section 3	The electrical substation will be bunded appropriately to 110% of the volume of oils that will be stored, and to prevent leakage of any associated chemicals to groundwater or surface water. The bunded area will be fitted with a storm drainage system and an appropriate oil interceptor;		
MM78	EIAR Section 5	Staff associated with the Proposed Development will conduct frequent visits, which will include inspections to establish whether any signs have been defaced, removed, or are becoming hidden by vegetation or foliage, with prompt action taken as necessary.		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
		Signs will also be erected at suitable locations across the site as required for the ease and safety of operation of the development. These signs include: - Buried cable route markers; - "No access to Unauthorised Personnel" at appropriate locations; - Speed limits signs at site entrance and junctions; - "Warning these Premises are alarmed" at appropriate locations; - "Danger HV" at appropriate locations; - "Warning – Keep clear of structures during electrical storms, high winds or ice conditions" at site entrance; - "No unauthorised vehicles beyond this point" at specific site entrances; and - Other operational signage required as per site-specific hazards.		
MM79	EIAR Section 5	An operational phase Health and Safety Plan will be developed to fully address identified Health and Safety issues associated with the operation of the site and providing for access for emergency services at all times.		
MM80	EIAR Section 8 CEMP Section 3	The operational phase drainage system of the Proposed Development will be installed and constructed in conjunction with the site construction works as outlined in sections 3.2.4.2 and 3.2.4.3 above. This will include check dams, swales, interceptor drains and settlement ponds. The drainage system will be monitored in the operational phase until such a time that all areas that have been reinstated become re-vegetated and the natural drainage regime has been restored		
MM81	EIAR Section 4	Drainage swales and silting ponds will remain in place to collect runoff from roads and hardstanding areas of the Proposed Development during the operational phase		
MM82	EIAR Section 4	The frequency of drainage system inspections will be reduced following completion of the construction phase of the Proposed Development. The project hydrologist		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
	CEMP Section 3	will inspect and review the drainage system after construction has been completed to provide guidance on the requirements of an operational phase drainage system.		
MM83	CEMP Section 4	Monthly sampling for laboratory analysis for a range of parameters adopted during pre-commencement and construction phases will continue for six months after construction, in particular after large excavation and heavy civils works. The Project Hydrologist will monitor and advise on the readings being received from the testing laboratory		
MM84	EIAR Section 9	• Any vehicles or plant brought onsite during the operational phase will be maintained in good operational order that comply with the Road Traffic Acts 1961 as amended, thereby minimising any emissions that arise. • When stationary, vehicles will be required to turn off engines.		
MM85	EIAR Section 7	Aggregate from authorised quarries to be used in road and hardstand maintenance		
Decommissioning Phase				
MM86	EIAR Section 4	Prior to the end of the operational period the Decommissioning Plan will be updated in line with decommissioning methodologies that may exist at the time and will agreed with the competent authority at that time.		EIAR Section 4
MM87	DP Section 3	Prior to decommissioning, a suitably qualified ecologist will complete an invasive species survey of the proposed decommissioning works area. Any invasive species discovered will be dealt with in accordance with the invasive species management plan		DP Section 3
MM88	EIAR Section 4 DP Section 3	The effectiveness of drainage measures in the natural drainage regime that will have resumed by the time of decommissioning will be monitored continuously by the ECoW or supervising hydrologist on-site. The ECoW or supervising hydrologist will respond to changing weather, ground or drainage conditions on the ground as the		EIAR Section 4 DP Section 3

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
	NIS Section 5	project proceeds, to ensure the effectiveness of the drainage design is maintained in so far as is possible. This may require the installation of additional check dams, interceptor drains or swales as deemed necessary on-site.		NIS Section 6
MM89	EIAR Section 4 DP Section 3	The mitigation measures proposed to avoid release of hydrocarbons at the site during the decommissioning phase are outlined in section 3.2 of the decommissioning plan and include refuelling vehicles offsite whenever possible, regularly inspecting plant and machinery for leaks, allowing only designated personnel to carry out refuelling and minimising fuel volumes onsite A programme for the regular inspection of plant and equipment for leaks and fitness for purpose will be developed at the outset of the decommissioning phase.		EIAR Section 4 DP Section 3
MM90	EIAR Section 13 DP Section 3	A Traffic Management Plan will be prepared in advance of any decommissioning works. The traffic management arrangements although similar to those that will be implemented for materials delivery as outlined in the EIAR will be agreed in advance of decommissioning with the competent authorities Kerry and Cork County Councils.		EIAR Section 13 DP Section 3

7. MONITORING PROPOSALS

All monitoring proposals relating to the pre-commencement, construction, operational and decommissioning phases of the Proposed Development are set out in the relevant chapters of the EIAR and NIS as part of the planning permission application to be submitted to KCC, CCC and An Bord Pleanála.

This section of the Construction and Environment Management Plan groups together all of the monitoring proposals presented in the EIAR and NIS. The monitoring proposals are presented in Table 7-1 below.

By presenting the monitoring proposals in the below format, it is intended to provide an easy to audit list that can be reviewed and reported on during the future phases of the project. The tabular format in which the below information is presented, can be further expanded upon during the course of future project phases to provide a reporting template for site compliance audits.

Table 7-1 Site Monitoring Measures

Ref. No.	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
		Pre-Commencement Phase			
MX1	EIAR Section 4 & 8	An inspection and maintenance plan for the on-site drainage system will be prepared in advance of commencement of any works.	Ongoing	Monthly	ECoW
MX2	CEMP Section 3	Prior to commencement of works in sub-catchments across the site main drain inspections will be competed to ensure ditches and streams are free from debris and blockages that may impede drainage.	As Required	Monthly	Project Hydrologist
MX3	EIAR Section 6	Pre-commencement ecological walkover of the site will be undertaken to determine if any protected faunal species have moved into the site in the intervening period between the submission of the EIAR and the commencement of construction.	Once	As required	Project Ecologist
MX4	EIAR Section 8	Sampling will be completed before, during (if the operation is conducted over a protracted time) and after the felling activity. The 'before' sampling will be conducted within 4 weeks of the felling activity commencing, preferably in medium to high water flow conditions. The "during" sampling will be undertaken once a week or after rainfall events. The 'after' sampling will comprise as many samplings as necessary to demonstrate that water quality has not been impacted by the felling activity.	As Required	Monthly	ECoW
MX5	EIAR Section 6 CEMP Section 3	A pre-commencement invasive species survey shall be completed for the site.	Once	As required	Project Ecologist

Ref. No.	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
Construction Phase					
MX6	EIAR Section 11	Archaeological monitoring of all ground works onsite in the area of any monuments will be undertaken at the construction phase of the development.	Once	As required	Project Archaeologist
MX7	EIAR Section 11	A highly visible buffer zone will be established around all areas containing monuments onsite.	Once	As required	Project Archaeologist
MX8	EIAR Section 4	Check dams will be inspected and maintained regularly to insure adequate performance. Maintenance checks will also ensure the centre elevation of the dam remains lower than the sides of the dam.	As Required	As Necessary	ECoW
MX9	CEMP Section 4	Daily general visual inspections of site operations and inspections of all watercourses within the site and in the surrounding area by the ECoW or a suitably qualified and competent person as delegated by the ECoW.	Weekly / As Required	As Necessary	ECoW
MX10	EIAR Section 4 CEMP Section 3	Inspections of the overburden storage areas will be made by a geotechnical engineer through regular monitoring of the works. The appointed contractor will review work practices at spoil deposition areas when periods of heavy rainfall are expected so as to prevent excessive dirty water runoff from being generated.	Weekly / Monthly	As Necessary	Contractor/ Geotechnical Engineer
MX11	EIAR Section 4 CEMP Section 3	The effectiveness of drainage measures designed to minimise runoff entering works areas and capture and treat silt-laden water from the works areas, will be monitored continuously by the ECoW or supervising hydrologist on-site. The ECoW or supervising hydrologist will respond to changing weather, ground or drainage conditions on the ground as the project proceeds, to ensure the effectiveness of the drainage design is maintained in so far as is	As Required	As Necessary	ECoW / Project Hydrologist

Ref. No.	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
		possible. This may require the installation of additional check dams, interceptor drains or swales as deemed necessary on-site.			
MX12	EIAR Section 8 CEMP Section 3	The plant used should be regularly inspected for leaks and fitness for purpose.	Before Use	As Necessary	Drivers / ECoW
MX13	EIAR Section 4	Regular inspections of all installed drainage systems will be undertaken, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water in parts of the systems where it is not intended.	Weekly/ Monthly	As Necessary	ECoW
MX14	EIAR Section 8 CEMP Section 4	Baseline laboratory analysis of a range of parameters with relevant regulatory limits and EQSs will be undertaken as per water monitoring programme for the Proposed Development. This will not be restricted to just these locations around the Proposed Development site with further sampling points added as deemed necessary by the ECoW in consultation with the Project Hydrologist and Site Manager In-situ field monitoring will be completed on a Monthly basis. In-situ field monitoring will also be completed after major rainfall events, i.e., after events of >25mm rainfall in any 24-hour period. The Project Hydrologist will monitor and advise on the readings collected by in-situ field monitoring.	Weekly, monthly and event based	As Necessary	ECoW / Project Hydrologist
MX15	CEMP Section 3	Training and supervision of drivers to ensure smooth machinery operation/driving, and to minimise unnecessary noise generation.	As Required	As Necessary	ECoW

Ref. No.	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
MX16	CEMP Section 3	A Project Ecologist will be appointed and will visit the site when requested to by the ECoW. The responsibilities and duties of the Project Ecologist are set out in section 4.1.4	As required	As required	Project Ecologist
Operational Phase					
MX17	EIAR Section 9	Any excess build-up of silt levels at dams, the settlement pond, or any other drainage features that may decrease the effectiveness of the drainage feature, will be removed. This will be part of the regular maintenance of the on-site drainage system.	As Required	Weekly	ECoW
Decommissioning Phases					
MX18	DP Section 3	Prior to decommissioning, a suitably qualified ecologist will complete an invasive species survey of the berms that will be temporarily removed during decommissioning at the delivery accommodation roadway and the junction upgrade adjacent and along the cable route to identify invasive species at joint bay locations where excavation to expose the cabling for removal will be required. Any invasive species discovered will be dealt with in accordance with the invasive species management plan.	As required	As required	Project Ecologist
MX19	DP Section 3	The Site Manager in consultation with the ECoW will be responsible for employing the services of a suitably qualified ecologist and any other suitably qualified professionals as required throughout the decommissioning works.	As required	As required	Site Manager
MX20	DP Section 3	The Site Manager and/or ECoW are the project focal point relating to decommissioning-related environmental issues and will maintain responsibility for monitoring the decommissioning works and Contractors/Sub-contractors from an environmental perspective	As required	As required	ECoW/ Site Manager

Ref. No.	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
MX21	EIAR Section 8	Regular inspections of all installed drainage systems will be undertaken, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water in parts of the systems where it is not intended	As Required	Weekly	ECoW
MX22	CEMP Section 3	Training and supervision of drivers to ensure smooth machinery operation/driving, and to minimise unnecessary noise generation during the decommissioning phase.	As Required	As Necessary	ECoW
MX23	CEMP Section 4	Daily general visual inspections of site operations and inspections of all watercourses within the site and in the surrounding area by the ECoW or a suitably qualified and competent person as delegated by the ECoW during the decommissioning phase.	Weekly / As Required	As Necessary	ECoW

8. PROGRAMME OF WORKS

The construction phase will take approximately 12 – 18 months to complete from starting on site to the commissioning of the electrical system and export of electricity from site.

The EIAR stipulated that in the interest of breeding birds, construction would not commence during the breeding bird season, which runs from March to August. The EIAR also stipulated that construction including the removal of conifers (forestry) by felling may commence at any stage from September onwards to the end of February thus avoiding the period from the 1st of March to the 31st of August inclusive, as prescribed in the Wildlife Acts, so that construction activities are ongoing by the time the next breeding bird season comes around and can continue throughout the next breeding season.

The phasing and scheduling of the main construction task items are outlined in Figure 8-1 below, where 1st January has been selected as an arbitrary start date for construction activities.

			Year 1				Year 2			
ID	**Task Name**	**Task Description**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**
1	Site Health and Safety									
2	Site Compounds	Site Compounds, site access								
3	Site Roads	Construction/upgrade of roads; install drainage measures & water protection measures								
4	Turbine Hardstands	Excavate bases, construct hardstanding areas								
5	Turbine Foundations	Fix reinforcing steel and anchorage system, erect shuttering, concrete pour								
6	Substation Construction and Electrical Works	Construct substation, underground cabling between turbines								
7	Backfilling and Landscaping									
8	Turbine Delivery and Erection									
9	Substation Commissioning									
10	Turbine Commisioning									

Figure 8-1 Indicative Construction Schedule

9. COMPLIANCE AND REVIEW

9.1 Site Inspections and Environmental Audits

Routine inspections of construction activities will be carried out on a daily and weekly basis by the ECoW and the Construction Manager to ensure all controls to prevent environmental impacts, relevant to the construction activities taking place at the time, are in place.

Environmental inspections will ensure that the works are undertaken in compliance with this CEMP and all other planning application documents. Only suitably trained staff will undertake environmental site inspections.

9.2 Auditing

Environmental audits will be carried out during the construction phase of the project. In contrast to monitoring and inspection activities, audits are designed to shed light on the underlying causes of non-compliance and not merely detect the non-compliance itself. In addition, audits are the main means by which system and performance improvement opportunities may be identified. Environmental audits will be carried out by the ECoW on behalf of the Project Developer, in an impartial and objective manner. Environmental audits will be conducted at planned intervals to determine whether the CEMP is being properly implemented and maintained. The results of environmental audits will be provided to the Project Developer and project contractor.

9.3 Environmental Compliance

The following definitions shall apply in relation to the classification of Environmental Occurrences during construction of the proposed renewable energy development:

Environmental Near Miss: An occurrence which if not controlled or due to its nature could lead to an Environmental Incident.

Environmental Incident: Any occurrence which has potential, due to its scale and nature, to migrate from source and have an environmental impact beyond the site boundary.

Environmental Exceedance Event: An environmental exceedance event occurs when monitoring results indicate that limits for a particular environmental parameter (as indicated in the Environmental Monitoring Programme) has been exceeded.

An exceedance will immediately trigger an investigation into the reason for the exceedance occurring and the application of suitable mitigation where necessary.

Exceedance events can be closed out on achieving a monitoring result below the assigned limit for a particular environmental parameter.

Environmental Non-Compliance: Non-fulfilment of a requirement and includes any deviations from established procedures, programs and other arrangements related to the EMP.

9.4 Corrective Action Procedure

A corrective action is implemented to rectify an environmental problem on-site. Corrective actions will be implemented by the Construction Manager, as advised by the Site ECoW. Corrective actions may be required as a result of the following;

- Environmental Audits;
- Environmental Inspections and Reviews;
- Environmental Monitoring;
- Environmental Incidents; and,
- Environmental Complaints.

A Corrective Action Notice will be used to communicate the details of the action required to the main contractor. A Corrective Action Notice is a form that describes the cause and effect of an environmental problem on site and the recommended corrective action that is required. The Corrective Action Notice, when completed, will include details of close out and follow up actions.

If an environmental problem occurs on site that requires immediate attention direct communications between the Construction Manager and the ECoW will be conducted. This in turn will be passed down to the site staff involved. A Corrective Action Notice will be completed at a later date.

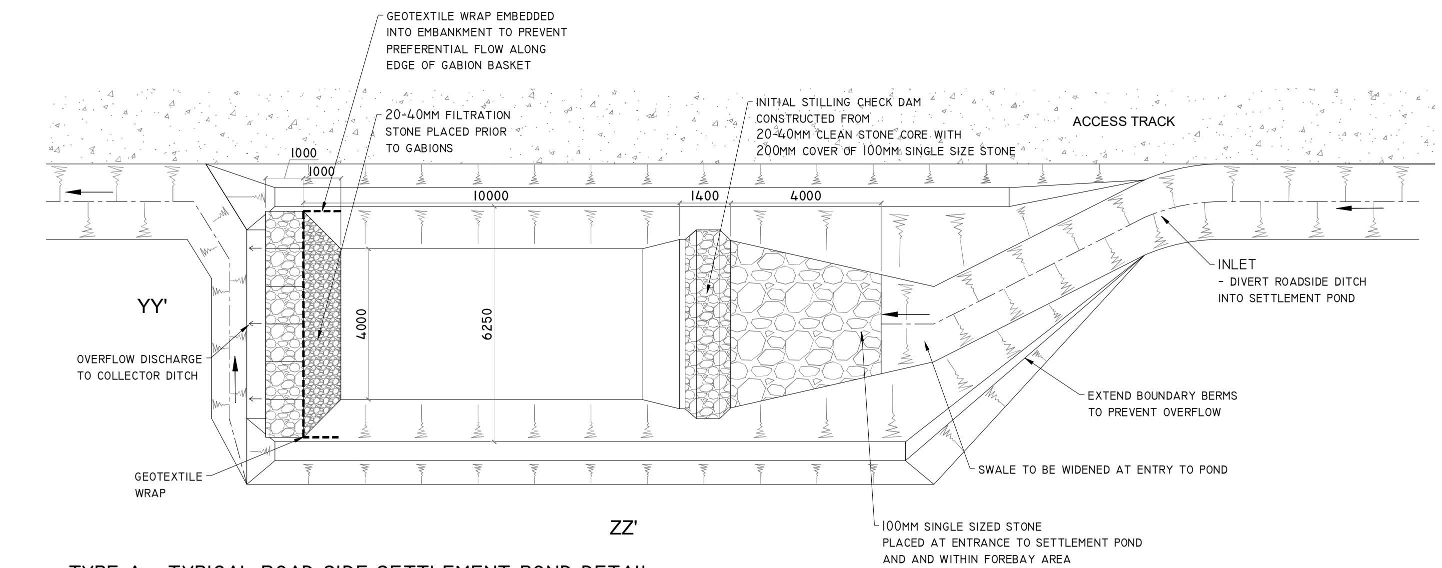
9.5 Construction Phase Review

The project contractor's CEMP will be the subject of review by the ECoW on behalf of the project developer whenever a revised version of the CEMP is presented for approval.

APPENDIX 4-4

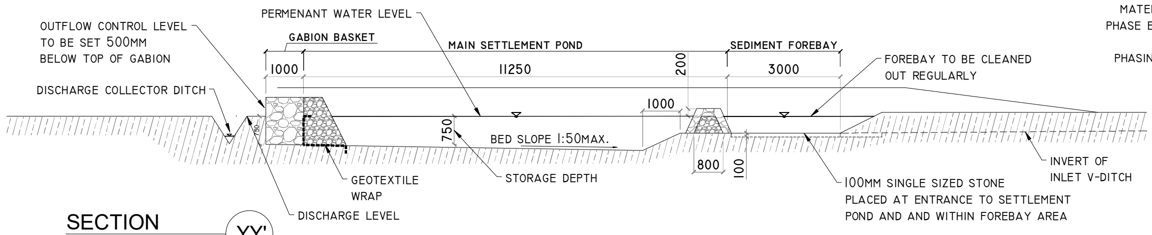
DRAINAGE DRAWINGS

DETAIL A1

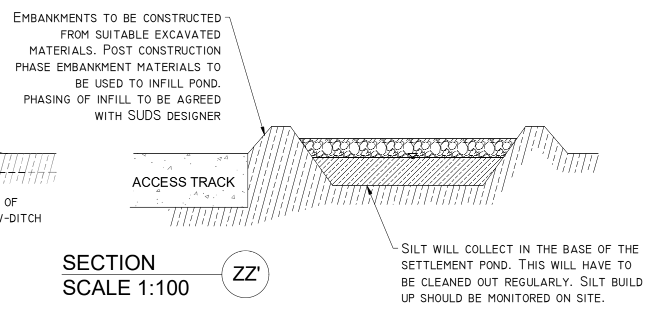


TYPE A - TYPICAL ROAD SIDE SETTLEMENT POND DETAIL
SCALE 1:200 (NOTE DIMENSIONS VARY DEPENDING ON CATCHMENT SIZE - SEE DRAINAGE SHEETS)

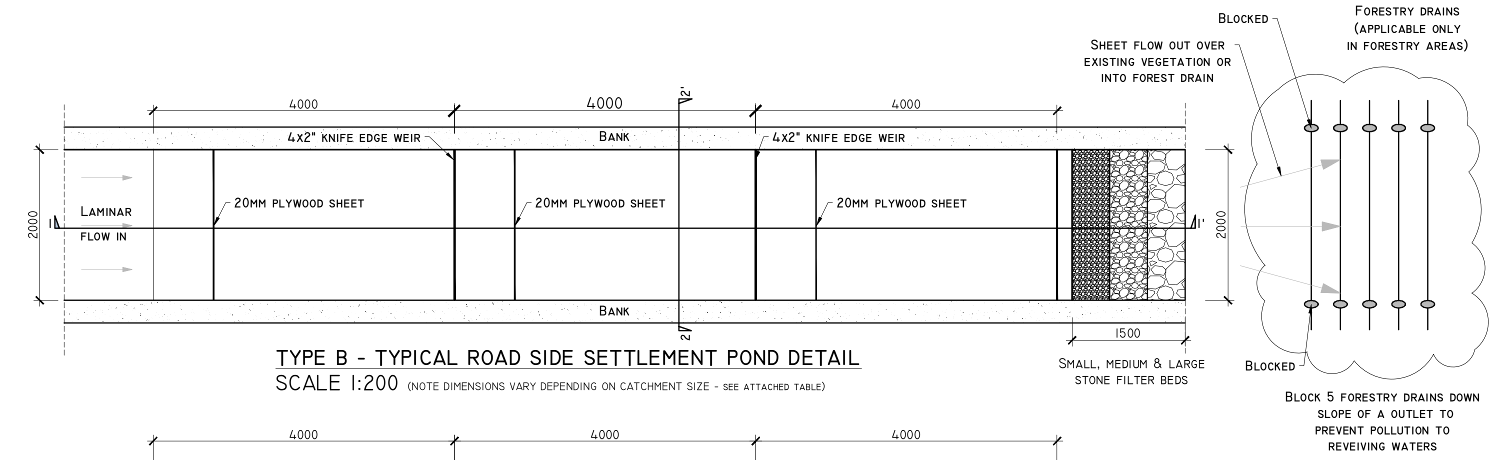
Pond Size W [m] x L [m] x D [m]			Catchment Size (m^2)		
Return Period	*50 yrs*	Storm Duration	500	1000	2000
6hr retention for coarse silt		6 hrs	2.8 x 9 x 1 m	4 x 13 x 1 m	5.7 x 18 x 1 m
11hr retention for medium silt		12 hrs	3.2 x 10 x 1 m	4.5 x 14 x 1 m	6.4 x 20 x 1 m
24hr retention for fine silt		24 hrs	3.5 x 11 x 1 m	5 x 16 x 1 m	7 x 22 x 1 m



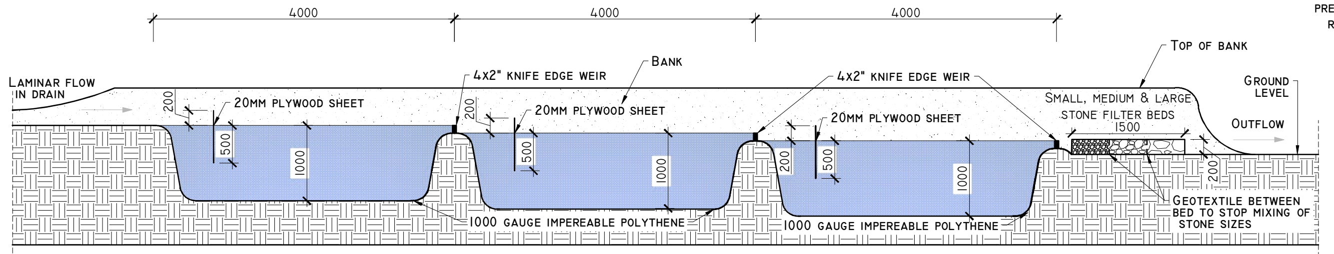
SECTION YY'
SCALE 1:100



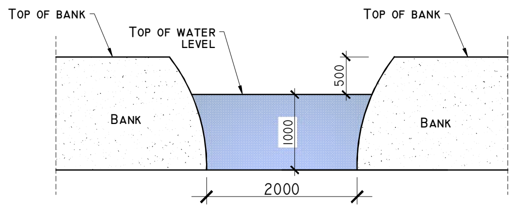
SECTION ZZ'
SCALE 1:100



TYPE B - TYPICAL ROAD SIDE SETTLEMENT POND DETAIL
SCALE 1:200 (NOTE DIMENSIONS VARY DEPENDING ON CATCHMENT SIZE - SEE ATTACHED TABLE)

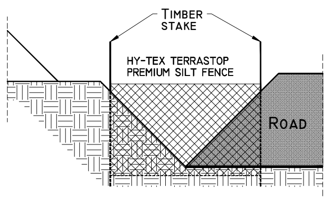


SECTION II'



SECTION 22'

SEDIMENT FENCE/CHECK DAM DETAIL



DETAIL A2

Project Design Drawing Notes
1. Drawings issued are for planning stage only.
2.
3. Do not scale off this drawing. Figured metric dimensions only should be taken off this drawing.

05/07/22	Planning	MG	MG
Date	Description	Chkd	Signed

Revisions

HYDRO ENVIRONMENTAL SERVICES
22 Lower Main St, Dungarvan, Co. Waterford, Ireland
tel: +353 (0) 58-44122
tel: +353 (0) 58-44244
email: info@hydroenvironmental.ie
web: www.hydroenvironmental.ie

Client: Kocknamork Ltd

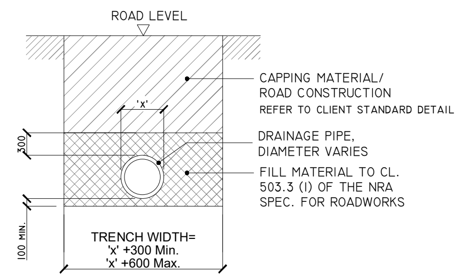
Job: Proposed Substation, Underground Cabling, Access Roads to Knocknamork Renewable Energy Development

Title: Drainage Details 1

Figure No: D501

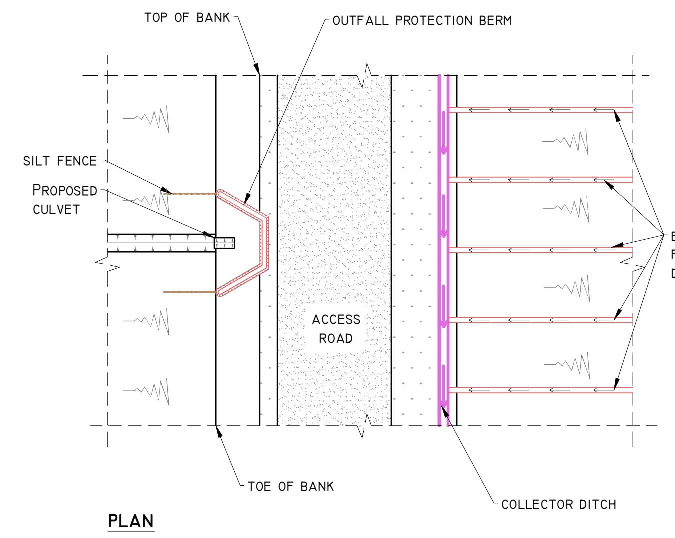
Drawing No: P1421-1-0722-A1-D501-00A	
Sheet Size: A1	Project No.: P1421-1
Scale: as shown (A1)	Drawn By: MG/GD
Date: 05/07/2022	Checked By: M.G.

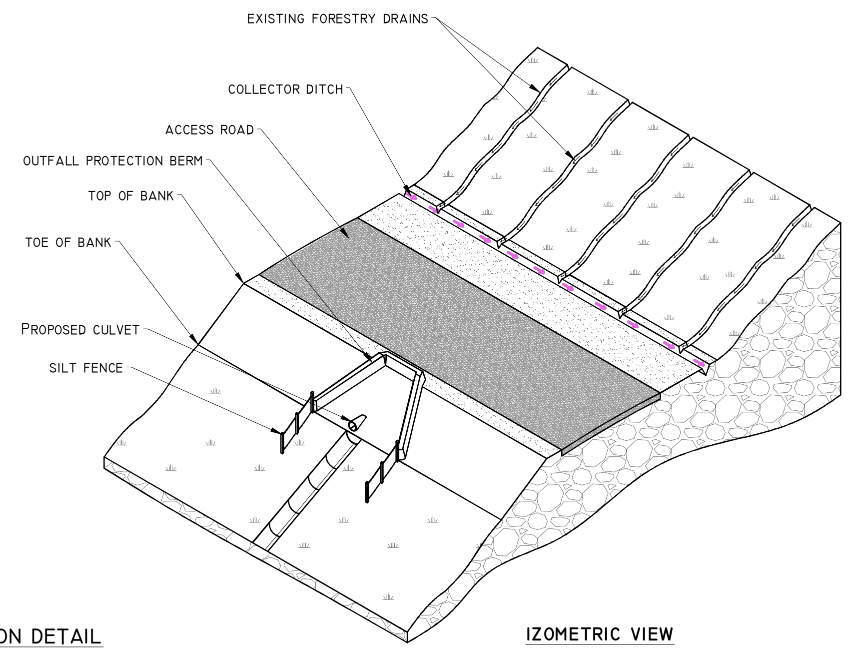
DETAIL B



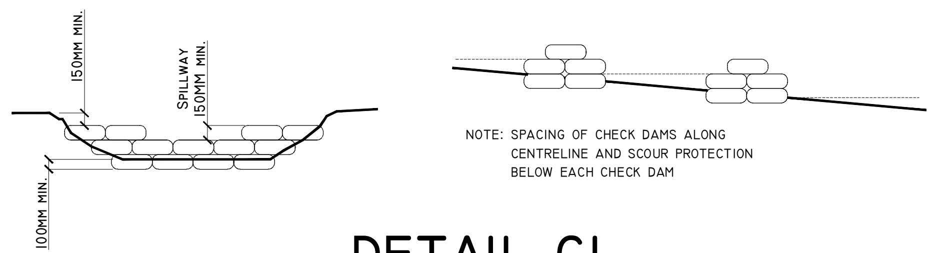
'TYPE B' CULVERT - DRAINAGE CROSSING BENEATH EXCAVATED ROAD
SCALE 1:50

DETAIL BI

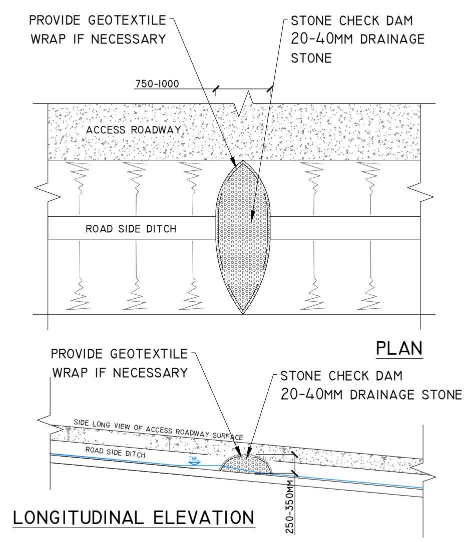




CULVET - OUTFALL PROTECTION DETAIL
SCHEMATIC - NOT TO SCALE

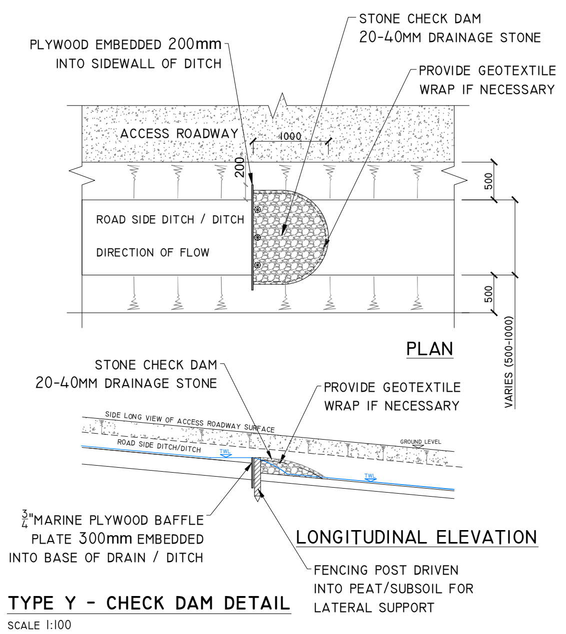


DETAIL C



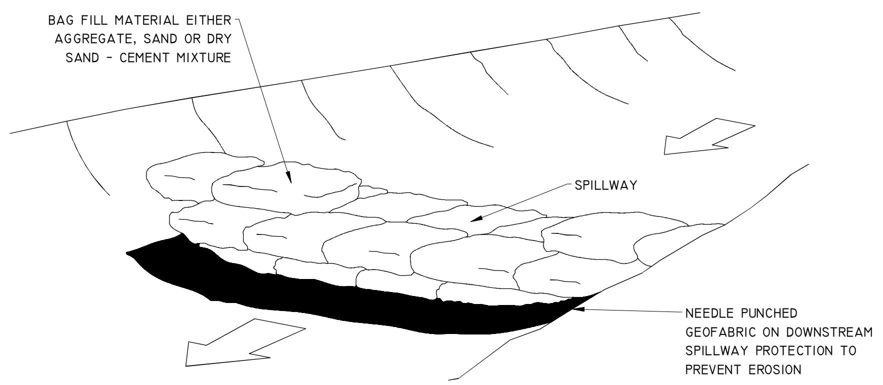
TYPE X - CHECK DAM DETAIL
SCALE 1:50

DETAIL D



TYPE Y - CHECK DAM DETAIL
SCALE 1:100

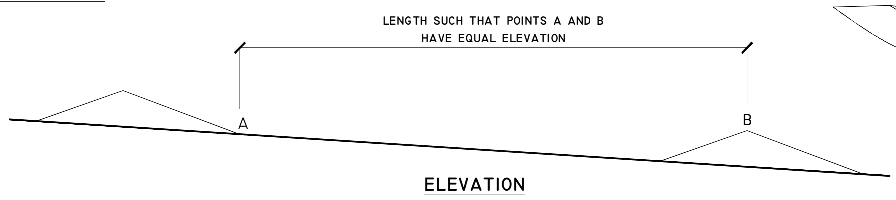
DETAIL CI

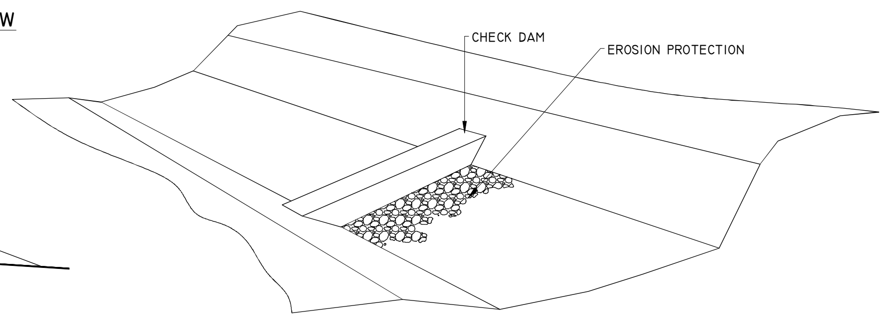


TEMPORARY CHECK DAM / SETTLEMENT POND OVERFLOW
SAND FILLED BAG CONSTRUCTION
SCHEMATIC - NOT TO SCALE

DETAIL C2

TEMPORARY CHECK DAM / SETTLEMENT POND OVERFLOW
SCHEMATIC - NOT TO SCALE





Date	Description	Chkd	Signed
05/07/22	Planning	MG	MG

Revisions

HYDRO ENVIRONMENTAL SERVICES
22 Lower Main St
Dungarvan
Co. Waterford
Ireland
tel: +353 (0) 58-44122
fax: +353 (0) 58-44244
email: info@hydroenvironmental.ie
web: www.hydroenvironmental.ie

Client: Kocknamork Ltd

Job: Proposed Substation, Underground Cabling, Access Roads to Knocknamork Renewable Energy Development

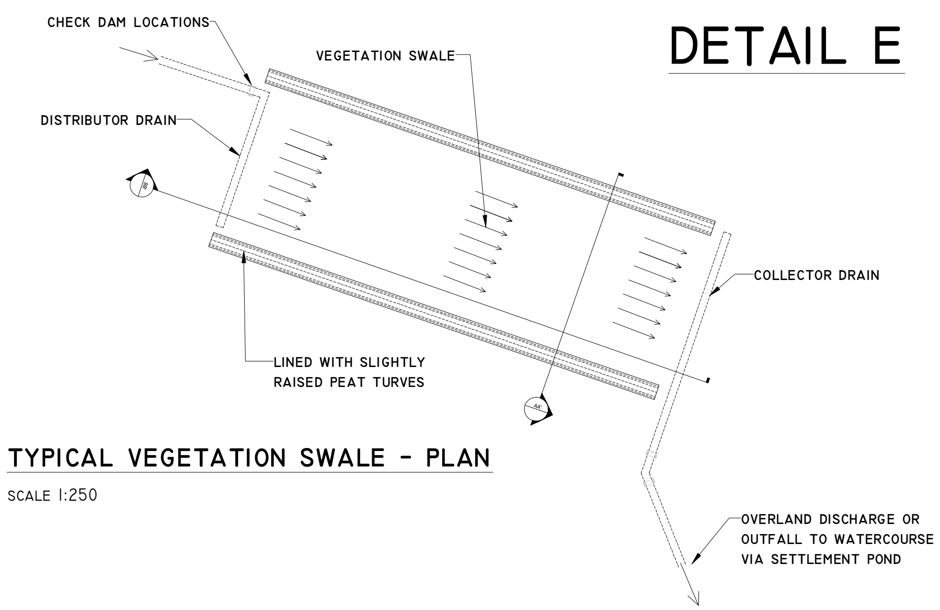
Title: Drainage Details 2

Figure No: D502

Drawing No: P1421-1-0722-A1-D502-00A

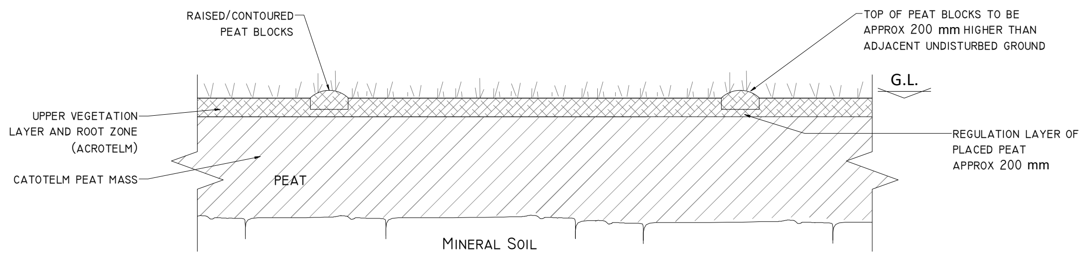
Sheet Size: A1	Project No.: P1421-1
Scale: as shown (A1)	Drawn By: MG/GD
Date: 05/07/2022	Checked By: M.G.

DETAIL E



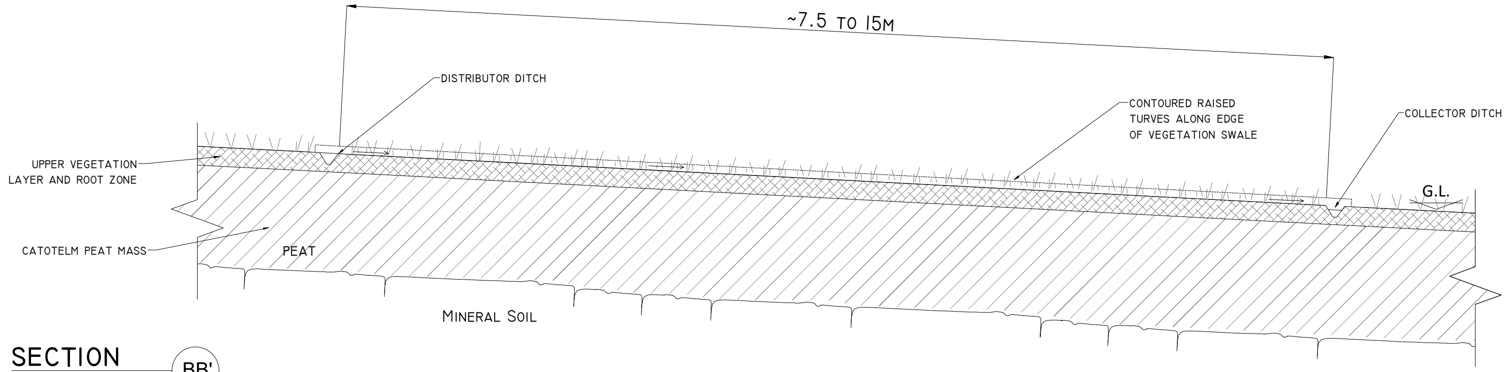
TYPICAL VEGETATION SWALE - PLAN

SCALE 1:250



SECTION AA'

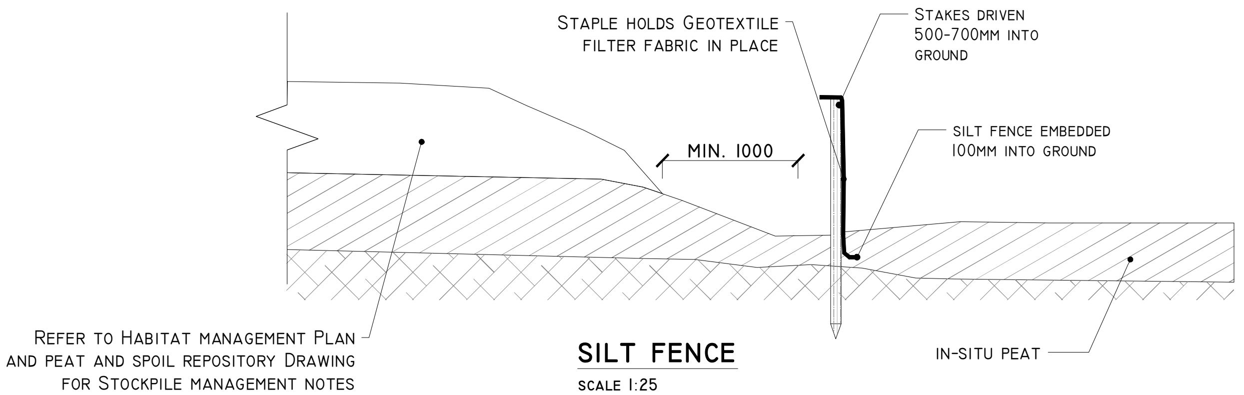
SCALE 1:200



SECTION BB'

SCALE 1:100

DETAIL F-I



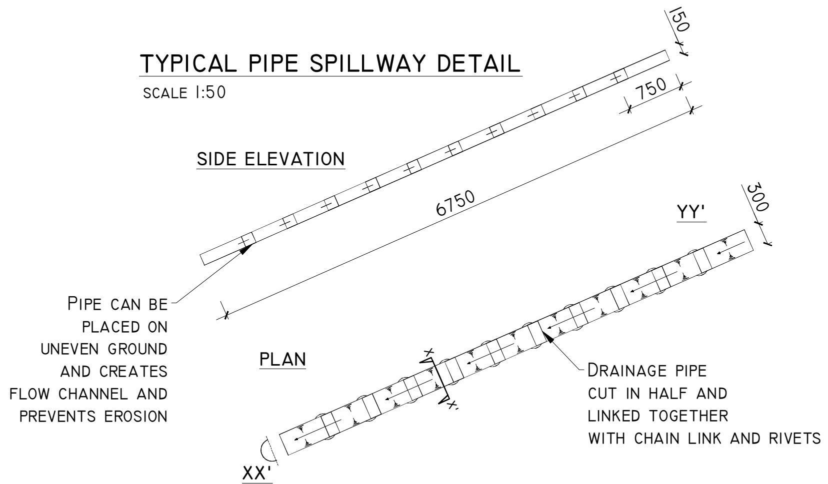
SILT FENCE

SCALE 1:25

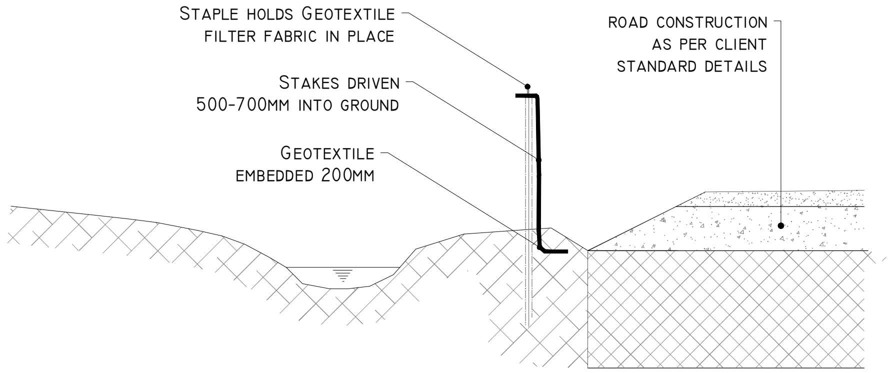
DETAIL G

TYPICAL PIPE SPILLWAY DETAIL

SCALE 1:50



DETAIL F-II

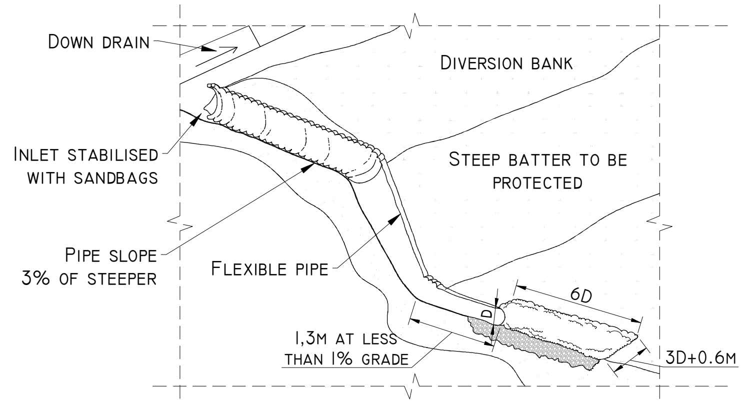


SILT FENCE FOR WATERCOURSE PROTECTION

SCALE 1:25

TYPICAL PIPE SPILLWAY DETAIL

SCHEMATIC - NOT TO SCALE



PROJECT DESIGN DRAWING NOTES

1. DRAWINGS ISSUED ARE FOR PLANNING STAGE ONLY.
2. COPYRIGHT, ALL RIGHTS RESERVED. NO PART HERE WITH MAY BE COPIED OR REPRODUCED PARTIALLY OR WHOLLY IN ANY FORM WHATSOEVER WITHOUT THE PRIOR NOTICE OF THE COPYRIGHT OWNER HYDRO-ENVIRONMENTAL SERVICES.
3. DO NOT SCALE OFF THIS DRAWING. FIGURED METRIC DIMENSIONS ONLY SHOULD BE TAKEN OFF THIS DRAWING.

Date	Description	Chkd	Signed
05/07/22	Planning	MG	MG

Revisions

HYDRO ENVIRONMENTAL SERVICES
22 Lower Main St, Dungarvan, Co. Waterford, Ireland
tel: +353 (0) 58-44122
fax: +353 (0) 58-44244
email: info@hydroenvironmental.ie
web: www.hydroenvironmental.ie

Client: KOCKNAMORK LTD

Job: PROPOSED SUBSTATION, UNDERGROUND CABLING, ACCESS ROADS TO KNOCKNAMORK RENEWABLE ENERGY DEVELOPMENT

Title: DRAINAGE DETAILS 3

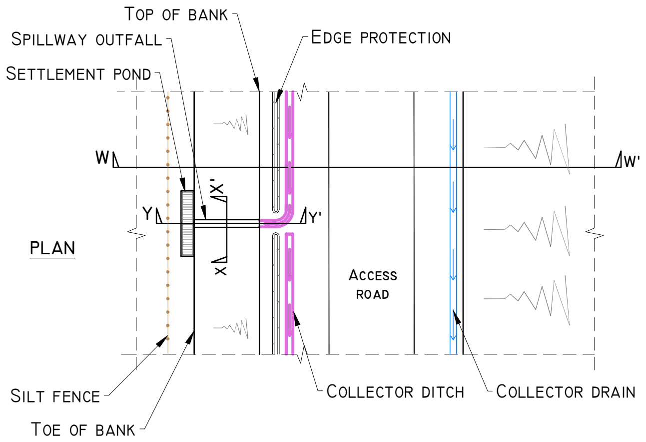
Figure No: D503

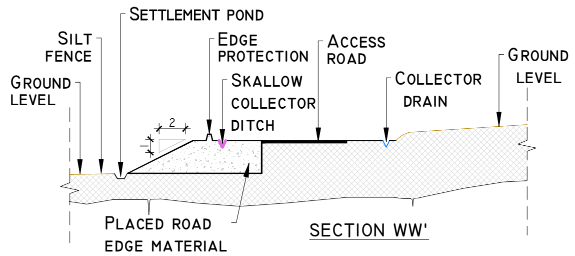
Drawing No: P1421-1-0722-A1-D503-00A

Sheet Size: A1	Project No.: P1421-1
Scale: as shown (A1)	Drawn By: MG/GD
Date: 05/07/2022	Checked By: M.G.

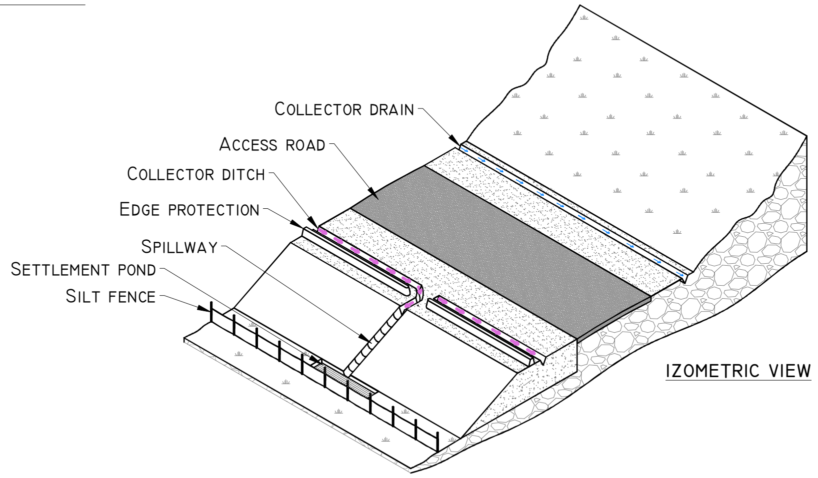
DETAIL H

PLAN





SECTION WW'



IZOMETRIC VIEW

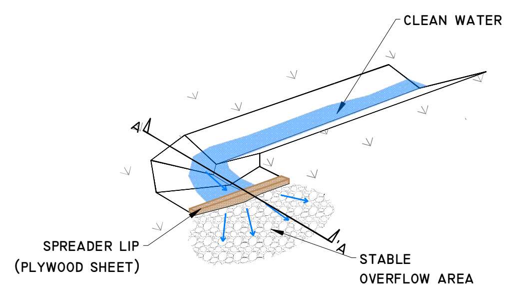
SPILLWAY OUTFALL PLAN

SCHEMATIC - NOT TO SCALE

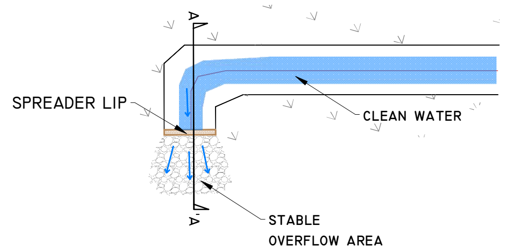
DETAIL J-1

LEVEL SPREADER DETAIL

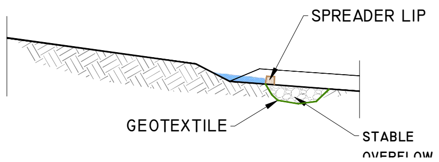
SCHEMATIC - NOT TO SCALE



PLAN



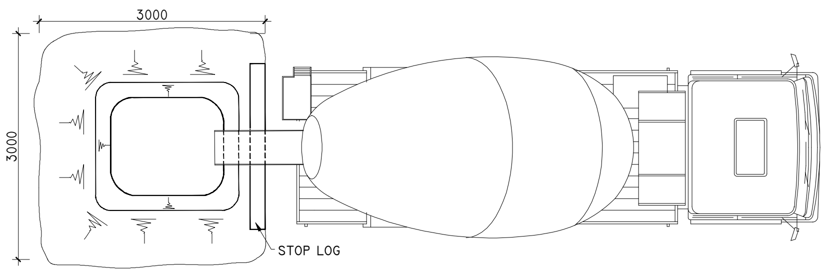
SECTION AA'



TEMPORARY CONCRETE WASH OUT PIT

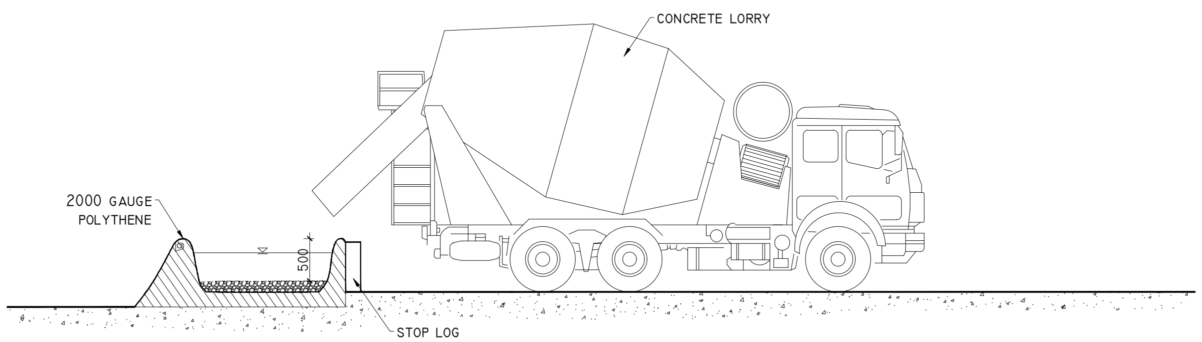
SCALE 1:50

PLAN



ELEVATION

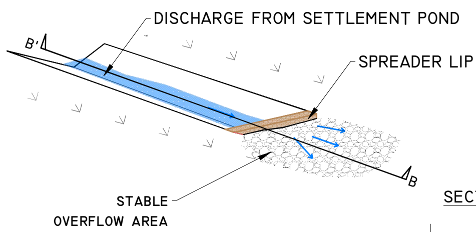
DETAIL I



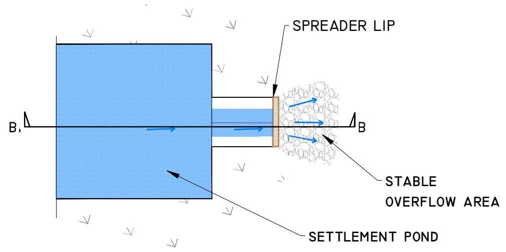
DETAIL J-2

LEVEL SPREADER DETAIL

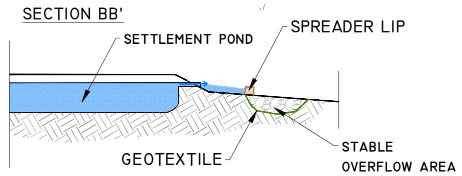
SCHEMATIC - NOT TO SCALE



PLAN



SECTION BB'



Project Design Drawing Notes

1. Drawings issued are for planning stage only.
2.
3. Do not scale off this drawing. Figured metric dimensions only should be taken off this drawing.

05/07/22	Planning	MG	MG
Date	Description	Chkd	Signed

Revisions

HYDRO ENVIRONMENTAL SERVICES

22 Lower Main St, Dungarvan, Co. Waterford, Ireland
tel: +353 (0) 58-44122
tel: +353 (0) 58-44244
email: info@hydroenvironmental.ie
web: www.hydroenvironmental.ie

Client: Kocknamork Ltd

Job: Proposed Substation, Underground Cabling, Access Roads to Knocknamork Renewable Energy Development

Title: Drainage Details 4

Figure No: D504

Drawing No: P1421-1-0722-A1-D504-00A	
Sheet Size: A1	Project No.: P1421-1
Scale: as shown (A1)	Drawn By: MG/GD
Date: 05/07/2022	Checked By: M.G.

POLLUTION PREVENTION NOTES:

1. Site management proposals are intended to ensure protection against surface water and groundwater pollution, siltation and erosion.
2. Suitable drainage control measures will be in place at all times to prevent conveyance of significant volumes of silt to off site receiving watercourses.
3. Silty water can arise from dewatering excavations, erosion of exposed/disturbed ground, temporary stockpiles, plant and wheel wash, site roads/tracks, and disturbance of existing field drains and ditches.

Discharges

4. Water containing silt will not be pumped directly to any natural watercourse. All discharges to be made over open ground or into existing field drain with silt trap at a minimum of 20m from nearest watercourse unless otherwise stated.
5. No excavated material is to be stored within any surface water buffer zone.
6. Pumped water will be directed into track side ditches and treated in settlement ponds and vegetation swales prior to overland discharge.
7. Pumping of clean water from excavations / or over-pumping in drains/ditches/streams will be completed in a manner that does not cause scour or erosion at the point of release/discharge. This will be done by reducing the flow velocities or by use of splash plates, and other similar discharge controls.
8. Vegetation will NOT be stripped from existing drains/ditches unless absolutely necessary.

Excavations

9. Where deep excavations are proposed cut-off drains will be use to reduce the amount of surface water entering the excavation. This will be the case around turbine base excavations.

Exposed Ground & Stockpiles

10. The amount of exposed ground and temporary stockpiles open at any one time will be minimised, as far as practicable.

Site tracks

11. Use of track side swales with check dams, and/or filtration check dams will reduce silt in runoff water as required.
12. Check dams to be inspected and cleaned regularly.

Refueling

13. Refuelling of mobile plant will be completed in designated refueling areas only, preferably on an impermeable surface and away from field drains / ditches and watercourses / waterbodies.
14. Spill kits and drip trays will be available on site for use as required.

Concrete

15. Care will be taken when completing concrete works on site to ensure no discharges occur.
16. Concrete wash water, and waste concrete will be managed appropriately on site.

IF WATER POLLUTION IS IDENTIFIED THE FOLLOWING STEPS WOULD BE ADHERED TO:

STOP - work in the immediate area should be stopped and the source of the pollution identified.

CONTAIN - the source of the pollution should be bunded using a suitable method. Natural watercourses should be temporarily diverted around the source of pollution.

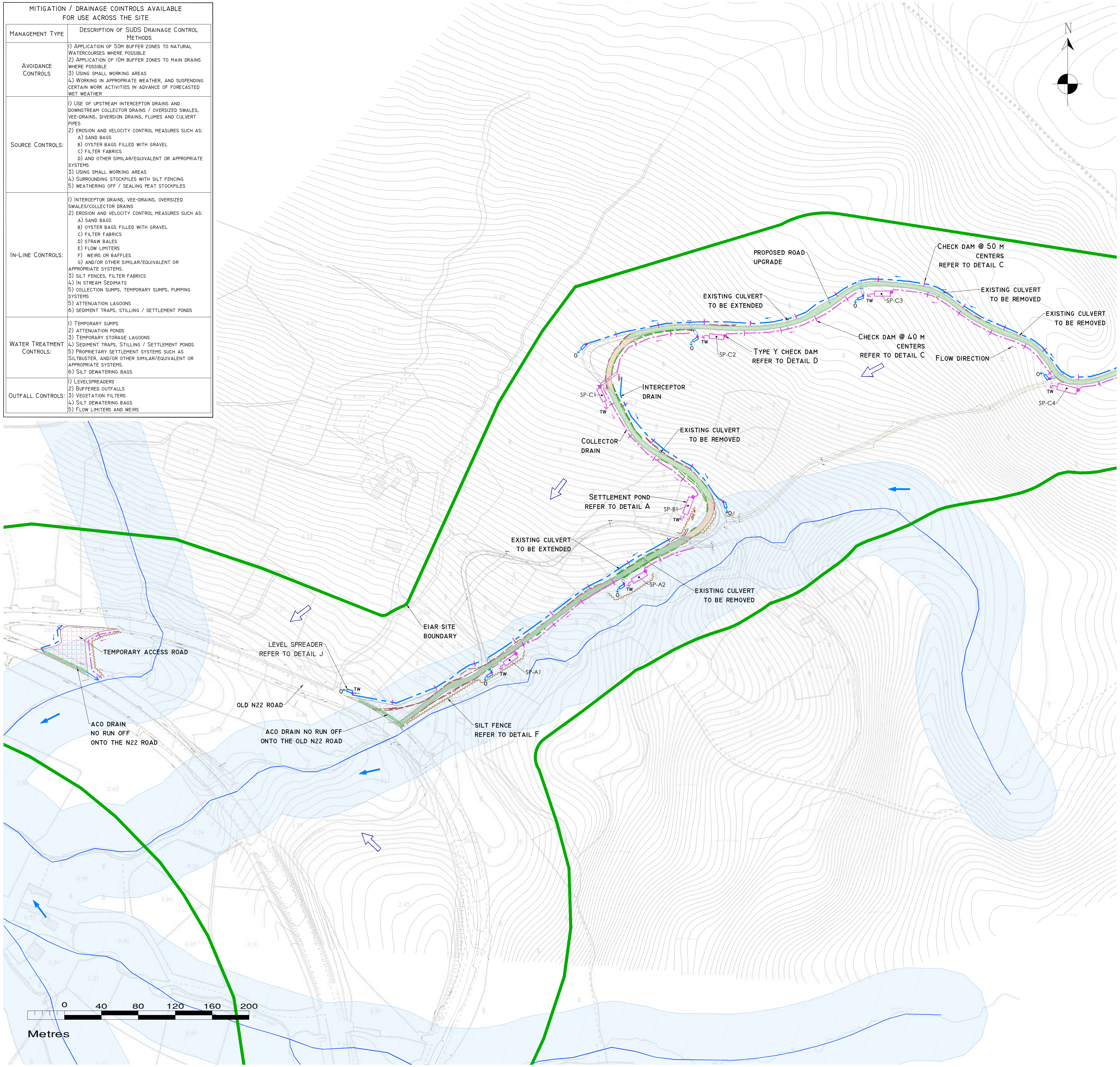
NOTIFY - The relevant authorities (Site Manager / Fisheries / NPWS / Local Authority etc.) should be notified immediately to ensure that measures can be implemented downstream to protect fisheries and other sensitive areas.

DRAINAGE NOTES:

1. Roadway surfacing design and construction to Engineer's Specification (i.e. by others).
2. Spare straw bales/silt fencing/ or similar, to be stored on site. The level of silt in runoff during construction is to be monitored visually and excessive silt levels in any area to be temporarily managed by placing silt fences, straw bales / or similar or additional check dams at the problem areas. Mobile siltbuster system to be available on-site for use as required also.
3. SUDS system to be constructed prior to, or at the same time as the access tracks. Interim measures such as the placement of straw bales/silt fencing/or similar approved method or additional check dams and silt fences to be employed in all instances where work carried out to construct the access tracks is likely to cause adverse environmental effects through increased silt loadings being generated during the construction phase.
4. Suitable prevention measures will be in place at all times to prevent the conveyance of significant volumes of silt to receiving watercourses. See notes on pollution prevention.
5. Interceptor swales / ditches to be used to collect upstream surface water flows. regular cross drains / discharge to field ditches/drains will be required to transfer / discharge surface water in interceptor drains to suitable field drain outfall points.
6. Drainage swales / ditches to be excavated adjacent to the access tracks. Regular cross drains to be located along access tracks to prevent excessive volumes of water collecting in the swales / ditches. Locations of cross drains to be agreed with the Engineer on site. Surface water will not be allowed to discharge directly into existing watercourses.
7. Where possible, a buffer zone of >20m to any existing watercourse will be required where over land discharges are proposed from access track swales / ditches.
8. Batters of all proposed swales / ditches to have a slope of between 1 : 1.5 to 1 : 2 depending upon depth of swale/ditch and will be left as cut to re-vegetate with local species.
9. Track side swales / ditches to be shallow with moderate gradients to prevent scouring. In steep areas check dams should be installed to reduce flow velocities and provide source control of silt containment. Where necessary these have been designated in conjunction with settlement ponds and silt traps, prior to discharge.
10. Settlement ponds to be constructed for silt removal at turbine bases and hard stand areas. Pond sizes depends on catchment area served. Sample pond sizes shown on Drawing D501.
11. straw bales / or similar and silt fences to be used also around spoil heaps to mitigate silt runoff. silt fences may be removed when suitable vegetation cover is established.
12. silt fences to be provide along edge of existing watercourse where works comes within <15m of edge of any ditch / ephemeral channels.
13. Slopes of the swales / ditches to be protected from erosion until vegetation has been established. Stripped vegetative layer (peat 'sod' or 'scraw') from excavations to be stored locally and used to line slopes and base of swales / ditches or longitudinal mounds of vegetation swales at field drain discharge points.
14. Areas stripped of vegetation should be kept to a minimum.
15. Clean stone flow control check dams to be made of locally won / geologically similar well graded stone. Aggregate size for stone check dams to be typically 20- 40mm clean stone. On sloping sections of the access tracks, 40mm check dams to be protected from washing away through the placement of 100m stone on the downhill face of the check dam and by wrapping in geotextile.
16. Build up of silt levels at check dams to be removed and disposed of appropriately. Silt levels at check dams to be visually inspected as part of an ongoing drainage maintenance programme during the construction phase. Where check dams become clogged with silt or vegetation, stone check dam to be removed and replaced subsequent to the removal of silt.
17. Spacing and frequency of check dams will be dependent upon longitudinal gradient of swale.
18. Location of filtration check dams (if required) to be agreed on site with Engineer. Settlement ponds to be constructed in a manner where they may be easily infilled at a later date (post completion of the turbine base and hardstand construction). Only suitable materials excavated from the pond to be used to form part of the embankment around the pond.
19. Oil fuel will be stored within bunded containment structures.
20. silt bags will be used on site at field drain discharge locations, as necessary.

MITIGATION / DRAINAGE COINTROLS AVAILABLE FOR USE ACROSS THE SITE

Management Type	Description of SUDS Drainage Control Methods
Avoidance Controls	1) Application of 50m buffer zones to natural Watercourses where possible 2) Application of 10m buffer zones to main drains where possible 3) Using small working areas 4) Working in appropriate weather, and suspending certain work activities in advance of forecasted wet weather
Source Controls:	1) Use of upstream interceptor drains and downstream collector drains / oversized swales, vee-drains, diversion drains, flumes and culvert pipes 2) erosion and velocity control measures such as: A) sand bags B) oyster bags filled with gravel C) filter fabrics D) and other similar/equivalent or appropriate systems 3) Using small working areas 4) Surrounding stockpiles with silt fencing 5) weathering off / sealing peat stockpiles
In-Line Controls:	1) Interceptor drains, vee-drains, oversized swales/collector drains 2) erosion and velocity control measures such as: A) sand bags B) oyster bags filled with gravel C) filter fabrics D) straw bales E) flow limiters F) weirs or baffles G) and/or other similar/equivalent or appropriate systems. 3) silt fences, filter fabrics 4) In stream Sedimats 5) collection sumps, temporary sumps, pumping systems 5) attenuation lagoons 6) sediment traps, stilling / settlement ponds
Water Treatment Controls:	1) Temporary sumps 2) attenuation ponds 3) Temporary storage lagoons 4) Sediment traps, Stilling / Settlement ponds 5) Proprietary settlement systems such as Siltbuster, and/or other similar/equivalent or appropriate systems. 6) Silt dewatering bags
Outfall Controls:	1) Levelspreaders 2) Buffered outfalls 3) Vegetation filters 4) Silt dewatering bags 5) Flow limiters and weirs



DRAWING LEGEND :

	RIVERS/STREAMS
	RIVERS/STREAMS 50M BUFFER
	LAKES
	LAKE 50M BUFFER
	STREAM FLOW DIRECTION

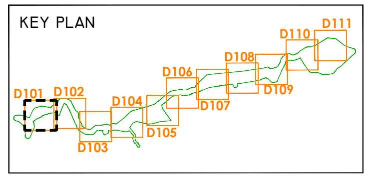
EXISTING DRAINAGE

	Upstream Interceptor Drain*
	Swales/Downstream Collector Drain
	Direction of flow
	Silt Fences*
	level spreader
	settlement pond - vegetation filter - level spreader
	Check Dam 'type A'/Silt trap*
	Check Dam 'type B'/Silt Trap
	proposed wc crossing culverts/bridges
	existing culverts proposed to be extended
	Proposed new culverts
	existing culverts to be removed
	Collector Ditch Culvert
	watercourse drain protection berm
O	Overland Flow Discharge
TW	Treated Water Discharge
SP	Settlement Pond
VS	Semi-Natural Vegetation Swale / Filter Bed /secondary SP
SP-A3	settlement pond number
	Pumping Sump
	ground slope direction

PROPOSED WF CONSTRUCTION DRAINAGE (*COMPLETED IN ADVANCE OF ACCESS ROAD WORKS)

	EIAR SITE BOUNDARY
	Existing ground surface minor contour (1 m interval)
	proposed road upgrade
	proposed new roads
	proposed road upgrade
	proposed new roads
	existing public road
	substation
	proposed borrow pit
	permitted borrow pit
	Ballyvouskill 220kV Substation
	Knocknamork Permitted Layout
	cut area
	fill area

KEY PLAN



Drawing Notes

1. Drawings issued are for planning application purposes only.
2.
3. Do not scale off this drawing. Figured metric dimensions only should be taken off this drawing.
4. All dimensions are in metres.

Date	Description	Chkd	Signed

Revisions

HYDRO ENVIRONMENTAL SERVICES
22 Lower Main St
Dungarvan
Co. Waterford
Ireland
tel: +353 (0) 58-44122
tel: +353 (0) 58-44244
email: info@hydroenvironmental.ie
web: www.hydroenvironmental.ie

Client: Knocknamork Ltd

Job: Knocknamork WF, Co. Cork

Title: Proposed Substation, Underground Cabling, Access Roads to Knocknamork Renewable Energy Development

Figure No: **D101**

Drawing No: P1421-1-0722-A1-D101-00A	
Sheet Size: A1	Project No.: P1421-1
Scale: 1:2,000 (A1)	Drawn By: GD
Date: 15/07/2022	Checked By: MG

POLLUTION PREVENTION NOTES:

1. Site management proposals are intended to ensure protection against surface water and groundwater pollution, siltation and erosion.
2. Suitable drainage control measures will be in place at all times to prevent conveyance of significant volumes of silt to off site receiving watercourses.
3. Silty water can arise from dewatering excavations, erosion of exposed/disturbed ground, temporary stockpiles, plant and wheel wash, site roads/tracks, and disturbance of existing field drains and ditches.

Discharges

4. Water containing silt will not be pumped directly to any natural watercourse. All discharges to be made over open ground or into existing field drain with silt trap at a minimum of 20m from nearest watercourse unless otherwise stated.
5. No excavated material is to be stored within any surface water buffer zone.
6. Pumped water will be directed into track side ditches and treated in settlement ponds and vegetation swales prior to overland discharge.
7. Pumping of clean water from excavations / or over-pumping in drains/ditches/streams will be completed in a manner that does not cause scour or erosion at the point of release/discharge. This will be done by reducing the flow velocities or by use of splash plates, and other similar discharge controls.
8. Vegetation will NOT be stripped from existing drains/ditches unless absolutely necessary.

Excavations

9. Where deep excavations are proposed cut-off drains will be use to reduce the amount of surface water entering the excavation. This will be the case around turbine base excavations.

Exposed Ground & Stockpiles

10. The amount of exposed ground and temporary stockpiles open at any one time will be minimised, as far as practicable.

Site tracks

11. Use of track side swales with check dams, and/or filtration check dams will reduce silt in runoff water as required.
12. Check dams to be inspected and cleaned regularly.

Refueling

13. Refuelling of mobile plant will be completed in designated refueling areas only, preferably on an impermeable surface and away from field drains / ditches and watercourses / waterbodies.
14. Spill kits and drip trays will be available on site for use as required.

Concrete

15. Care will be taken when completing concrete works on site to ensure no discharges occur.
16. Concrete wash water, and waste concrete will be managed appropriately on site.

If water pollution is identified the following steps would be adhered to:

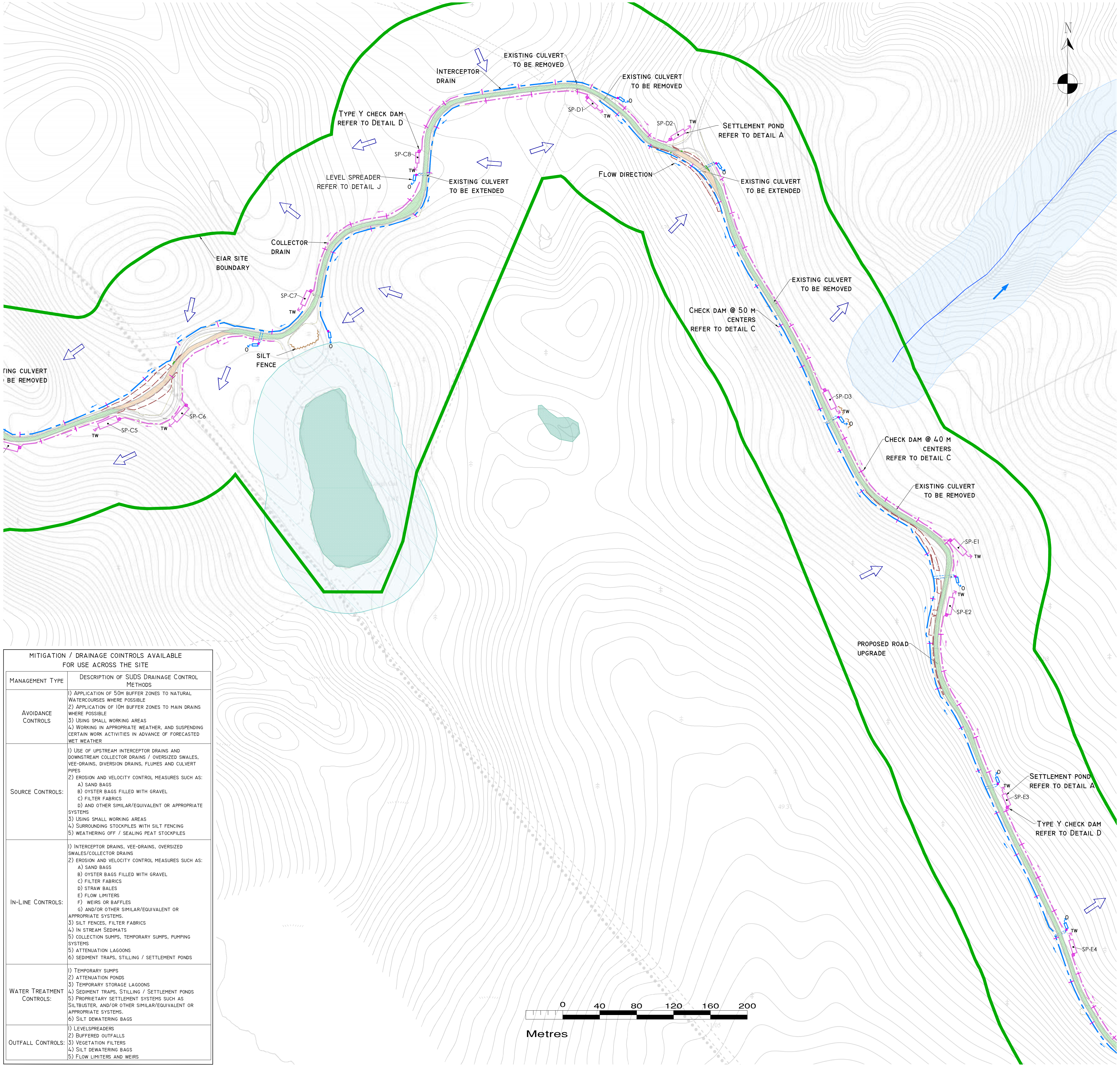
STOP - work in the immediate area should be stopped and the source of the pollution identified.

CONTAIN - the source of the pollution should be bunded using a suitable method. Natural watercourses should be temporarily diverted around the source of pollution.

NOTIFY - The relevant authorities (Site Manager / Fisheries / NPWS / Local Authority etc.) should be notified immediately to ensure that measures can be implemented downstream to protect fisheries and other sensitive areas.

DRAINAGE NOTES:

1. Roadway surfacing design and construction to Engineer's Specification (i.e. by others).
2. Spare straw bales/silt fencing/ or similar, to be stored on site. The level of silt in runoff during construction is to be monitored visually and excessive silt levels in any area to be temporarily managed by placing silt fences, straw bales / or similar or additional check dams at the problem areas. Mobile siltbuster system to be available on-site for use as required also.
3. SUDS system to be constructed prior to, or at the same time as the access tracks. Interim measures such as the placement of straw bales/silt fencing/or similar approved method or additional check dams and silt fences to be employed in all instances where work carried out to construct the access tracks is likely to cause adverse environmental effects through increased silt loadings being generated during the construction phase.
4. Suitable prevention measures will be in place at all times to prevent the conveyance of significant volumes of silt to receiving watercourses. See notes on pollution prevention.
5. Interceptor swales / ditches to be used to collect upstream surface water flows. regular cross drains / discharge to field ditches/drains will be required to transfer / discharge surface water in interceptor drains to suitable field drain outfall points.
6. Drainage swales / ditches to be excavated adjacent to the access tracks. Regular cross drains to be located along access tracks to prevent excessive volumes of water collecting in the swales / ditches. Locations of cross drains to be agreed with the Engineer on site. Surface water will not be allowed to discharge directly into existing watercourses.
7. Where possible, a buffer zone of >20m to any existing watercourse will be required where over land discharges are proposed from access track swales / ditches.
8. Batters of all proposed swales / ditches to have a slope of between 1 : 1.5 to 1 : 2 depending upon depth of swale/ditch and will be left as cut to re-vegetate with local species.
9. Track side swales / ditches to be shallow with moderate gradients to prevent scouring. In steep areas check dams should be installed to reduce flow velocities and provide source control of silt containment. Where necessary these have been designated in conjunction with settlement ponds and silt traps, prior to discharge.
10. Settlement ponds to be constructed for silt removal at turbine bases and hard stand areas. Pond sizes depends on catchment area served. Sample pond sizes shown on Drawing D501.
11. straw bales / or similar and silt fences to be used also around spoil heaps to mitigate silt runoff. silt fences may be removed when suitable vegetation cover is established.
12. silt fences to be provide along edge of existing watercourse where works comes within <15m of edge of any ditch / ephemeral channels.
13. Slopes of the swales / ditches to be protected from erosion until vegetation has been established. Stripped vegetative layer (peat 'sod' or 'scraw') from excavations to be stored locally and used to line slopes and base of swales / ditches or longitudinal mounds of vegetation swales at field drain discharge points.
14. Areas stripped of vegetation should be kept to a minimum.
15. Clean stone flow control check dams to be made of locally won / geologically similar well graded stone. Aggregate size for stone check dams to be typically 20- 40mm clean stone. On sloping sections of the access tracks, 40mm check dams to be protected from washing away through the placement of 100m stone on the downhill face of the check dam and by wrapping in geotextile.
16. Build up of silt levels at check dams to be removed and disposed of appropriately. Silt levels at check dams to be visually inspected as part of an ongoing drainage maintenance programme during the construction phase. Where check dams become clogged with silt or vegetation, stone check dam to be removed and replaced subsequent to the removal of silt.
17. Spacing and frequency of check dams will be dependent upon longitudinal gradient of swale.
18. Location of filtration check dams (if required) to be agreed on site with Engineer. Settlement ponds to be constructed in a manner where they may be easily infilled at a later date (post completion of the turbine base and hardstand construction). Only suitable materials excavated from the pond to be used to form part of the embankment around the pond.
19. Oil fuel will be stored within bunded containment structures.
20. silt bags will be used on site at field drain discharge locations, as necessary.



MITIGATION / DRAINAGE COINTROLS AVAILABLE FOR USE ACROSS THE SITE	
Management Type	Description of SUDS Drainage Control Methods
Avoidance Controls	1) Application of 50m buffer zones to natural Watercourses where possible 2) Application of 10m buffer zones to main drains where possible 3) Using small working areas 4) Working in appropriate weather, and suspending certain work activities in advance of forecasted wet weather
Source Controls:	1) Use of upstream interceptor drains and downstream collector drains / oversized swales, vee-drains, diversion drains, flumes and culvert pipes 2) erosion and velocity control measures such as: a) sand bags b) oyster bags filled with gravel c) filter fabrics d) and other similar/equivalent or appropriate systems 3) Using small working areas 4) Surrounding stockpiles with silt fencing 5) weathering off / sealing peat stockpiles
In-Line Controls:	1) Interceptor drains, vee-drains, oversized swales/collector drains 2) erosion and velocity control measures such as: a) sand bags b) oyster bags filled with gravel c) filter fabrics d) straw bales e) flow limiters f) weirs or baffles g) and/or other similar/equivalent or appropriate systems. 3) silt fences, filter fabrics 4) In stream Sedimats 5) collection sumps, temporary sumps, pumping systems 5) attenuation lagoons 6) sediment traps, stilling / settlement ponds
Water Treatment Controls:	1) Temporary sumps 2) attenuation ponds 3) Temporary storage lagoons 4) Sediment traps, Stilling / Settlement ponds 5) Proprietary settlement systems such as Siltbuster, and/or other similar/equivalent or appropriate systems. 6) Silt dewatering bags
Outfall Controls:	1) Levelspreaders 2) Buffered outfalls 3) Vegetation filters 4) Silt dewatering bags 5) Flow limiters and weirs

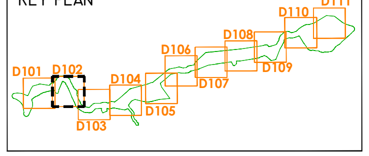
Drawing Legend :

Existing Drainage
- rivers/streams
- rivers/streams 50m buffer
- lakes
- lake 50m buffer
- stream flow direction

Proposed WF Construction Drainage (*completed in advance of access road works)
- Upstream Interceptor Drain*
- Swales/Downstream Collector Drain
- Direction of flow
- Silt Fences*
- level spreader
- settlement pond - vegetation filter - level spreader
- Check Dam 'type A'/Silt trap*
- Check Dam 'type B'/Silt Trap
- proposed wc crossing culverts/bridges
- existing culverts proposed to be extended
- Proposed new culverts
- existing culverts to be removed
- Collector Ditch Culvert
- watercourse drain protection berm
- O Overland Flow Discharge
- TW Treated Water Discharge
- SP Settlement Pond
- VS Semi-Natural Vegetation Swale / Filter Bed /secondary SP
- SP-A3 settlement pond number
- Pumping Sump
- ground slope direction

- EIAR site boundary
- Existing ground surface minor contour (1 m interval)
- proposed road upgrade
- proposed new roads
- proposed road upgrade
- proposed new roads
- existing public road
- substation
- proposed borrow pit
- permitted borrow pit
- Ballyvouskill 220kV Substation
- Knocknamork Permitted Layout
- cut area
- fill area

KEY PLAN



Drawing Notes

1. Drawings issued are for planning application purposes only.
2.
3. Do not scale off this drawing. Figured metric dimensions only should be taken off this drawing.
4. All dimensions are in metres.

Date	Description	Chkd	Signed

Revisions

HYDRO ENVIRONMENTAL SERVICES
22 Lower Main St
Dungarvan
Co. Waterford
Ireland
tel: +353 (0) 58-44122
tel: +353 (0) 58-44244
email: info@hydroenvironmental.ie
web: www.hydroenvironmental.ie

Client: Knocknamork Ltd

Job: Proposed Substation, Underground Cabling, Access Roads to Knocknamork Renewable Energy Development

Title: Proposed Drainage Layout

Figure No: D102

Drawing No: P1421-1-0722-A1-D102-00A	
Sheet Size: A1	Project No.: P1421-1
Scale: 1:2,000 (A1)	Drawn By: GD
Date: 15/07/2022	Checked By: MG

Pollution Prevention Notes:

1. Site management proposals are intended to ensure protection against surface water and groundwater pollution, siltation and erosion.
2. Suitable drainage control measures will be in place at all times to prevent conveyance of significant volumes of silt to off site receiving watercourses.
3. Silty water can arise from dewatering excavations, erosion of exposed/disturbed ground, temporary stockpiles, plant and wheel wash, site roads/tracks, and disturbance of existing field drains and ditches.

Discharges

4. Water containing silt will not be pumped directly to any natural watercourse. All discharges to be made over open ground or into existing field drain with silt trap at a minimum of 20m from nearest watercourse unless otherwise stated.
5. No excavated material is to be stored within any surface water buffer zone.
6. Pumped water will be directed into track side ditches and treated in settlement ponds and vegetation swales prior to overland discharge.
7. Pumping of clean water from excavations / or over-pumping in drains/ditches/streams will be completed in a manner that does not cause scour or erosion at the point of release/discharge. This will be done by reducing the flow velocities or by use of splash plates, and other similar discharge controls.
8. Vegetation will NOT be stripped from existing drains/ditches unless absolutely necessary.

Excavations

9. Where deep excavations are proposed cut-off drains will be use to reduce the amount of surface water entering the excavation. This will be the case around turbine base excavations.

Exposed Ground & Stockpiles

10. The amount of exposed ground and temporary stockpiles open at any one time will be minimised, as far as practicable.

Site tracks

11. Use of track side swales with check dams, and/or filtration check dams will reduce silt in runoff water as required.
12. Check dams to be inspected and cleaned regularly.

Refueling

13. Refuelling of mobile plant will be completed in designated refueling areas only, preferably on an impermeable surface and away from field drains / ditches and watercourses / waterbodies.
14. Spill kits and drip trays will be available on site for use as required.

Concrete

15. Care will be taken when completing concrete works on site to ensure no discharges occur.
16. Concrete wash water, and waste concrete will be managed appropriately on site.

If water pollution is identified the following steps would be adhered to:

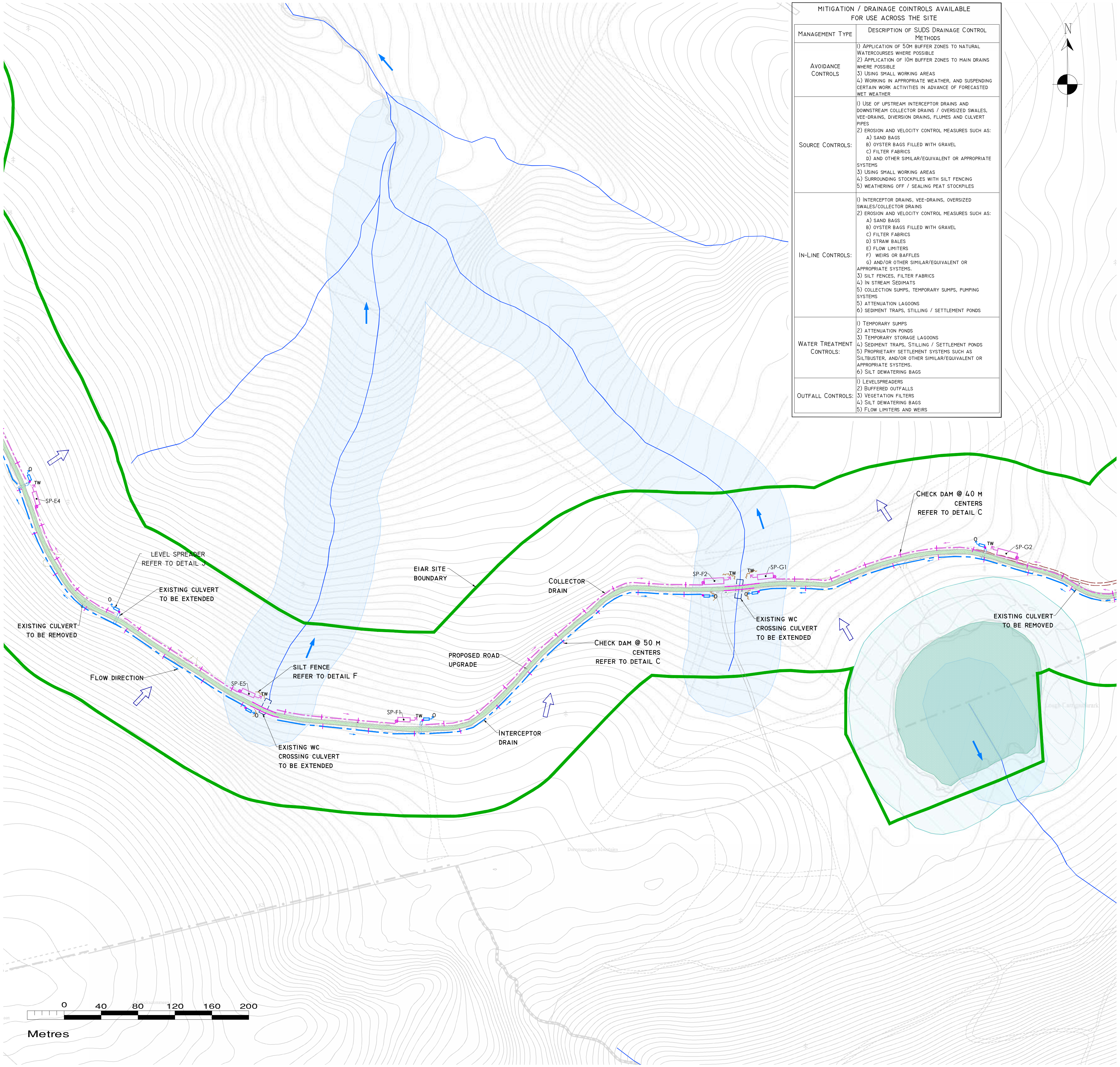
STOP - work in the immediate area should be stopped and the source of the pollution identified.

CONTAIN - the source of the pollution should be bunded using a suitable method. Natural watercourses should be temporarily diverted around the source of pollution.

NOTIFY - The relevant authorities (Site Manager / Fisheries / NPWS / Local Authority etc.) should be notified immediately to ensure that measures can be implemented downstream to protect fisheries and other sensitive areas.

Drainage Notes:

1. Roadway surfacing design and construction to Engineer's Specification (i.e. by others).
2. Spare straw bales/silt fencing/ or similar, to be stored on site. The level of silt in runoff during construction is to be monitored visually and excessive silt levels in any area to be temporarily managed by placing silt fences, straw bales / or similar or additional check dams at the problem areas. Mobile siltbuster system to be available on-site for use as required also.
3. SUDS system to be constructed prior to, or at the same time as the access tracks. Interim measures such as the placement of straw bales/silt fencing/or similar approved method or additional check dams and silt fences to be employed in all instances where work carried out to construct the access tracks is likely to cause adverse environmental effects through increased silt loadings being generated during the construction phase.
4. Suitable prevention measures will be in place at all times to prevent the conveyance of significant volumes of silt to receiving watercourses. See notes on pollution prevention.
5. Interceptor swales / ditches to be used to collect upstream surface water flows. regular cross drains / discharge to field ditches/drains will be required to transfer / discharge surface water in interceptor drains to suitable field drain outfall points.
6. Drainage swales / ditches to be excavated adjacent to the access tracks. Regular cross drains to be located along access tracks to prevent excessive volumes of water collecting in the swales / ditches. Locations of cross drains to be agreed with the Engineer on site. Surface water will not be allowed to discharge directly into existing watercourses.
7. Where possible, a buffer zone of >20m to any existing watercourse will be required where over land discharges are proposed from access track swales / ditches.
8. Batters of all proposed swales / ditches to have a slope of between 1 : 1.5 to 1 : 2 depending upon depth of swale/ditch and will be left as cut to re-vegetate with local species.
9. Track side swales / ditches to be shallow with moderate gradients to prevent scouring. In steep areas check dams should be installed to reduce flow velocities and provide source control of silt containment. Where necessary these have been designated in conjunction with settlement ponds and silt traps, prior to discharge.
10. Settlement ponds to be constructed for silt removal at turbine bases and hard stand areas. Pond sizes depends on catchment area served. Sample pond sizes shown on Drawing D501.
11. straw bales / or similar and silt fences to be used also around spoil heaps to mitigate silt runoff. silt fences may be removed when suitable vegetation cover is established.
12. silt fences to be provide along edge of existing watercourse where works comes within <15m of edge of any ditch / ephemeral channels.
13. Slopes of the swales / ditches to be protected from erosion until vegetation has been established. Stripped vegetative layer (peat 'sod' or 'scraw') from excavations to be stored locally and used to line slopes and base of swales / ditches or longitudinal mounds of vegetation swales at field drain discharge points.
14. Areas stripped of vegetation should be kept to a minimum.
15. Clean stone flow control check dams to be made of locally won / geologically similar well graded stone. Aggregate size for stone check dams to be typically 20- 40mm clean stone. On sloping sections of the access tracks, 40mm check dams to be protected from washing away through the placement of 100m stone on the downhill face of the check dam and by wrapping in geotextile.
16. Build up of silt levels at check dams to be removed and disposed of appropriately. Silt levels at check dams to be visually inspected as part of an ongoing drainage maintenance programme during the construction phase. Where check dams become clogged with silt or vegetation, stone check dam to be removed and replaced subsequent to the removal of silt.
17. Spacing and frequency of check dams will be dependent upon longitudinal gradient of swale.
18. Location of filtration check dams (if required) to be agreed on site with Engineer. Settlement ponds to be constructed in a manner where they may be easily infilled at a later date (post completion of the turbine base and hardstand construction). Only suitable materials excavated from the pond to be used to form part of the embankment around the pond.
19. Oil fuel will be stored within bunded containment structures.
20. silt bags will be used on site at field drain discharge locations, as necessary.



MITIGATION / DRAINAGE COINTROLS AVAILABLE FOR USE ACROSS THE SITE

Management Type	Description of SUDS Drainage Control Methods
Avoidance Controls	1) Application of 50m buffer zones to natural Watercourses where possible 2) Application of 10m buffer zones to main drains where possible 3) Using small working areas 4) Working in appropriate weather, and suspending certain work activities in advance of forecasted wet weather
Source Controls:	1) Use of upstream interceptor drains and downstream collector drains / oversized swales, vee-drains, diversion drains, flumes and culvert pipes 2) erosion and velocity control measures such as: a) sand bags b) oyster bags filled with gravel c) filter fabrics d) and other similar/equivalent or appropriate systems 3) Using small working areas 4) Surrounding stockpiles with silt fencing 5) weathering off / sealing peat stockpiles
In-Line Controls:	1) Interceptor drains, vee-drains, oversized swales/collector drains 2) erosion and velocity control measures such as: a) sand bags b) oyster bags filled with gravel c) filter fabrics d) straw bales e) flow limiters f) weirs or baffles g) and/or other similar/equivalent or appropriate systems. 3) silt fences, filter fabrics 4) In stream Sedimats 5) collection sumps, temporary sumps, pumping systems 5) attenuation lagoons 6) sediment traps, stilling / settlement ponds
Water Treatment Controls:	1) Temporary sumps 2) attenuation ponds 3) Temporary storage lagoons 4) Sediment traps, Stilling / Settlement ponds 5) Proprietary settlement systems such as Siltbuster, and/or other similar/equivalent or appropriate systems. 6) Silt dewatering bags
Outfall Controls:	1) Levelspreaders 2) Buffered outfalls 3) Vegetation filters 4) Silt dewatering bags 5) Flow limiters and weirs

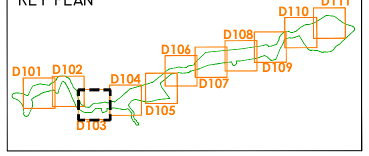
Drawing Legend :

Existing Drainage:
- Rivers/streams
- Rivers/streams 50m buffer
- Lakes
- Lake 50m buffer
- Stream flow direction

Proposed WF Construction Drainage (*completed in advance of access road works):
- Upstream Interceptor Drain*
- Swales/Downstream Collector Drain
- Direction of flow
- Silt Fences*
- level spreader
- settlement pond - vegetation filter - level spreader
- Check Dam 'type A'/Silt trap*
- Check Dam 'type B'/Silt Trap
- proposed WC crossing culverts/bridges
- existing culverts proposed to be extended
- Proposed new culverts
- existing culverts to be removed
- Collector Ditch Culvert
- watercourse drain protection berm
- O Overland Flow Discharge
- TW Treated Water Discharge
- SP Settlement Pond
- VS Semi-Natural Vegetation Swale / Filter Bed /secondary SP
- SP-A3 settlement pond number
- Pumping Sump
- ground slope direction

- EIAR site boundary
- Existing ground surface minor contour (1 m interval)
- proposed road upgrade
- proposed new roads
- proposed road upgrade
- proposed new roads
- existing public road
- substation
- proposed borrow pit
- permitted borrow pit
- Ballyvouskill 220kV Substation
- Knocknamork Permitted Layout
- cut area
- fill area

KEY PLAN



Drawing Notes

1. Drawings issued are for planning application purposes only.
2. Copyright, all rights reserved. No part here with may be copied or reproduced partially or wholly in any form whatsoever without the prior notice of the copyright owner Hydro-Environmental Services.
3. Do not scale off this drawing. Figured metric dimensions only should be taken off this drawing.
4. All dimensions are in metres.

Date	Description	Chkd	Signed

Revisions

HYDRO ENVIRONMENTAL SERVICES

22 Lower Main St
Dungarvan
Co. Waterford
Ireland

tel: +353 (0) 58-44122
tel: +353 (0) 58-44244
email: info@hydroenvironmental.ie
web: www.hydroenvironmental.ie

Client: Knocknamork Ltd

Job: Proposed Substation, Underground Cabling, Access Roads to Knocknamork Renewable Energy Development

Title: Proposed Drainage Layout

Figure No: **D103**

Drawing No: P1421-1-0722-A1-D103-00A	
Sheet Size: A1	Project No.: P1421-1
Scale: 1:2,000 (A1)	Drawn By: GD
Date: 15/07/2022	Checked By: MG

POLLUTION PREVENTION NOTES:

1. Site management proposals are intended to ensure protection against surface water and groundwater pollution, siltation and erosion.
2. Suitable drainage control measures will be in place at all times to prevent conveyance of significant volumes of silt to off site receiving watercourses.
3. Silty water can arise from dewatering excavations, erosion of exposed/disturbed ground, temporary stockpiles, plant and wheel wash, site roads/tracks, and disturbance of existing field drains and ditches.

Discharges

4. Water containing silt will not be pumped directly to any natural watercourse. All discharges to be made over open ground or into existing field drain with silt trap at a minimum of 20m from nearest watercourse unless otherwise stated.
5. No excavated material is to be stored within any surface water buffer zone.
6. Pumped water will be directed into track side ditches and treated in settlement ponds and vegetation swales prior to overland discharge.
7. Pumping of clean water from excavations / or over-pumping in drains/ditches/streams will be completed in a manner that does not cause scour or erosion at the point of release/discharge. This will be done by reducing the flow velocities or by use of splash plates, and other similar discharge controls.
8. Vegetation will NOT be stripped from existing drains/ditches unless absolutely necessary.

Excavations

9. Where deep excavations are proposed cut-off drains will be use to reduce the amount of surface water entering the excavation. This will be the case around turbine base excavations.

Exposed Ground & Stockpiles

10. The amount of exposed ground and temporary stockpiles open at any one time will be minimised, as far as practicable.

Site tracks

11. Use of track side swales with check dams, and/or filtration check dams will reduce silt in runoff water as required.
12. Check dams to be inspected and cleaned regularly.

Refueling

13. Refuelling of mobile plant will be completed in designated refueling areas only, preferably on an impermeable surface and away from field drains / ditches and watercourses / waterbodies.
14. Spill kits and drip trays will be available on site for use as required.

Concrete

15. Care will be taken when completing concrete works on site to ensure no discharges occur.
16. Concrete wash water, and waste concrete will be managed appropriately on site.

If water pollution is identified the following steps would be adhered to:

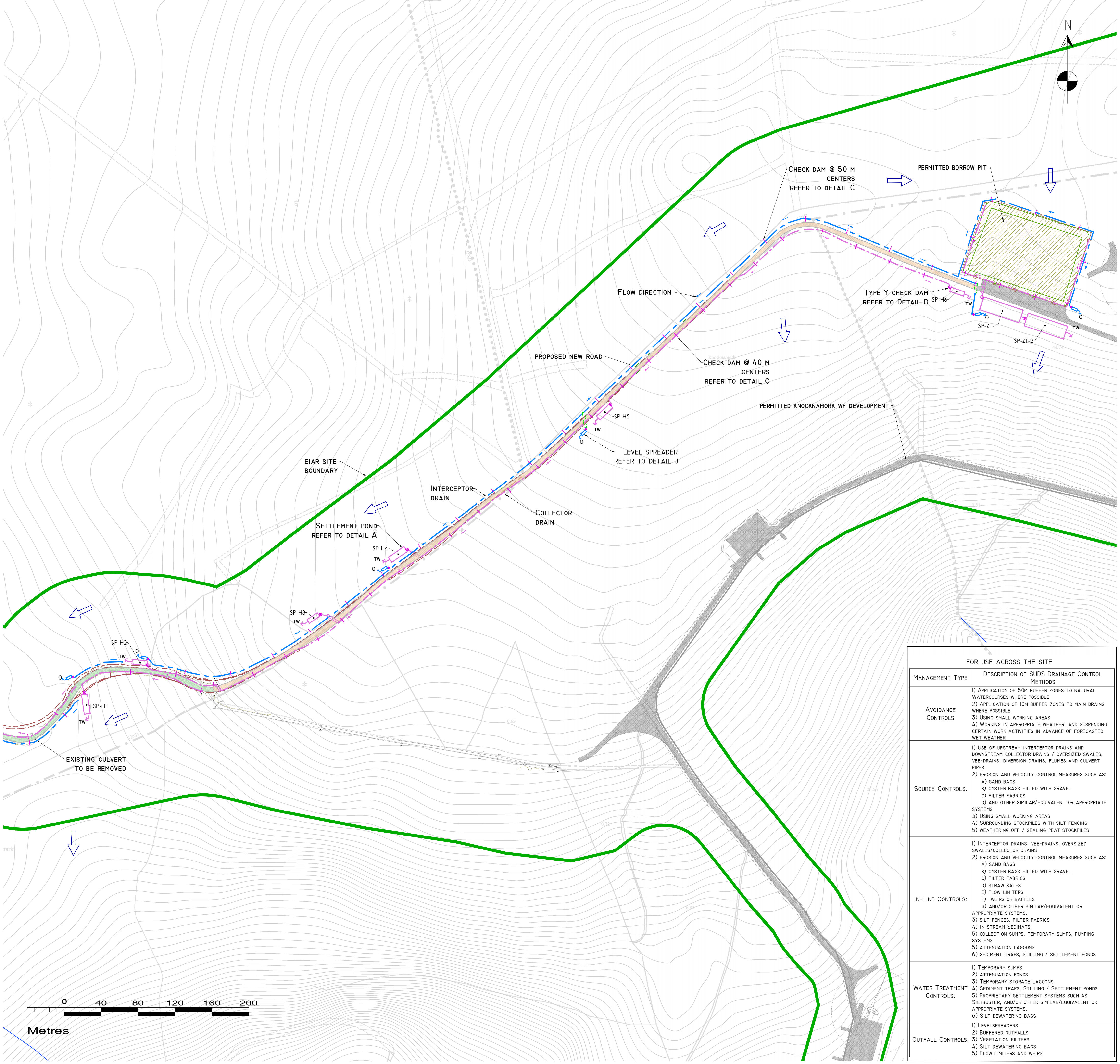
STOP - work in the immediate area should be stopped and the source of the pollution identified.

CONTAIN - the source of the pollution should be bunded using a suitable method. Natural watercourses should be temporarily diverted around the source of pollution.

NOTIFY - The relevant authorities (Site Manager / Fisheries / NPWS / Local Authority etc.) should be notified immediately to ensure that measures can be implemented downstream to protect fisheries and other sensitive areas.

DRAINAGE NOTES:

1. Roadway surfacing design and construction to Engineer's Specification (i.e. by others).
2. Spare straw bales/silt fencing/ or similar, to be stored on site. The level of silt in runoff during construction is to be monitored visually and excessive silt levels in any area to be temporarily managed by placing silt fences, straw bales / or similar or additional check dams at the problem areas. Mobile siltbuster system to be available on-site for use as required also.
3. SUDS system to be constructed prior to, or at the same time as the access tracks. Interim measures such as the placement of straw bales/silt fencing/or similar approved method or additional check dams and silt fences to be employed in all instances where work carried out to construct the access tracks is likely to cause adverse environmental effects through increased silt loadings being generated during the construction phase.
4. Suitable prevention measures will be in place at all times to prevent the conveyance of significant volumes of silt to receiving watercourses. See notes on pollution prevention.
5. Interceptor swales / ditches to be used to collect upstream surface water flows. regular cross drains / discharge to field ditches/drains will be required to transfer / discharge surface water in interceptor drains to suitable field drain outfall points.
6. Drainage swales / ditches to be excavated adjacent to the access tracks. Regular cross drains to be located along access tracks to prevent excessive volumes of water collecting in the swales / ditches. Locations of cross drains to be agreed with the Engineer on site. Surface water will not be allowed to discharge directly into existing watercourses.
7. Where possible, a buffer zone of >20m to any existing watercourse will be required where over land discharges are proposed from access track swales / ditches.
8. Batters of all proposed swales / ditches to have a slope of between 1 : 1.5 to 1 : 2 depending upon depth of swale/ditch and will be left as cut to re-vegetate with local species.
9. Track side swales / ditches to be shallow with moderate gradients to prevent scouring. In steep areas check dams should be installed to reduce flow velocities and provide source control of silt containment. Where necessary these have been designated in conjunction with settlement ponds and silt traps, prior to discharge.
10. Settlement ponds to be constructed for silt removal at turbine bases and hard stand areas. Pond sizes depends on catchment area served. Sample pond sizes shown on Drawing D501.
11. straw bales / or similar and silt fences to be used also around spoil heaps to mitigate silt runoff. silt fences may be removed when suitable vegetation cover is established.
12. silt fences to be provide along edge of existing watercourse where works comes within <15m of edge of any ditch / ephemeral channels.
13. Slopes of the swales / ditches to be protected from erosion until vegetation has been established. Stripped vegetative layer (peat 'sod' or 'scraw') from excavations to be stored locally and used to line slopes and base of swales / ditches or longitudinal mounds of vegetation swales at field drain discharge points.
14. Areas stripped of vegetation should be kept to a minimum.
15. Clean stone flow control check dams to be made of locally won / geologically similar well graded stone. Aggregate size for stone check dams to be typically 20- 40mm clean stone. On sloping sections of the access tracks, 40mm check dams to be protected from washing away through the placement of 100m stone on the downhill face of the check dam and by wrapping in geotextile.
16. Build up of silt levels at check dams to be removed and disposed of appropriately. Silt levels at check dams to be visually inspected as part of an ongoing drainage maintenance programme during the construction phase. Where check dams become clogged with silt or vegetation, stone check dam to be removed and replaced subsequent to the removal of silt.
17. Spacing and frequency of check dams will be dependent upon longitudinal gradient of swale.
18. Location of filtration check dams (if required) to be agreed on site with Engineer. Settlement ponds to be constructed in a manner where they may be easily infilled at a later date (post completion of the turbine base and hardstand construction). Only suitable materials excavated from the pond to be used to form part of the embankment around the pond.
19. Oil fuel will be stored within bunded containment structures.
20. silt bags will be used on site at field drain discharge locations, as necessary.



FOR USE ACROSS THE SITE

Management Type	Description of SUDS Drainage Control Methods
Avoidance Controls	1) Application of 50m buffer zones to natural Watercourses where possible 2) Application of 10m buffer zones to main drains where possible 3) Using small working areas 4) Working in appropriate weather, and suspending certain work activities in advance of forecasted wet weather
Source Controls:	1) Use of upstream interceptor drains and downstream collector drains / oversized swales, vee-drains, diversion drains, flumes and culvert pipes 2) erosion and velocity control measures such as: a) sand bags b) oyster bags filled with gravel c) filter fabrics d) and other similar/equivalent or appropriate systems 3) Using small working areas 4) Surrounding stockpiles with silt fencing 5) weathering off / sealing peat stockpiles
In-Line Controls:	1) Interceptor drains, vee-drains, oversized swales/collector drains 2) erosion and velocity control measures such as: a) sand bags b) oyster bags filled with gravel c) filter fabrics d) straw bales e) flow limiters f) weirs or baffles g) and/or other similar/equivalent or appropriate systems. 3) silt fences, filter fabrics 4) In stream Sedimats 5) collection sumps, temporary sumps, pumping systems 5) attenuation lagoons 6) sediment traps, stilling / settlement ponds
Water Treatment Controls:	1) Temporary sumps 2) attenuation ponds 3) Temporary storage lagoons 4) Sediment traps, Stilling / Settlement ponds 5) Proprietary settlement systems such as Siltbuster, and/or other similar/equivalent or appropriate systems. 6) Silt dewatering bags
Outfall Controls:	1) Levelspreaders 2) Buffered outfalls 3) Vegetation filters 4) Silt dewatering bags 5) Flow limiters and weirs

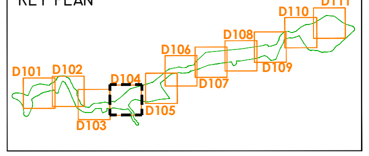
Drawing Legend :

Existing Drainage:
- Rivers/streams
- Rivers/streams 50m buffer
- Lakes
- Lake 50m buffer
- Stream flow direction

Proposed WF Construction Drainage (*completed in advance of access road works):
- Upstream Interceptor Drain*
- Swales/Downstream Collector Drain
- Direction of flow
- Silt Fences*
- Level spreader
- Settlement pond - vegetation filter - level spreader
- Check Dam 'Type A'/Silt trap*
- Check Dam 'Type B'/Silt Trap
- Proposed WC crossing culverts/bridges
- Existing culverts proposed to be extended
- Proposed new culverts
- Existing culverts to be removed
- Collector Ditch Culvert
- Watercourse drain protection berm
- O — Overland Flow Discharge
- TW — Treated Water Discharge
- SP — Settlement Pond
- VS — Semi-Natural Vegetation Swale / Filter Bed /secondary SP
- SP-A3 — settlement pond number
- Pumping Sump
- ground slope direction

- EIAR site boundary
- Existing ground surface minor contour (1 m interval)
- Proposed road upgrade
- Proposed new roads
- Proposed road upgrade
- Proposed new roads
- Existing public road
- Substation
- Proposed borrow pit
- Permitted borrow pit
- Ballyvouskill 220kV Substation
- Knocknamork Permitted Layout
- cut area
- fill area

KEY PLAN



Drawing Notes

1. Drawings issued are for planning application purposes only.
2. Copyright, all rights reserved. No part here with may be copied or reproduced partially or wholly in any form whatsoever without the prior notice of the copyright owner Hydro-Environmental Services.
3. Do not scale off this drawing. Figured metric dimensions only should be taken off this drawing.
4. All dimensions are in metres.

Date	Description	Chkd	Signed

Revisions

HYDRO ENVIRONMENTAL SERVICES

22 Lower Main St
Dungarvan
Co. Waterford
Ireland

tel: +353 (0) 58-44122
tel: +353 (0) 58-44244
email: info@hydroenvironmental.ie
web: www.hydroenvironmental.ie

Client: Knocknamork Ltd

Job: Proposed Substation, Underground Cabling, Access Roads to Knocknamork Renewable Energy Development

Title: Proposed Drainage Layout

Figure No: **D104**

Drawing No: P1421-1-0722-A1-D104-00A	
Sheet Size: A1	Project No.: P1421-1
Scale: 1:2,000 (A1)	Drawn By: GD
Date: 15/07/2022	Checked By: MG

POLLUTION PREVENTION NOTES:

1. Site management proposals are intended to ensure protection against surface water and groundwater pollution, siltation and erosion.
2. Suitable drainage control measures will be in place at all times to prevent conveyance of significant volumes of silt to off site receiving watercourses.
3. Silty water can arise from dewatering excavations, erosion of exposed/disturbed ground, temporary stockpiles, plant and wheel wash, site roads/tracks, and disturbance of existing field drains and ditches.

Discharges

4. Water containing silt will not be pumped directly to any natural watercourse. All discharges to be made over open ground or into existing field drain with silt trap at a minimum of 20m from nearest watercourse unless otherwise stated.
5. No excavated material is to be stored within any surface water buffer zone.
6. Pumped water will be directed into track side ditches and treated in settlement ponds and vegetation swales prior to overland discharge.
7. Pumping of clean water from excavations / or over-pumping in drains/ditches/streams will be completed in a manner that does not cause scour or erosion at the point of release/discharge. This will be done by reducing the flow velocities or by use of splash plates, and other similar discharge controls.
8. Vegetation will NOT be stripped from existing drains/ditches unless absolutely necessary.

Excavations

9. Where deep excavations are proposed cut-off drains will be use to reduce the amount of surface water entering the excavation. This will be the case around turbine base excavations.

Exposed Ground & Stockpiles

10. The amount of exposed ground and temporary stockpiles open at any one time will be minimised, as far as practicable.

Site tracks

11. Use of track side swales with check dams, and/or filtration check dams will reduce silt in runoff water as required.
12. Check dams to be inspected and cleaned regularly.

Refueling

13. Refuelling of mobile plant will be completed in designated refueling areas only, preferably on an impermeable surface and away from field drains / ditches and watercourses / waterbodies.
14. Spill kits and drip trays will be available on site for use as required.

Concrete

15. Care will be taken when completing concrete works on site to ensure no discharges occur.
16. Concrete wash water, and waste concrete will be managed appropriately on site.

If water pollution is identified the following steps would be adhered to:

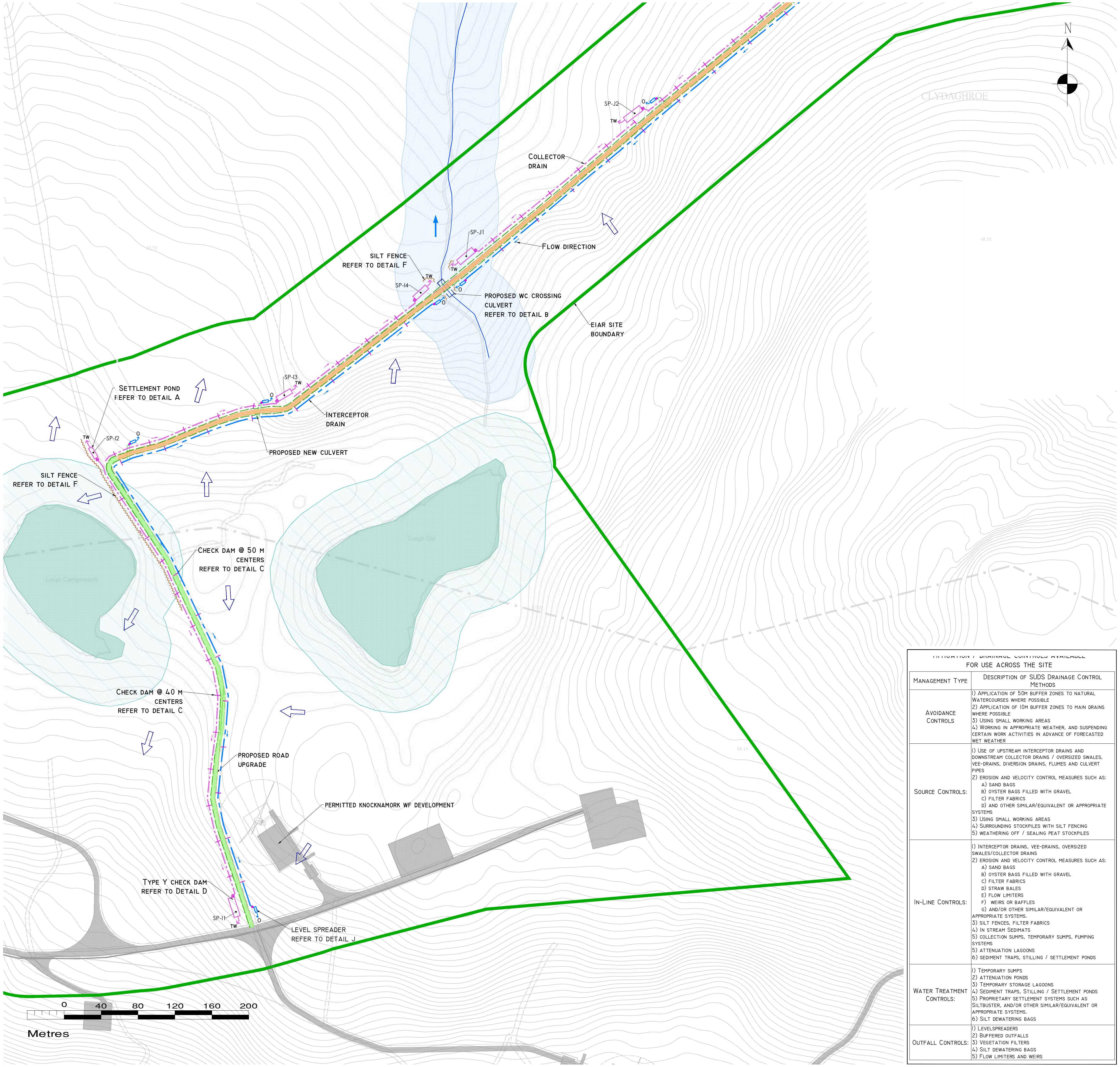
STOP - work in the immediate area should be stopped and the source of the pollution identified.

CONTAIN - the source of the pollution should be bunded using a suitable method. Natural watercourses should be temporarily diverted around the source of pollution.

NOTIFY - The relevant authorities (Site Manager / Fisheries / NPWS / Local Authority etc.) should be notified immediately to ensure that measures can be implemented downstream to protect fisheries and other sensitive areas.

DRAINAGE NOTES:

1. Roadway surfacing design and construction to Engineer's Specification (i.e. by others).
2. Spare straw bales/silt fencing/ or similar, to be stored on site. The level of silt in runoff during construction is to be monitored visually and excessive silt levels in any area to be temporarily managed by placing silt fences, straw bales / or similar or additional check dams at the problem areas. Mobile siltbuster system to be available on-site for use as required also.
3. SUDS system to be constructed prior to, or at the same time as the access tracks. Interim measures such as the placement of straw bales/silt fencing/or similar approved method or additional check dams and silt fences to be employed in all instances where work carried out to construct the access tracks is likely to cause adverse environmental effects through increased silt loadings being generated during the construction phase.
4. Suitable prevention measures will be in place at all times to prevent the conveyance of significant volumes of silt to receiving watercourses. See notes on pollution prevention.
5. Interceptor swales / ditches to be used to collect upstream surface water flows. regular cross drains / discharge to field ditches/drains will be required to transfer / discharge surface water in interceptor drains to suitable field drain outfall points.
6. Drainage swales / ditches to be excavated adjacent to the access tracks. Regular cross drains to be located along access tracks to prevent excessive volumes of water collecting in the swales / ditches. Locations of cross drains to be agreed with the Engineer on site. Surface water will not be allowed to discharge directly into existing watercourses.
7. Where possible, a buffer zone of >20m to any existing watercourse will be required where over land discharges are proposed from access track swales / ditches.
8. Batters of all proposed swales / ditches to have a slope of between 1 : 1.5 to 1 : 2 depending upon depth of swale/ditch and will be left as cut to re-vegetate with local species.
9. Track side swales / ditches to be shallow with moderate gradients to prevent scouring. In steep areas check dams should be installed to reduce flow velocities and provide source control of silt containment. Where necessary these have been designated in conjunction with settlement ponds and silt traps, prior to discharge.
10. Settlement ponds to be constructed for silt removal at turbine bases and hard stand areas. Pond sizes depends on catchment area served. Sample pond sizes shown on Drawing D501.
11. straw bales / or similar and silt fences to be used also around spoil heaps to mitigate silt runoff. silt fences may be removed when suitable vegetation cover is established.
12. silt fences to be provide along edge of existing watercourse where works comes within <15m of edge of any ditch / ephemeral channels.
13. Slopes of the swales / ditches to be protected from erosion until vegetation has been established. Stripped vegetative layer (peat 'sod' or 'scraw') from excavations to be stored locally and used to line slopes and base of swales / ditches or longitudinal mounds of vegetation swales at field drain discharge points.
14. Areas stripped of vegetation should be kept to a minimum.
15. Clean stone flow control check dams to be made of locally won / geologically similar well graded stone. Aggregate size for stone check dams to be typically 20- 40mm clean stone. On sloping sections of the access tracks, 40mm check dams to be protected from washing away through the placement of 100m stone on the downhill face of the check dam and by wrapping in geotextile.
16. Build up of silt levels at check dams to be removed and disposed of appropriately. Silt levels at check dams to be visually inspected as part of an ongoing drainage maintenance programme during the construction phase. Where check dams become clogged with silt or vegetation, stone check dam to be removed and replaced subsequent to the removal of silt.
17. Spacing and frequency of check dams will be dependent upon longitudinal gradient of swale.
18. Location of filtration check dams (if required) to be agreed on site with Engineer. Settlement ponds to be constructed in a manner where they may be easily infilled at a later date (post completion of the turbine base and hardstand construction). Only suitable materials excavated from the pond to be used to form part of the embankment around the pond.
19. Oil fuel will be stored within bunded containment structures.
20. silt bags will be used on site at field drain discharge locations, as necessary.



Mitigation / Drainage Controls Available for Use Across the Site

Management Type	Description of SUDS Drainage Control Methods
Avoidance Controls	1) Application of 50m buffer zones to natural Watercourses where possible 2) Application of 10m buffer zones to main drains where possible 3) Using small working areas 4) Working in appropriate weather, and suspending certain work activities in advance of forecasted wet weather
Source Controls:	1) Use of upstream interceptor drains and downstream collector drains / oversized swales, vee-drains, diversion drains, flumes and culvert pipes 2) erosion and velocity control measures such as: a) sand bags b) oyster bags filled with gravel c) filter fabrics d) and other similar/equivalent or appropriate systems 3) Using small working areas 4) Surrounding stockpiles with silt fencing 5) weathering off / sealing peat stockpiles
In-Line Controls:	1) Interceptor drains, vee-drains, oversized swales/collector drains 2) erosion and velocity control measures such as: a) sand bags b) oyster bags filled with gravel c) filter fabrics d) straw bales e) flow limiters f) weirs or baffles g) and/or other similar/equivalent or appropriate systems. 3) silt fences, filter fabrics 4) In stream Sedimats 5) collection sumps, temporary sumps, pumping systems 5) attenuation lagoons 6) sediment traps, stilling / settlement ponds
Water Treatment Controls:	1) Temporary sumps 2) attenuation ponds 3) Temporary storage lagoons 4) Sediment traps, Stilling / Settlement ponds 5) Proprietary settlement systems such as Siltbuster, and/or other similar/equivalent or appropriate systems. 6) Silt dewatering bags
Outfall Controls:	1) Levelspreaders 2) Buffered outfalls 3) Vegetation filters 4) Silt dewatering bags 5) Flow limiters and weirs

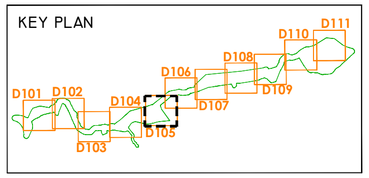
Drawing Legend :

Existing Drainage:
- Rivers/streams
- Rivers/streams 50m buffer
- Lakes
- Lake 50m buffer
- Stream flow direction

Proposed WF Construction Drainage (*completed in advance of access road works):
- Upstream Interceptor Drain*
- Swales/Downstream Collector Drain
- Direction of flow
- Silt Fences*
- Level spreader
- Settlement pond - vegetation filter - level spreader
- Check Dam 'Type A'/Silt trap*
- Check Dam 'Type B'/Silt Trap
- Proposed WC crossing culverts/bridges
- Existing culverts proposed to be extended
- Proposed new culverts
- Existing culverts to be removed
- Collector Ditch Culvert
- Watercourse drain protection berm
- O — Overland Flow Discharge
- TW — Treated Water Discharge
- SP — Settlement Pond
- VS — Semi-Natural Vegetation Swale / Filter Bed /secondary SP
- SP-A3 — Settlement pond number
- Pumping Sump
- Ground slope direction

- EIAR site boundary
- Existing ground surface minor contour (1 m interval)
- Proposed road upgrade
- Proposed new roads
- Proposed road upgrade
- Proposed new roads
- Existing public road
- Substation
- Proposed borrow pit
- Permitted borrow pit
- Ballyvouskill 220kV Substation
- Knocknamork Permitted Layout
- Cut area
- Fill area

KEY PLAN



Drawing Notes

1. Drawings issued are for planning application purposes only.
2. Copyright, all rights reserved. No part here with may be copied or reproduced partially or wholly in any form whatsoever without the prior notice of the copyright owner Hydro-Environmental Services.
3. Do not scale off this drawing. Figured metric dimensions only should be taken off this drawing.
4. All dimensions are in metres.

Date	Description	Chkd	Signed

Revisions

HYDRO ENVIRONMENTAL SERVICES

22 Lower Main St
Dungarvan
Co. Waterford
Ireland

tel: +353 (0) 58-44122
fax: +353 (0) 58-44244
email: info@hydroenvironmental.ie
web: www.hydroenvironmental.ie

Client: Knocknamork Ltd

Job: Proposed Substation, Underground Cabling, Access Roads to Knocknamork Renewable Energy Development

Title: Proposed Drainage Layout

Figure No: D105

Drawing No: P1421-1-0722-A1-D105-00A	
Sheet Size: A1	Project No.: P1421-1
Scale: 1:2,000 (A1)	Drawn By: GD
Date: 15/07/2022	Checked By: MG

POLLUTION PREVENTION NOTES:

1. Site management proposals are intended to ensure protection against surface water and groundwater pollution, siltation and erosion.
2. Suitable drainage control measures will be in place at all times to prevent conveyance of significant volumes of silt to off site receiving watercourses.
3. Silty water can arise from dewatering excavations, erosion of exposed/disturbed ground, temporary stockpiles, plant and wheel wash, site roads/tracks, and disturbance of existing field drains and ditches.

Discharges

4. Water containing silt will not be pumped directly to any natural watercourse. All discharges to be made over open ground or into existing field drain with silt trap at a minimum of 20m from nearest watercourse unless otherwise stated.
5. No excavated material is to be stored within any surface water buffer zone.
6. Pumped water will be directed into track side ditches and treated in settlement ponds and vegetation swales prior to overland discharge.
7. Pumping of clean water from excavations / or over-pumping in drains/ditches/streams will be completed in a manner that does not cause scour or erosion at the point of release/discharge. This will be done by reducing the flow velocities or by use of splash plates, and other similar discharge controls.
8. Vegetation will NOT be stripped from existing drains/ditches unless absolutely necessary.

Excavations

9. Where deep excavations are proposed cut-off drains will be use to reduce the amount of surface water entering the excavation. This will be the case around turbine base excavations.

Exposed Ground & Stockpiles

10. The amount of exposed ground and temporary stockpiles open at any one time will be minimised, as far as practicable.

Site tracks

11. Use of track side swales with check dams, and/or filtration check dams will reduce silt in runoff water as required.
12. Check dams to be inspected and cleaned regularly.

Refueling

13. Refuelling of mobile plant will be completed in designated refueling areas only, preferably on an impermeable surface and away from field drains / ditches and watercourses / waterbodies.
14. Spill kits and drip trays will be available on site for use as required.

Concrete

15. Care will be taken when completing concrete works on site to ensure no discharges occur.
16. Concrete wash water, and waste concrete will be managed appropriately on site.

If water pollution is identified the following steps would be adhered to:

STOP - work in the immediate area should be stopped and the source of the pollution identified.

CONTAIN - the source of the pollution should be bunded using a suitable method. Natural watercourses should be temporarily diverted around the source of pollution.

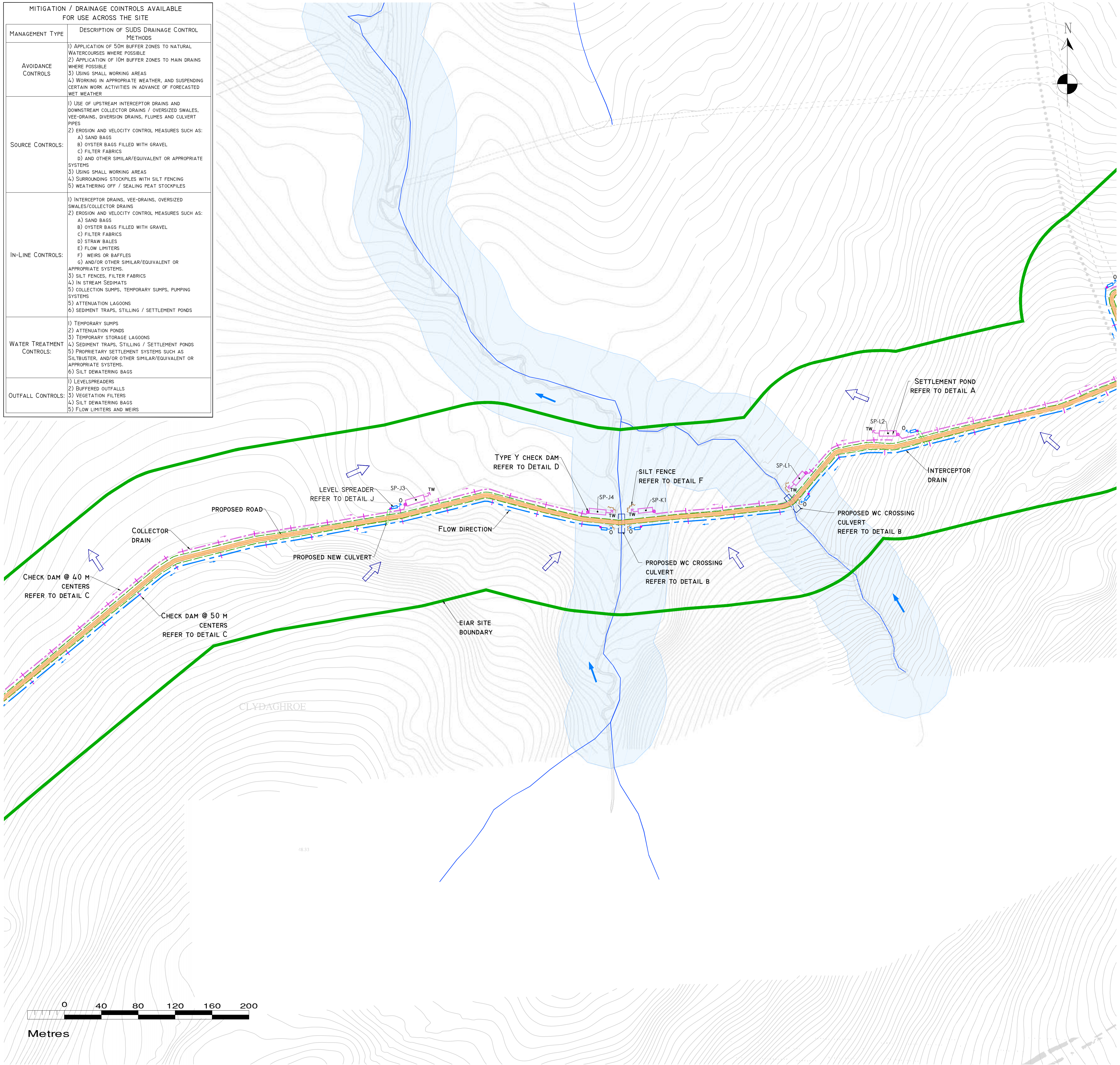
NOTIFY - The relevant authorities (Site Manager / Fisheries / NPWS / Local Authority etc.) should be notified immediately to ensure that measures can be implemented downstream to protect fisheries and other sensitive areas.

DRAINAGE NOTES:

1. Roadway surfacing design and construction to Engineer's Specification (i.e. by others).
2. Spare straw bales/silt fencing/ or similar, to be stored on site. The level of silt in runoff during construction is to be monitored visually and excessive silt levels in any area to be temporarily managed by placing silt fences, straw bales / or similar or additional check dams at the problem areas. Mobile siltbuster system to be available on-site for use as required also.
3. SUDS system to be constructed prior to, or at the same time as the access tracks. Interim measures such as the placement of straw bales/silt fencing/or similar approved method or additional check dams and silt fences to be employed in all instances where work carried out to construct the access tracks is likely to cause adverse environmental effects through increased silt loadings being generated during the construction phase.
4. Suitable prevention measures will be in place at all times to prevent the conveyance of significant volumes of silt to receiving watercourses. See notes on pollution prevention.
5. Interceptor swales / ditches to be used to collect upstream surface water flows. regular cross drains / discharge to field ditches/drains will be required to transfer / discharge surface water in interceptor drains to suitable field drain outfall points.
6. Drainage swales / ditches to be excavated adjacent to the access tracks. Regular cross drains to be located along access tracks to prevent excessive volumes of water collecting in the swales / ditches. Locations of cross drains to be agreed with the Engineer on site. Surface water will not be allowed to discharge directly into existing watercourses.
7. Where possible, a buffer zone of >20m to any existing watercourse will be required where over land discharges are proposed from access track swales / ditches.
8. Batters of all proposed swales / ditches to have a slope of between 1 : 1.5 to 1 : 2 depending upon depth of swale/ditch and will be left as cut to re-vegetate with local species.
9. Track side swales / ditches to be shallow with moderate gradients to prevent scouring. In steep areas check dams should be installed to reduce flow velocities and provide source control of silt containment. Where necessary these have been designated in conjunction with settlement ponds and silt traps, prior to discharge.
10. Settlement ponds to be constructed for silt removal at turbine bases and hard stand areas. Pond sizes depends on catchment area served. Sample pond sizes shown on Drawing D501.
11. straw bales / or similar and silt fences to be used also around spoil heaps to mitigate silt runoff. silt fences may be removed when suitable vegetation cover is established.
12. silt fences to be provide along edge of existing watercourse where works comes within <15m of edge of any ditch / ephemeral channels.
13. Slopes of the swales / ditches to be protected from erosion until vegetation has been established. Stripped vegetative layer (peat 'sod' or 'scraw') from excavations to be stored locally and used to line slopes and base of swales / ditches or longitudinal mounds of vegetation swales at field drain discharge points.
14. Areas stripped of vegetation should be kept to a minimum.
15. Clean stone flow control check dams to be made of locally won / geologically similar well graded stone. Aggregate size for stone check dams to be typically 20- 40mm clean stone. On sloping sections of the access tracks, 40mm check dams to be protected from washing away through the placement of 100m stone on the downhill face of the check dam and by wrapping in geotextile.
16. Build up of silt levels at check dams to be removed and disposed of appropriately. Silt levels at check dams to be visually inspected as part of an ongoing drainage maintenance programme during the construction phase. Where check dams become clogged with silt or vegetation, stone check dam to be removed and replaced subsequent to the removal of silt.
17. Spacing and frequency of check dams will be dependent upon longitudinal gradient of swale.
18. Location of filtration check dams (if required) to be agreed on site with Engineer. Settlement ponds to be constructed in a manner where they may be easily infilled at a later date (post completion of the turbine base and hardstand construction). Only suitable materials excavated from the pond to be used to form part of the embankment around the pond.
19. Oil fuel will be stored within bunded containment structures.
20. silt bags will be used on site at field drain discharge locations, as necessary.

MITIGATION / DRAINAGE COINTROLS AVAILABLE FOR USE ACROSS THE SITE

Management Type	Description of SUDS Drainage Control Methods
Avoidance Controls	1) Application of 50m buffer zones to natural Watercourses where possible 2) Application of 10m buffer zones to main drains where possible 3) Using small working areas 4) Working in appropriate weather, and suspending certain work activities in advance of forecasted wet weather
Source Controls:	1) Use of upstream interceptor drains and downstream collector drains / oversized swales, vee-drains, diversion drains, flumes and culvert pipes 2) erosion and velocity control measures such as: a) sand bags b) oyster bags filled with gravel c) filter fabrics d) and other similar/equivalent or appropriate systems 3) Using small working areas 4) Surrounding stockpiles with silt fencing 5) weathering off / sealing peat stockpiles
In-Line Controls:	1) Interceptor drains, vee-drains, oversized swales/collector drains 2) erosion and velocity control measures such as: a) sand bags b) oyster bags filled with gravel c) filter fabrics d) straw bales e) flow limiters f) weirs or baffles g) and/or other similar/equivalent or appropriate systems. 3) silt fences, filter fabrics 4) In stream Sedimats 5) collection sumps, temporary sumps, pumping systems 5) attenuation lagoons 6) sediment traps, stilling / settlement ponds
Water Treatment Controls:	1) Temporary sumps 2) attenuation ponds 3) Temporary storage lagoons 4) Sediment traps, Stilling / Settlement ponds 5) Proprietary settlement systems such as Siltbuster, and/or other similar/equivalent or appropriate systems. 6) Silt dewatering bags
Outfall Controls:	1) Levelspreaders 2) Buffered outfalls 3) Vegetation filters 4) Silt dewatering bags 5) Flow limiters and weirs



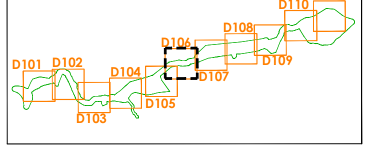
Drawing Legend :

Existing Drainage:
- Rivers/streams
- Rivers/streams 50m buffer
- Lakes
- Lake 50m buffer
- Stream flow direction

Proposed WF Construction Drainage (*completed in advance of access road works):
- Upstream Interceptor Drain*
- Swales/Downstream Collector Drain
- Direction of flow
- Silt Fences*
- Level spreader
- Settlement pond - vegetation filter - level spreader
- Check Dam 'type A'/Silt trap*
- Check Dam 'type B'/Silt Trap
- proposed wc crossing culverts/bridges
- existing culverts proposed to be extended
- Proposed new culverts
- existing culverts to be removed
- Collector Ditch Culvert
- watercourse drain protection berm
- O Overland Flow Discharge
- TW Treated Water Discharge
- SP Settlement Pond
- VS Semi-Natural Vegetation Swale / Filter Bed /secondary SP
- SP-A3 settlement pond number
- Pumping Sump
- ground slope direction

- EIAR site boundary
- Existing ground surface minor contour (1 m interval)
- proposed road upgrade
- proposed new roads
- proposed road upgrade
- proposed new roads
- existing public road
- substation
- proposed borrow pit
- permitted borrow pit
- Ballyvouskill 220kV Substation
- Knocknamork Permitted Layout
- cut area
- fill area

KEY PLAN



Drawing Notes

1. Drawings issued are for planning application purposes only.
2. Copyright, all rights reserved. No part here with may be copied or reproduced partially or wholly in any form whatsoever without the prior notice of the copyright owner Hydro-Environmental Services.
3. Do not scale off this drawing. Figured metric dimensions only should be taken off this drawing.
4. All dimensions are in metres.

Date	Description	Chkd	Signed

Revisions

HYDRO ENVIRONMENTAL SERVICES

22 Lower Main St
Dungarvan
Co. Waterford
Ireland

tel: +353 (0) 58-44122
tel: +353 (0) 58-44244
email: info@hydroenvironmental.ie
web: www.hydroenvironmental.ie

Client: Knocknamork Ltd

Job: Proposed Substation, Underground Cabling, Access Roads to Knocknamork Renewable Energy Development

Title: Proposed Drainage Layout

Figure No: D106

Drawing No: P1421-1-0722-A1-D106-00A	
Sheet Size: A1	Project No.: P1421-1
Scale: 1:2,000 (A1)	Drawn By: GD
Date: 15/07/2022	Checked By: MG

POLLUTION PREVENTION NOTES:

1. Site management proposals are intended to ensure protection against surface water and groundwater pollution, siltation and erosion.
2. Suitable drainage control measures will be in place at all times to prevent conveyance of significant volumes of silt to off site receiving watercourses.
3. Silty water can arise from dewatering excavations, erosion of exposed/disturbed ground, temporary stockpiles, plant and wheel wash, site roads/tracks, and disturbance of existing field drains and ditches.

Discharges

4. Water containing silt will not be pumped directly to any natural watercourse. All discharges to be made over open ground or into existing field drain with silt trap at a minimum of 20m from nearest watercourse unless otherwise stated.
5. No excavated material is to be stored within any surface water buffer zone.
6. Pumped water will be directed into track side ditches and treated in settlement ponds and vegetation swales prior to overland discharge.
7. Pumping of clean water from excavations / or over-pumping in drains/ditches/streams will be completed in a manner that does not cause scour or erosion at the point of release/discharge. This will be done by reducing the flow velocities or by use of splash plates, and other similar discharge controls.
8. Vegetation will NOT be stripped from existing drains/ditches unless absolutely necessary.

Excavations

9. Where deep excavations are proposed cut-off drains will be use to reduce the amount of surface water entering the excavation. This will be the case around turbine base excavations.

Exposed Ground & Stockpiles

10. The amount of exposed ground and temporary stockpiles open at any one time will be minimised, as far as practicable.

Site tracks

11. Use of track side swales with check dams, and/or filtration check dams will reduce silt in runoff water as required.
12. Check dams to be inspected and cleaned regularly.

Refueling

13. Refuelling of mobile plant will be completed in designated refueling areas only, preferably on an impermeable surface and away from field drains / ditches and watercourses / waterbodies.
14. Spill kits and drip trays will be available on site for use as required.

Concrete

15. Care will be taken when completing concrete works on site to ensure no discharges occur.
16. Concrete wash water, and waste concrete will be managed appropriately on site.

IF WATER POLLUTION IS IDENTIFIED THE FOLLOWING STEPS WOULD BE ADHERED TO:

STOP - work in the immediate area should be stopped and the source of the pollution identified.

CONTAIN - the source of the pollution should be bunded using a suitable method. Natural watercourses should be temporarily diverted around the source of pollution.

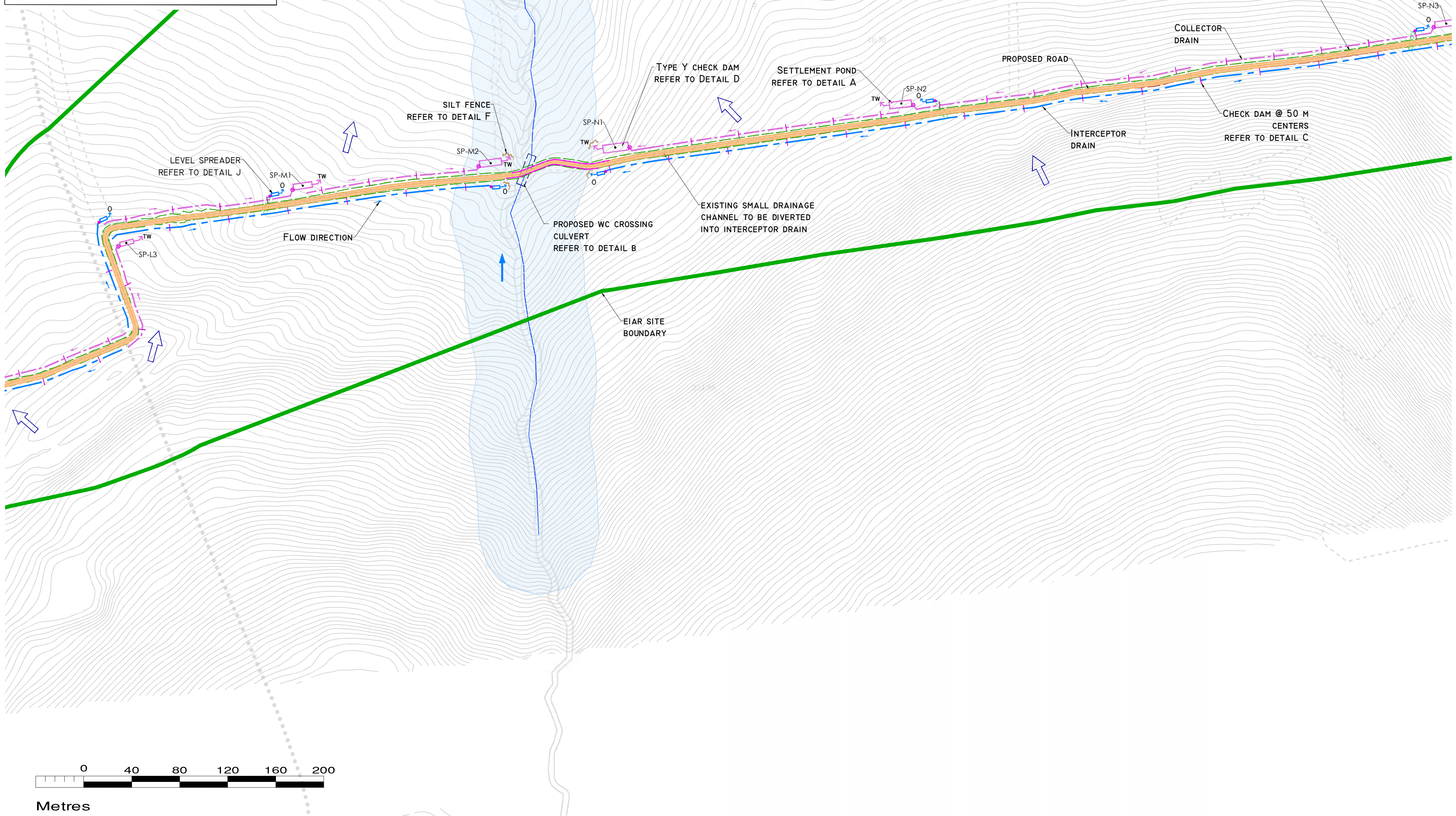
NOTIFY - The relevant authorities (Site Manager / Fisheries / NPWS / Local Authority etc.) should be notified immediately to ensure that measures can be implemented downstream to protect fisheries and other sensitive areas.

DRAINAGE NOTES:

1. Roadway surfacing design and construction to Engineer's Specification (i.e. by others).
2. Spare straw bales/silt fencing/ or similar, to be stored on site. The level of silt in runoff during construction is to be monitored visually and excessive silt levels in any area to be temporarily managed by placing silt fences, straw bales / or similar or additional check dams at the problem areas. Mobile siltbuster system to be available on-site for use as required also.
3. SUDS system to be constructed prior to, or at the same time as the access tracks. Interim measures such as the placement of straw bales/silt fencing/or similar approved method or additional check dams and silt fences to be employed in all instances where work carried out to construct the access tracks is likely to cause adverse environmental effects through increased silt loadings being generated during the construction phase.
4. Suitable prevention measures will be in place at all times to prevent the conveyance of significant volumes of silt to receiving watercourses. See notes on pollution prevention.
5. Interceptor swales / ditches to be used to collect upstream surface water flows. Regular cross drains / discharge to field ditches/drains will be required to transfer / discharge surface water in interceptor drains to suitable field drain outfall points.
6. Drainage swales / ditches to be excavated adjacent to the access tracks. Regular cross drains to be located along access tracks to prevent excessive volumes of water collecting in the swales / ditches. Locations of cross drains to be agreed with the Engineer on site. Surface water will not be allowed to discharge directly into existing watercourses.
7. Where possible, a buffer zone of >20m to any existing watercourse will be required where over land discharges are proposed from access track swales / ditches.
8. Batters of all proposed swales / ditches to have a slope of between 1 : 1.5 to 1 : 2 depending upon depth of swale/ditch and will be left as cut to re-vegetate with local species.
9. Track side swales / ditches to be shallow with moderate gradients to prevent scouring. In steep areas check dams should be installed to reduce flow velocities and provide source control of silt containment. Where necessary these have been designated in conjunction with settlement ponds and silt traps, prior to discharge.
10. Settlement ponds to be constructed for silt removal at turbine bases and hard stand areas. Pond sizes depends on catchment area served. Sample pond sizes shown on Drawing D501.
11. straw bales / or similar and silt fences to be used also around spoil heaps to mitigate silt runoff. silt fences may be removed when suitable vegetation cover is established.
12. silt fences to be provide along edge of existing watercourse where works comes within <15m of edge of any ditch / ephemeral channels.
13. Slopes of the swales / ditches to be protected from erosion until vegetation has been established. Stripped vegetative layer (peat 'sod' or 'scraw') from excavations to be stored locally and used to line slopes and base of swales / ditches or longitudinal mounds of vegetation swales at field drain discharge points.
14. Areas stripped of vegetation should be kept to a minimum.
15. Clean stone flow control check dams to be made of locally won / geologically similar well graded stone. Aggregate size for stone check dams to be typically 20- 40mm clean stone. On sloping sections of the access tracks, 40mm check dams to be protected from washing away through the placement of 100m stone on the downhill face of the check dam and by wrapping in geotextile.
16. Build up of silt levels at check dams to be removed and disposed of appropriately. Silt levels at check dams to be visually inspected as part of an ongoing drainage maintenance programme during the construction phase. Where check dams become clogged with silt or vegetation, stone check dam to be removed and replaced subsequent to the removal of silt.
17. Spacing and frequency of check dams will be dependent upon longitudinal gradient of swale.
18. Location of filtration check dams (if required) to be agreed on site with Engineer. Settlement ponds to be constructed in a manner where they may be easily infilled at a later date (post completion of the turbine base and hardstand construction). Only suitable materials excavated from the pond to be used to form part of the embankment around the pond.
19. Oil fuel will be stored within bunded containment structures.
20. silt bags will be used on site at field drain discharge locations, as necessary.

MITIGATION / DRAINAGE COINTROLS AVAILABLE FOR USE ACROSS THE SITE

Management Type	Description of SUDS Drainage Control Methods
Avoidance Controls	1) Application of 50m buffer zones to natural Watercourses where possible 2) Application of 10m buffer zones to main drains where possible 3) Using small working areas 4) Working in appropriate weather, and suspending certain work activities in advance of forecasted wet weather
Source Controls:	1) Use of upstream interceptor drains and downstream collector drains / oversized swales, vee-drains, diversion drains, flumes and culvert pipes 2) erosion and velocity control measures such as: A) sand bags B) oyster bags filled with gravel C) filter fabrics D) and other similar/equivalent or appropriate systems 3) Using small working areas 4) Surrounding stockpiles with silt fencing 5) weathering off / sealing peat stockpiles
In-Line Controls:	1) Interceptor drains, vee-drains, oversized swales/collector drains 2) erosion and velocity control measures such as: A) sand bags B) oyster bags filled with gravel C) filter fabrics D) straw bales E) flow limiters F) weirs or baffles G) and/or other similar/equivalent or appropriate systems. 3) silt fences, filter fabrics 4) In stream Sedimats 5) collection sumps, temporary sumps, pumping systems 5) attenuation lagoons 6) sediment traps, stilling / settlement ponds
Water Treatment Controls:	1) Temporary sumps 2) attenuation ponds 3) Temporary storage lagoons 4) Sediment traps, Stilling / Settlement ponds 5) Proprietary settlement systems such as Siltbuster, and/or other similar/equivalent or appropriate systems. 6) Silt dewatering bags
Outfall Controls:	1) Levelspreaders 2) Buffered outfalls 3) Vegetation filters 4) Silt dewatering bags 5) Flow limiters and weirs



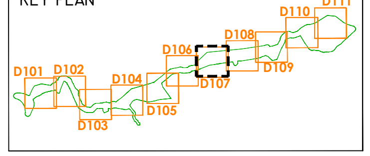
Drawing Legend :

Existing Drainage
- Rivers/streams
- Rivers/streams 50m buffer
- Lakes
- Lake 50m buffer
- Stream flow direction

Proposed WF Construction Drainage (*completed in advance of access road works)
- Upstream Interceptor Drain*
- Swales/Downstream Collector Drain
- Direction of flow
- Silt Fences*
- Level spreader
- Settlement pond - vegetation filter - level spreader
- Check Dam 'Type A'/Silt trap*
- Check Dam 'Type B'/Silt Trap
- Proposed WC crossing culverts/bridges
- Existing culverts proposed to be extended
- Proposed new culverts
- Existing culverts to be removed
- Collector Ditch Culvert
- Watercourse drain protection berm
- O Overland Flow Discharge
- TW Treated Water Discharge
- SP Settlement Pond
- VS Semi-Natural Vegetation Swale / Filter Bed /secondary SP
- SP-A3 Settlement pond number
- Pumping Sump
- Ground slope direction

- EIAR site boundary
- Existing ground surface minor contour (1 m interval)
- Proposed road upgrade
- Proposed new roads
- Proposed road upgrade
- Proposed new roads
- Existing public road
- Substation
- Proposed borrow pit
- Permitted borrow pit
- Ballyvouskill 220kV Substation
- Knocknamork Permitted Layout
- Cut area
- Fill area

KEY PLAN



Drawing Notes
1. Drawings issued are for planning application purposes only.
2. Copyright, all rights reserved. No part here with may be copied or reproduced partially or wholly in any form whatsoever without the prior notice of the copyright owner Hydro-Environmental Services.
3. Do not scale off this drawing. Figured metric dimensions only should be taken off this drawing.
4. All dimensions are in metres.

Date	Description	Chkd	Signed

Revisions

HYDRO ENVIRONMENTAL SERVICES
22 Lower Main St
Dungarvan
Co. Waterford
Ireland
tel: +353 (0) 58-44122
tel: +353 (0) 58-44244
email: info@hydroenvironmental.ie
web: www.hydroenvironmental.ie

Client: Knocknamork Ltd

Job: Proposed Substation, Underground Cabling, Access Roads to Knocknamork Renewable Energy Development

Title: Proposed Drainage Layout

Figure No: **D107**

Drawing No: P1421-1-0722-A1-D107-00A	
Sheet Size: A1	Project No.: P1421-1
Scale: 1:2,000 (A1)	Drawn By: GD
Date: 15/07/2022	Checked By: MG

POLLUTION PREVENTION NOTES:

1. Site management proposals are intended to ensure protection against surface water and groundwater pollution, siltation and erosion.
2. Suitable drainage control measures will be in place at all times to prevent conveyance of significant volumes of silt to off site receiving watercourses.
3. Silty water can arise from dewatering excavations, erosion of exposed/disturbed ground, temporary stockpiles, plant and wheel wash, site roads/tracks, and disturbance of existing field drains and ditches.

Discharges

4. Water containing silt will not be pumped directly to any natural watercourse. All discharges to be made over open ground or into existing field drain with silt trap at a minimum of 20m from nearest watercourse unless otherwise stated.
5. No excavated material is to be stored within any surface water buffer zone.
6. Pumped water will be directed into track side ditches and treated in settlement ponds and vegetation swales prior to overland discharge.
7. Pumping of clean water from excavations / or over-pumping in drains/ditches/streams will be completed in a manner that does not cause scour or erosion at the point of release/discharge. This will be done by reducing the flow velocities or by use of splash plates, and other similar discharge controls.
8. Vegetation will NOT be stripped from existing drains/ditches unless absolutely necessary.

Excavations

9. Where deep excavations are proposed cut-off drains will be use to reduce the amount of surface water entering the excavation. This will be the case around turbine base excavations.

Exposed Ground & Stockpiles

10. The amount of exposed ground and temporary stockpiles open at any one time will be minimised, as far as practicable.

Site tracks

11. Use of track side swales with check dams, and/or filtration check dams will reduce silt in runoff water as required.
12. Check dams to be inspected and cleaned regularly.

Refueling

13. Refuelling of mobile plant will be completed in designated refueling areas only, preferably on an impermeable surface and away from field drains / ditches and watercourses / waterbodies.
14. Spill kits and drip trays will be available on site for use as required.

Concrete

15. Care will be taken when completing concrete works on site to ensure no discharges occur.
16. Concrete wash water, and waste concrete will be managed appropriately on site.

If water pollution is identified the following steps would be adhered to:

STOP - work in the immediate area should be stopped and the source of the pollution identified.

CONTAIN - the source of the pollution should be bunded using a suitable method. Natural watercourses should be temporarily diverted around the source of pollution.

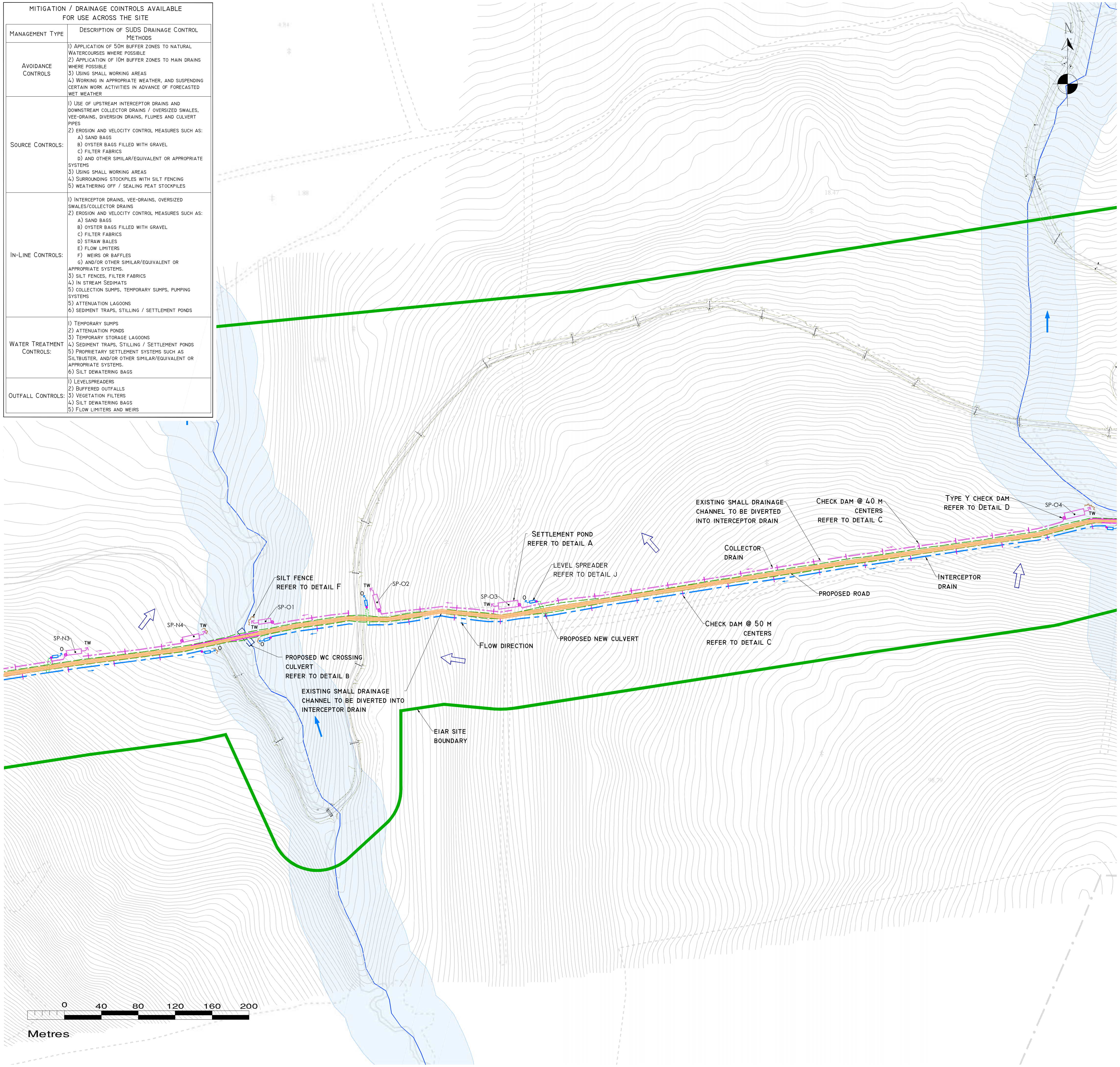
NOTIFY - The relevant authorities (Site Manager / Fisheries / NPWS / Local Authority etc.) should be notified immediately to ensure that measures can be implemented downstream to protect fisheries and other sensitive areas.

DRAINAGE NOTES:

1. Roadway surfacing design and construction to Engineer's Specification (i.e. by others).
2. Spare straw bales/silt fencing/ or similar, to be stored on site. The level of silt in runoff during construction is to be monitored visually and excessive silt levels in any area to be temporarily managed by placing silt fences, straw bales / or similar or additional check dams at the problem areas. Mobile siltbuster system to be available on-site for use as required also.
3. SUDS system to be constructed prior to, or at the same time as the access tracks. Interim measures such as the placement of straw bales/silt fencing/or similar approved method or additional check dams and silt fences to be employed in all instances where work carried out to construct the access tracks is likely to cause adverse environmental effects through increased silt loadings being generated during the construction phase.
4. Suitable prevention measures will be in place at all times to prevent the conveyance of significant volumes of silt to receiving watercourses. See notes on pollution prevention.
5. Interceptor swales / ditches to be used to collect upstream surface water flows. regular cross drains / discharge to field ditches/drains will be required to transfer / discharge surface water in interceptor drains to suitable field drain outfall points.
6. Drainage swales / ditches to be excavated adjacent to the access tracks. Regular cross drains to be located along access tracks to prevent excessive volumes of water collecting in the swales / ditches. Locations of cross drains to be agreed with the Engineer on site. Surface water will not be allowed to discharge directly into existing watercourses.
7. Where possible, a buffer zone of >20m to any existing watercourse will be required where over land discharges are proposed from access track swales / ditches.
8. Batters of all proposed swales / ditches to have a slope of between 1 : 1.5 to 1 : 2 depending upon depth of swale/ditch and will be left as cut to re-vegetate with local species.
9. Track side swales / ditches to be shallow with moderate gradients to prevent scouring. In steep areas check dams should be installed to reduce flow velocities and provide source control of silt containment. Where necessary these have been designated in conjunction with settlement ponds and silt traps, prior to discharge.
10. Settlement ponds to be constructed for silt removal at turbine bases and hard stand areas. Pond sizes depends on catchment area served. Sample pond sizes shown on Drawing D501.
11. straw bales / or similar and silt fences to be used also around spoil heaps to mitigate silt runoff. silt fences may be removed when suitable vegetation cover is established.
12. silt fences to be provide along edge of existing watercourse where works comes within <15m of edge of any ditch / ephemeral channels.
13. Slopes of the swales / ditches to be protected from erosion until vegetation has been established. Stripped vegetative layer (peat 'sod' or 'scraw') from excavations to be stored locally and used to line slopes and base of swales / ditches or longitudinal mounds of vegetation swales at field drain discharge points.
14. Areas stripped of vegetation should be kept to a minimum.
15. Clean stone flow control check dams to be made of locally won / geologically similar well graded stone. Aggregate size for stone check dams to be typically 20- 40mm clean stone. On sloping sections of the access tracks, 40mm check dams to be protected from washing away through the placement of 100m stone on the downhill face of the check dam and by wrapping in geotextile.
16. Build up of silt levels at check dams to be removed and disposed of appropriately. Silt levels at check dams to be visually inspected as part of an ongoing drainage maintenance programme during the construction phase. Where check dams become clogged with silt or vegetation, stone check dam to be removed and replaced subsequent to the removal of silt.
17. Spacing and frequency of check dams will be dependent upon longitudinal gradient of swale.
18. Location of filtration check dams (if required) to be agreed on site with Engineer. Settlement ponds to be constructed in a manner where they may be easily infilled at a later date (post completion of the turbine base and hardstand construction). Only suitable materials excavated from the pond to be used to form part of the embankment around the pond.
19. Oil fuel will be stored within bunded containment structures.
20. silt bags will be used on site at field drain discharge locations, as necessary.

MITIGATION / DRAINAGE COINTROLS AVAILABLE FOR USE ACROSS THE SITE

Management Type	Description of SUDS Drainage Control Methods
Avoidance Controls	1) Application of 50m buffer zones to natural Watercourses where possible 2) Application of 10m buffer zones to main drains where possible 3) Using small working areas 4) Working in appropriate weather, and suspending certain work activities in advance of forecasted wet weather
Source Controls:	1) Use of upstream interceptor drains and downstream collector drains / oversized swales, vee-drains, diversion drains, flumes and culvert pipes 2) erosion and velocity control measures such as: A) sand bags B) oyster bags filled with gravel C) filter fabrics D) and other similar/equivalent or appropriate systems 3) Using small working areas 4) Surrounding stockpiles with silt fencing 5) weathering off / sealing peat stockpiles
In-Line Controls:	1) Interceptor drains, vee-drains, oversized swales/collector drains 2) erosion and velocity control measures such as: A) sand bags B) oyster bags filled with gravel C) filter fabrics D) straw bales E) flow limiters F) weirs or baffles G) and/or other similar/equivalent or appropriate systems. 3) silt fences, filter fabrics 4) In stream Sedimats 5) collection sumps, temporary sumps, pumping systems 5) attenuation lagoons 6) sediment traps, stilling / settlement ponds
Water Treatment Controls:	1) Temporary sumps 2) attenuation ponds 3) Temporary storage lagoons 4) Sediment traps, Stilling / Settlement ponds 5) Proprietary settlement systems such as Siltbuster, and/or other similar/equivalent or appropriate systems. 6) Silt dewatering bags
Outfall Controls:	1) Levelspreaders 2) Buffered outfalls 3) Vegetation filters 4) Silt dewatering bags 5) Flow limiters and weirs



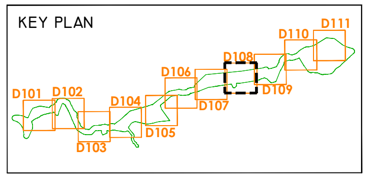
Drawing Legend :

Existing Drainage:
- Rivers/streams
- Rivers/streams 50m buffer
- Lakes
- Lake 50m buffer
- Stream flow direction

Proposed WF Construction Drainage (*completed in advance of access road works):
- Upstream Interceptor Drain*
- Swales/Downstream Collector Drain
- Direction of flow
- Silt Fences*
- level spreader
- settlement pond - vegetation filter - level spreader
- Check Dam 'type A'/Silt trap*
- Check Dam 'type B'/Silt Trap
- proposed wc crossing culverts/bridges
- existing culverts proposed to be extended
- Proposed new culverts
- existing culverts to be removed
- Collector Ditch Culvert
- watercourse drain protection berm
- O — Overland Flow Discharge
- TW — Treated Water Discharge
- SP — Settlement Pond
- VS — Semi-Natural Vegetation Swale / Filter Bed /secondary SP
- SP-A3 — settlement pond number
- Pumping Sump
- ground slope direction

- EIAR site boundary
- Existing ground surface minor contour (1 m interval)
- proposed road upgrade
- proposed new roads
- proposed road upgrade
- proposed new roads
- existing public road
- substation
- proposed borrow pit
- permitted borrow pit
- Ballyvouskill 220kV Substation
- Knocknamork Permitted Layout
- cut area
- fill area

KEY PLAN



Drawing Notes

1. Drawings issued are for planning application purposes only.
2. Copyright, all rights reserved. No part here with may be copied or reproduced partially or wholly in any form whatsoever without the prior notice of the copyright owner Hydro-Environmental Services.
3. Do not scale off this drawing. Figured metric dimensions only should be taken off this drawing.
4. All dimensions are in metres.

Date	Description	Chkd	Signed

Revisions

HYDRO ENVIRONMENTAL SERVICES
22 Lower Main St
Dungarvan
Co. Waterford
Ireland
tel: +353 (0) 58-44122
fax: +353 (0) 58-44244
email: info@hydroenvironmental.ie
web: www.hydroenvironmental.ie

Client: Knockmamork Ltd

Job: Proposed Substation, Underground Cabling, Access Roads to Knocknamork Renewable Energy Development

Title: Proposed Drainage Layout

Figure No: D108

Drawing No: P1421-1-0722-A1-D108-00A

Sheet Size: A1	Project No.: P1421-1
Scale: 1:2,000 (A1)	Drawn By: GD
Date: 15/07/2022	Checked By: MG

POLLUTION PREVENTION NOTES:

1. Site management proposals are intended to ensure protection against surface water and groundwater pollution, siltation and erosion.
2. Suitable drainage control measures will be in place at all times to prevent conveyance of significant volumes of silt to off site receiving watercourses.
3. Silty water can arise from dewatering excavations, erosion of exposed/disturbed ground, temporary stockpiles, plant and wheel wash, site roads/tracks, and disturbance of existing field drains and ditches.

Discharges

4. Water containing silt will not be pumped directly to any natural watercourse. All discharges to be made over open ground or into existing field drain with silt trap at a minimum of 20m from nearest watercourse unless otherwise stated.
5. No excavated material is to be stored within any surface water buffer zone.
6. Pumped water will be directed into track side ditches and treated in settlement ponds and vegetation swales prior to overland discharge.
7. Pumping of clean water from excavations / or over-pumping in drains/ditches/streams will be completed in a manner that does not cause scour or erosion at the point of release/discharge. This will be done by reducing the flow velocities or by use of splash plates, and other similar discharge controls.
8. Vegetation will NOT be stripped from existing drains/ditches unless absolutely necessary.

Excavations

9. Where deep excavations are proposed cut-off drains will be use to reduce the amount of surface water entering the excavation. This will be the case around turbine base excavations.

Exposed Ground & Stockpiles

10. The amount of exposed ground and temporary stockpiles open at any one time will be minimised, as far as practicable.

Site tracks

11. Use of track side swales with check dams, and/or filtration check dams will reduce silt in runoff water as required.
12. Check dams to be inspected and cleaned regularly.

Refueling

13. Refuelling of mobile plant will be completed in designated refueling areas only, preferably on an impermeable surface and away from field drains / ditches and watercourses / waterbodies.
14. Spill kits and drip trays will be available on site for use as required.

Concrete

15. Care will be taken when completing concrete works on site to ensure no discharges occur.
16. Concrete wash water, and waste concrete will be managed appropriately on site.

IF WATER POLLUTION IS IDENTIFIED THE FOLLOWING STEPS WOULD BE ADHERED TO:

STOP - work in the immediate area should be stopped and the source of the pollution identified.

CONTAIN - the source of the pollution should be bunded using a suitable method. Natural watercourses should be temporarily diverted around the source of pollution.

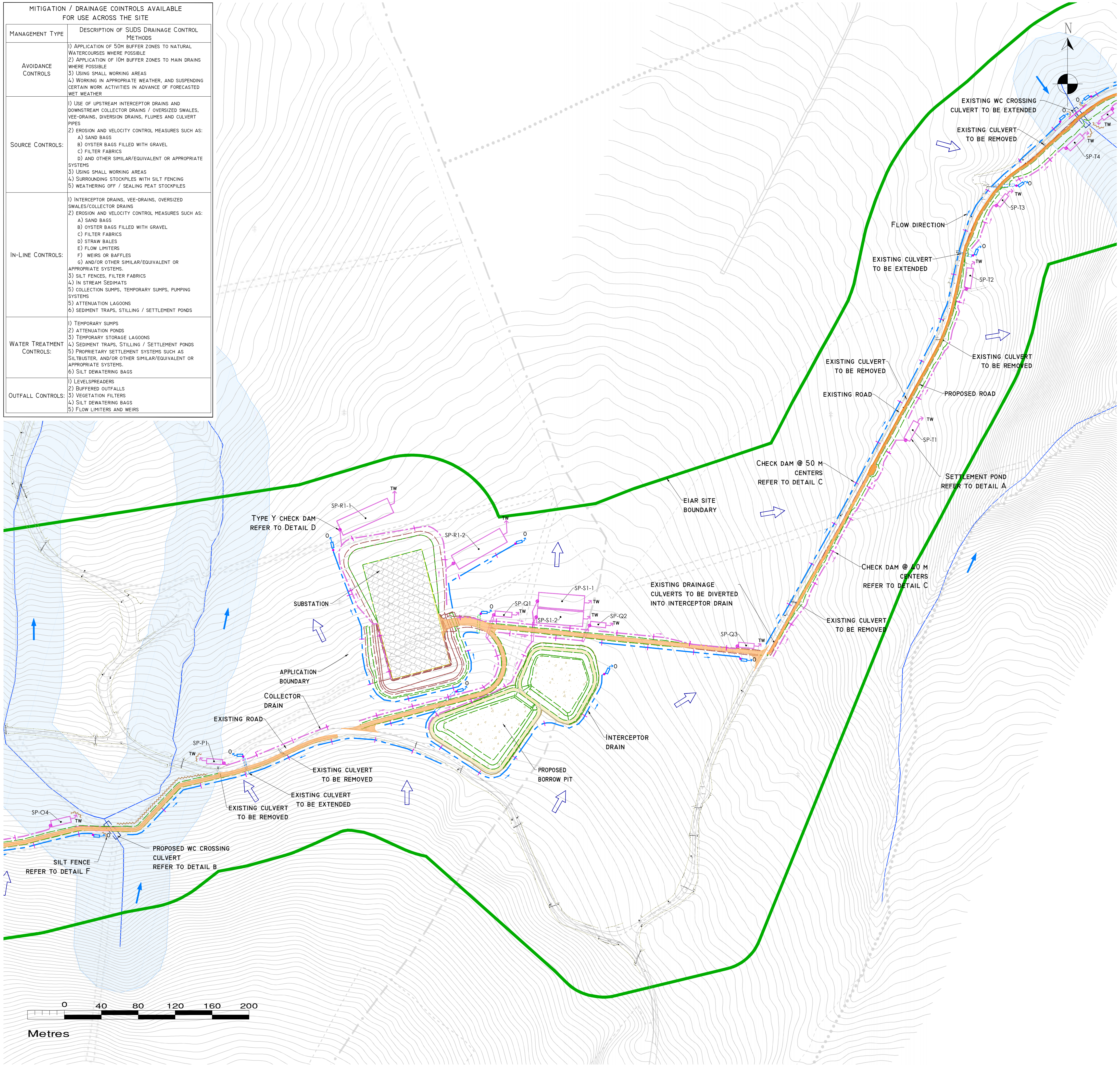
NOTIFY - The relevant authorities (Site Manager / Fisheries / NPWS / Local Authority etc.) should be notified immediately to ensure that measures can be implemented downstream to protect fisheries and other sensitive areas.

DRAINAGE NOTES:

1. Roadway surfacing design and construction to Engineer's Specification (i.e. by others).
2. Spare straw bales/silt fencing/ or similar, to be stored on site. The level of silt in runoff during construction is to be monitored visually and excessive silt levels in any area to be temporarily managed by placing silt fences, straw bales / or similar or additional check dams at the problem areas. Mobile siltbuster system to be available on-site for use as required also.
3. SUDS system to be constructed prior to, or at the same time as the access tracks. Interim measures such as the placement of straw bales/silt fencing/or similar approved method or additional check dams and silt fences to be employed in all instances where work carried out to construct the access tracks is likely to cause adverse environmental effects through increased silt loadings being generated during the construction phase.
4. Suitable prevention measures will be in place at all times to prevent the conveyance of significant volumes of silt to receiving watercourses. See notes on pollution prevention.
5. Interceptor swales / ditches to be used to collect upstream surface water flows. regular cross drains / discharge to field ditches/drains will be required to transfer / discharge surface water in interceptor drains to suitable field drain outfall points.
6. Drainage swales / ditches to be excavated adjacent to the access tracks. Regular cross drains to be located along access tracks to prevent excessive volumes of water collecting in the swales / ditches. Locations of cross drains to be agreed with the Engineer on site. Surface water will not be allowed to discharge directly into existing watercourses.
7. Where possible, a buffer zone of >20m to any existing watercourse will be required where over land discharges are proposed from access track swales / ditches.
8. Batters of all proposed swales / ditches to have a slope of between 1 : 1.5 to 1 : 2 depending upon depth of swale/ditch and will be left as cut to re-vegetate with local species.
9. Track side swales / ditches to be shallow with moderate gradients to prevent scouring. In steep areas check dams should be installed to reduce flow velocities and provide source control of silt containment. Where necessary these have been designated in conjunction with settlement ponds and silt traps, prior to discharge.
10. Settlement ponds to be constructed for silt removal at turbine bases and hard stand areas. Pond sizes depends on catchment area served. Sample pond sizes shown on Drawing D501.
11. straw bales / or similar and silt fences to be used also around spoil heaps to mitigate silt runoff. silt fences may be removed when suitable vegetation cover is established.
12. silt fences to be provide along edge of existing watercourse where works comes within <15m of edge of any ditch / ephemeral channels.
13. Slopes of the swales / ditches to be protected from erosion until vegetation has been established. Stripped vegetative layer (peat 'sod' or 'scraw') from excavations to be stored locally and used to line slopes and base of swales / ditches or longitudinal mounds of vegetation swales at field drain discharge points.
14. Areas stripped of vegetation should be kept to a minimum.
15. Clean stone flow control check dams to be made of locally won / geologically similar well graded stone. Aggregate size for stone check dams to be typically 20- 40mm clean stone. On sloping sections of the access tracks, 40mm check dams to be protected from washing away through the placement of 100m stone on the downhill face of the check dam and by wrapping in geotextile.
16. Build up of silt levels at check dams to be removed and disposed of appropriately. Silt levels at check dams to be visually inspected as part of an ongoing drainage maintenance programme during the construction phase. Where check dams become clogged with silt or vegetation, stone check dam to be removed and replaced subsequent to the removal of silt.
17. Spacing and frequency of check dams will be dependent upon longitudinal gradient of swale.
18. Location of filtration check dams (if required) to be agreed on site with Engineer. Settlement ponds to be constructed in a manner where they may be easily infilled at a later date (post completion of the turbine base and hardstand construction). Only suitable materials excavated from the pond to be used to form part of the embankment around the pond.
19. Oil fuel will be stored within bunded containment structures.
20. silt bags will be used on site at field drain discharge locations, as necessary.

MITIGATION / DRAINAGE COINTROLS AVAILABLE FOR USE ACROSS THE SITE

Management Type	Description of SUDS Drainage Control Methods
Avoidance Controls	1) Application of 50m buffer zones to natural Watercourses where possible 2) Application of 10m buffer zones to main drains where possible 3) Using small working areas 4) Working in appropriate weather, and suspending certain work activities in advance of forecasted wet weather
Source Controls:	1) Use of upstream interceptor drains and downstream collector drains / oversized swales, vee-drains, diversion drains, flumes and culvert pipes 2) erosion and velocity control measures such as: A) sand bags B) oyster bags filled with gravel C) filter fabrics D) and other similar/equivalent or appropriate systems 3) Using small working areas 4) Surrounding stockpiles with silt fencing 5) weathering off / sealing peat stockpiles
In-Line Controls:	1) Interceptor drains, vee-drains, oversized swales/collector drains 2) erosion and velocity control measures such as: A) sand bags B) oyster bags filled with gravel C) filter fabrics D) straw bales E) flow limiters F) weirs or baffles G) and/or other similar/equivalent or appropriate systems. 3) silt fences, filter fabrics 4) In stream Sedimats 5) collection sumps, temporary sumps, pumping systems 5) attenuation lagoons 6) sediment traps, stilling / settlement ponds
Water Treatment Controls:	1) Temporary sumps 2) attenuation ponds 3) Temporary storage lagoons 4) Sediment traps, Stilling / Settlement ponds 5) Proprietary settlement systems such as Siltbuster, and/or other similar/equivalent or appropriate systems. 6) Silt dewatering bags
Outfall Controls:	1) Levelspreaders 2) Buffered outfalls 3) Vegetation filters 4) Silt dewatering bags 5) Flow limiters and weirs



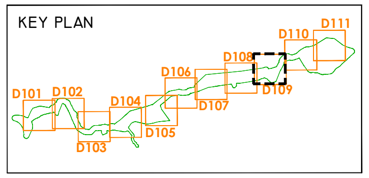
Drawing Legend :

Existing Drainage:
- Rivers/streams
- Rivers/streams 50m buffer
- Lakes
- Lake 50m buffer
- Stream flow direction

Proposed WF Construction Drainage (* completed in advance of access road works):
- Upstream Interceptor Drain*
- Swales/Downstream Collector Drain
- Direction of flow
- Silt Fences*
- Level spreader
- Settlement pond - vegetation filter - level spreader
- Check Dam 'type A'/Silt trap*
- Check Dam 'type B'/Silt Trap
- Proposed WC crossing culverts/bridges
- Existing culverts proposed to be extended
- Proposed new culverts
- Existing culverts to be removed
- Collector Ditch Culvert
- Watercourse drain protection berm
- O Overland Flow Discharge
- TW Treated Water Discharge
- SP Settlement Pond
- VS Semi-Natural Vegetation Swale / Filter Bed /secondary SP
- SP-A3 settlement pond number
- Pumping Sump
- ground slope direction

- EIAR site boundary
- Existing ground surface minor contour (1 m interval)
- proposed road upgrade
- proposed new roads
- proposed road upgrade
- proposed new roads
- existing public road
- substation
- proposed borrow pit
- permitted borrow pit
- Ballyvouskill 220kV Substation
- Knocknamork Permitted Layout
- cut area
- fill area

KEY PLAN



Drawing Notes

1. Drawings issued are for planning application purposes only.
2. Copyright, all rights reserved. No part here with may be copied or reproduced partially or wholly in any form whatsoever without the prior notice of the copyright owner Hydro-Environmental Services.
3. Do not scale off this drawing. Figured metric dimensions only should be taken off this drawing.
4. All dimensions are in metres.

Date	Description	Chkd	Signed

Revisions

HYDRO ENVIRONMENTAL SERVICES
22 Lower Main St
Dungarvan
Co. Waterford
Ireland
tel: +353 (0) 58-44122
tel: +353 (0) 58-44244
email: info@hydroenvironmental.ie
web: www.hydroenvironmental.ie

Client: Knocknamork Ltd

Job: Proposed Substation, Underground Cabling, Access Roads to Knocknamork Renewable Energy Development

Title: Proposed Drainage Layout

Figure No: **D109**

Drawing No: P1421-1-0722-A1-D109-00A	
Sheet Size: A1	Project No.: P1421-1
Scale: 1:2,000 (A1)	Drawn By: GD
Date: 15/07/2022	Checked By: MG

POLLUTION PREVENTION NOTES:

1. Site management proposals are intended to ensure protection against surface water and groundwater pollution, siltation and erosion.
2. Suitable drainage control measures will be in place at all times to prevent conveyance of significant volumes of silt to off site receiving watercourses.
3. Silty water can arise from dewatering excavations, erosion of exposed/disturbed ground, temporary stockpiles, plant and wheel wash, site roads/tracks, and disturbance of existing field drains and ditches.

Discharges

4. Water containing silt will not be pumped directly to any natural watercourse. All discharges to be made over open ground or into existing field drain with silt trap at a minimum of 20m from nearest watercourse unless otherwise stated.
5. No excavated material is to be stored within any surface water buffer zone.
6. Pumped water will be directed into track side ditches and treated in settlement ponds and vegetation swales prior to overland discharge.
7. Pumping of clean water from excavations / or over-pumping in drains/ditches/streams will be completed in a manner that does not cause scour or erosion at the point of release/discharge. This will be done by reducing the flow velocities or by use of splash plates, and other similar discharge controls.
8. Vegetation will NOT be stripped from existing drains/ditches unless absolutely necessary.

Excavations

9. Where deep excavations are proposed cut-off drains will be use to reduce the amount of surface water entering the excavation. This will be the case around turbine base excavations.

Exposed Ground & Stockpiles

10. The amount of exposed ground and temporary stockpiles open at any one time will be minimised, as far as practicable.

Site tracks

11. Use of track side swales with check dams, and/or filtration check dams will reduce silt in runoff water as required.
12. Check dams to be inspected and cleaned regularly.

Refueling

13. Refuelling of mobile plant will be completed in designated refueling areas only, preferably on an impermeable surface and away from field drains / ditches and watercourses / waterbodies.
14. Spill kits and drip trays will be available on site for use as required.

Concrete

15. Care will be taken when completing concrete works on site to ensure no discharges occur.
16. Concrete wash water, and waste concrete will be managed appropriately on site.

If water pollution is identified the following steps would be adhered to:

STOP - work in the immediate area should be stopped and the source of the pollution identified.

CONTAIN - the source of the pollution should be bunded using a suitable method. Natural watercourses should be temporarily diverted around the source of pollution.

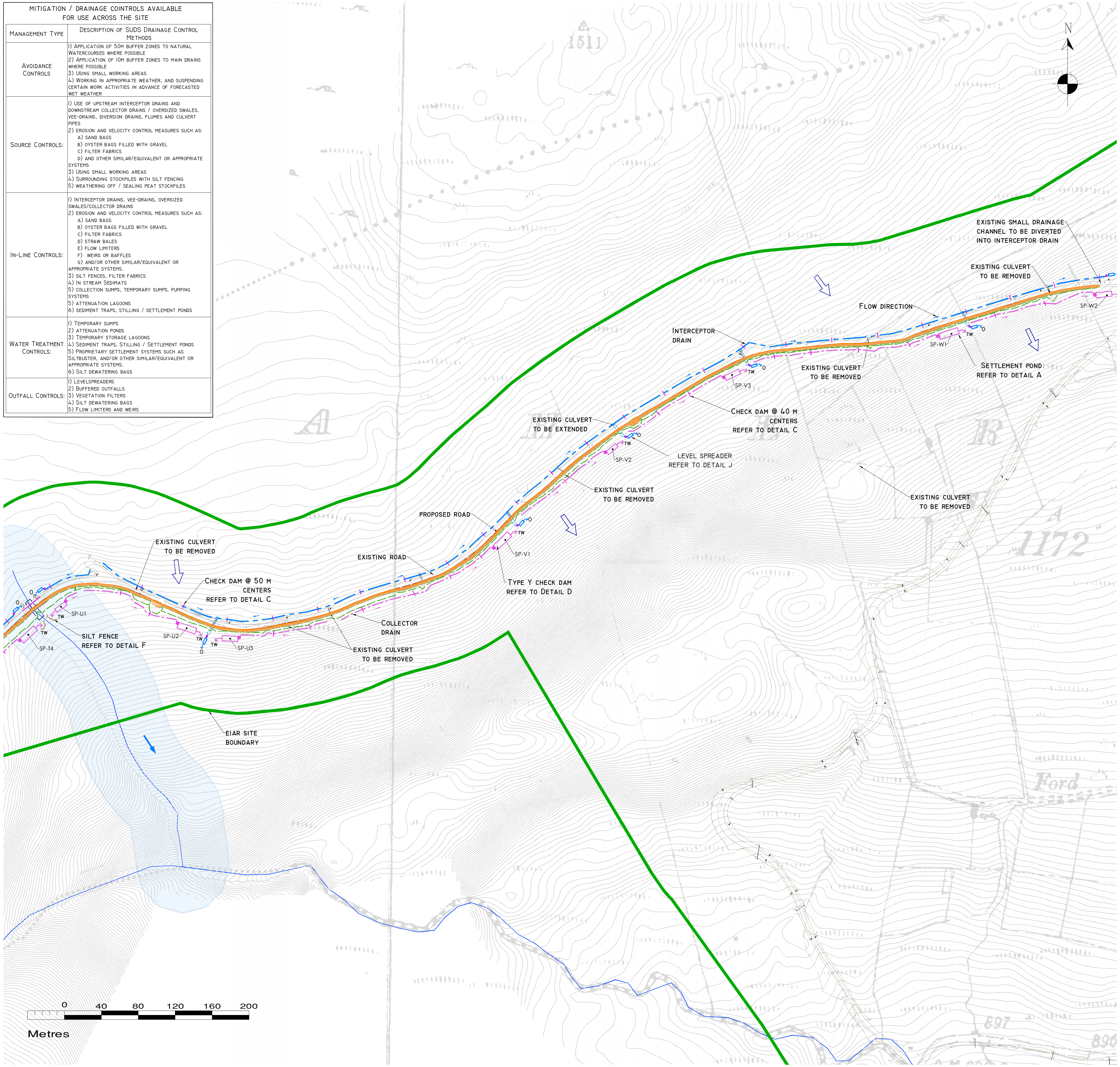
NOTIFY - The relevant authorities (Site Manager / Fisheries / NPWS / Local Authority etc.) should be notified immediately to ensure that measures can be implemented downstream to protect fisheries and other sensitive areas.

DRAINAGE NOTES:

1. Roadway surfacing design and construction to Engineer's Specification (i.e. by others).
2. Spare straw bales/silt fencing/ or similar, to be stored on site. The level of silt in runoff during construction is to be monitored visually and excessive silt levels in any area to be temporarily managed by placing silt fences, straw bales / or similar or additional check dams at the problem areas. Mobile siltbuster system to be available on-site for use as required also.
3. SUDS system to be constructed prior to, or at the same time as the access tracks. Interim measures such as the placement of straw bales/silt fencing/or similar approved method or additional check dams and silt fences to be employed in all instances where work carried out to construct the access tracks is likely to cause adverse environmental effects through increased silt loadings being generated during the construction phase.
4. Suitable prevention measures will be in place at all times to prevent the conveyance of significant volumes of silt to receiving watercourses. See notes on pollution prevention.
5. Interceptor swales / ditches to be used to collect upstream surface water flows. regular cross drains / discharge to field ditches/drains will be required to transfer / discharge surface water in interceptor drains to suitable field drain outfall points.
6. Drainage swales / ditches to be excavated adjacent to the access tracks. Regular cross drains to be located along access tracks to prevent excessive volumes of water collecting in the swales / ditches. Locations of cross drains to be agreed with the Engineer on site. Surface water will not be allowed to discharge directly into existing watercourses.
7. Where possible, a buffer zone of >20m to any existing watercourse will be required where over land discharges are proposed from access track swales / ditches.
8. Batters of all proposed swales / ditches to have a slope of between 1 : 1.5 to 1 : 2 depending upon depth of swale/ditch and will be left as cut to re-vegetate with local species.
9. Track side swales / ditches to be shallow with moderate gradients to prevent scouring. In steep areas check dams should be installed to reduce flow velocities and provide source control of silt containment. Where necessary these have been designated in conjunction with settlement ponds and silt traps, prior to discharge.
10. Settlement ponds to be constructed for silt removal at turbine bases and hard stand areas. Pond sizes depends on catchment area served. Sample pond sizes shown on Drawing D501.
11. straw bales / or similar and silt fences to be used also around spoil heaps to mitigate silt runoff. silt fences may be removed when suitable vegetation cover is established.
12. silt fences to be provide along edge of existing watercourse where works comes within <15m of edge of any ditch / ephemeral channels.
13. Slopes of the swales / ditches to be protected from erosion until vegetation has been established. Stripped vegetative layer (peat 'sod' or 'scraw') from excavations to be stored locally and used to line slopes and base of swales / ditches or longitudinal mounds of vegetation swales at field drain discharge points.
14. Areas stripped of vegetation should be kept to a minimum.
15. Clean stone flow control check dams to be made of locally won / geologically similar well graded stone. Aggregate size for stone check dams to be typically 20- 40mm clean stone. On sloping sections of the access tracks, 40mm check dams to be protected from washing away through the placement of 100m stone on the downhill face of the check dam and by wrapping in geotextile.
16. Build up of silt levels at check dams to be removed and disposed of appropriately. Silt levels at check dams to be visually inspected as part of an ongoing drainage maintenance programme during the construction phase. Where check dams become clogged with silt or vegetation, stone check dam to be removed and replaced subsequent to the removal of silt.
17. Spacing and frequency of check dams will be dependent upon longitudinal gradient of swale.
18. Location of filtration check dams (if required) to be agreed on site with Engineer. Settlement ponds to be constructed in a manner where they may be easily infilled at a later date (post completion of the turbine base and hardstand construction). Only suitable materials excavated from the pond to be used to form part of the embankment around the pond.
19. Oil fuel will be stored within bunded containment structures.
20. silt bags will be used on site at field drain discharge locations, as necessary.

MITIGATION / DRAINAGE COINTROLS AVAILABLE FOR USE ACROSS THE SITE

Management Type	Description of SUDS Drainage Control Methods
Avoidance Controls	1) Application of 50m buffer zones to natural Watercourses where possible 2) Application of 10m buffer zones to main drains where possible 3) Using small working areas 4) Working in appropriate weather, and suspending certain work activities in advance of forecasted wet weather
Source Controls:	1) Use of upstream interceptor drains and downstream collector drains / oversized swales, vee-drains, diversion drains, flumes and culvert pipes 2) erosion and velocity control measures such as: A) sand bags B) oyster bags filled with gravel C) filter fabrics D) and other similar/equivalent or appropriate systems 3) Using small working areas 4) Surrounding stockpiles with silt fencing 5) weathering off / sealing peat stockpiles
In-Line Controls:	1) Interceptor drains, vee-drains, oversized swales/collector drains 2) erosion and velocity control measures such as: A) sand bags B) oyster bags filled with gravel C) filter fabrics D) straw bales E) flow limiters F) weirs or baffles G) and/or other similar/equivalent or appropriate systems. 3) silt fences, filter fabrics 4) In stream Sedimats 5) collection sumps, temporary sumps, pumping systems 5) attenuation lagoons 6) sediment traps, stilling / settlement ponds
Water Treatment Controls:	1) Temporary sumps 2) attenuation ponds 3) Temporary storage lagoons 4) Sediment traps, Stilling / Settlement ponds 5) Proprietary settlement systems such as Siltbuster, and/or other similar/equivalent or appropriate systems. 6) Silt dewatering bags
Outfall Controls:	1) Levelspreaders 2) Buffered outfalls 3) Vegetation filters 4) Silt dewatering bags 5) Flow limiters and weirs



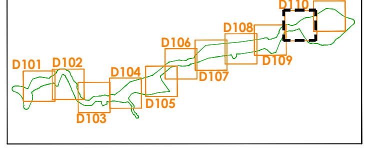
Drawing Legend :

Existing Drainage:
- Rivers/streams
- Rivers/streams 50m buffer
- Lakes
- Lake 50m buffer
- Stream flow direction

Proposed WF Construction Drainage (*completed in advance of access road works):
- Upstream Interceptor Drain*
- Swales/Downstream Collector Drain
- Direction of flow
- Silt Fences*
- Level spreader
- Settlement pond - vegetation filter - level spreader
- Check Dam 'Type A'/Silt trap*
- Check Dam 'Type B'/Silt Trap
- Proposed WC crossing culverts/bridges
- Existing culverts proposed to be extended
- Proposed new culverts
- Existing culverts to be removed
- Collector Ditch Culvert
- Watercourse drain protection berm
- O Overland Flow Discharge
- TW Treated Water Discharge
- SP Settlement Pond
- VS Semi-Natural Vegetation Swale / Filter Bed /secondary SP
- SP-A3 Settlement pond number
- Pumping Sump
- Ground slope direction

- EIAR site boundary
- Existing ground surface minor contour (1 m interval)
- Proposed road upgrade
- Proposed new roads
- Proposed road upgrade
- Proposed new roads
- Existing public road
- Substation
- Proposed borrow pit
- Permitted borrow pit
- Ballyvouskill 220kV Substation
- Knocknamork Permitted Layout
- Cut area
- Fill area

KEY PLAN



Drawing Notes

1. Drawings issued are for planning application purposes only.
2.
3. Do not scale off this drawing. Figured metric dimensions only should be taken off this drawing.
4. All dimensions are in metres.

Date	Description	Chkd	Signed

Revisions

HYDRO ENVIRONMENTAL SERVICES
22 Lower Main St
Dungarvan
Co. Waterford
Ireland
tel: +353 (0) 58-44122
tel: +353 (0) 58-44244
email: info@hydroenvironmental.ie
web: www.hydroenvironmental.ie

Client: Knocknamork Ltd

Job: Proposed Substation, Underground Cabling, Access Roads to Knocknamork Renewable Energy Development

Title: Proposed Drainage Layout

Figure No: **D110**

Drawing No: P1421-1-0722-A1-D110-00A	
Sheet Size: A1	Project No.: P1421-1
Scale: 1:2,000 (A1)	Drawn By: GD
Date: 15/07/2022	Checked By: MG

POLLUTION PREVENTION NOTES:

1. Site management proposals are intended to ensure protection against surface water and groundwater pollution, siltation and erosion.
2. Suitable drainage control measures will be in place at all times to prevent conveyance of significant volumes of silt to off site receiving watercourses.
3. Silty water can arise from dewatering excavations, erosion of exposed/disturbed ground, temporary stockpiles, plant and wheel wash, site roads/tracks, and disturbance of existing field drains and ditches.

Discharges

4. Water containing silt will not be pumped directly to any natural watercourse. All discharges to be made over open ground or into existing field drain with silt trap at a minimum of 20m from nearest watercourse unless otherwise stated.
5. No excavated material is to be stored within any surface water buffer zone.
6. Pumped water will be directed into track side ditches and treated in settlement ponds and vegetation swales prior to overland discharge.
7. Pumping of clean water from excavations / or over-pumping in drains/ditches/streams will be completed in a manner that does not cause scour or erosion at the point of release/discharge. This will be done by reducing the flow velocities or by use of splash plates, and other similar discharge controls.
8. Vegetation will NOT be stripped from existing drains/ditches unless absolutely necessary.

Excavations

9. Where deep excavations are proposed cut-off drains will be use to reduce the amount of surface water entering the excavation. This will be the case around turbine base excavations.

Exposed Ground & Stockpiles

10. The amount of exposed ground and temporary stockpiles open at any one time will be minimised, as far as practicable.

Site tracks

11. Use of track side swales with check dams, and/or filtration check dams will reduce silt in runoff water as required.
12. Check dams to be inspected and cleaned regularly.

Refueling

13. Refuelling of mobile plant will be completed in designated refueling areas only, preferably on an impermeable surface and away from field drains / ditches and watercourses / waterbodies.
14. Spill kits and drip trays will be available on site for use as required.

Concrete

15. Care will be taken when completing concrete works on site to ensure no discharges occur.
16. Concrete wash water, and waste concrete will be managed appropriately on site.

If water pollution is identified the following steps would be adhered to:

STOP - work in the immediate area should be stopped and the source of the pollution identified.

CONTAIN - the source of the pollution should be bunded using a suitable method. Natural watercourses should be temporarily diverted around the source of pollution.

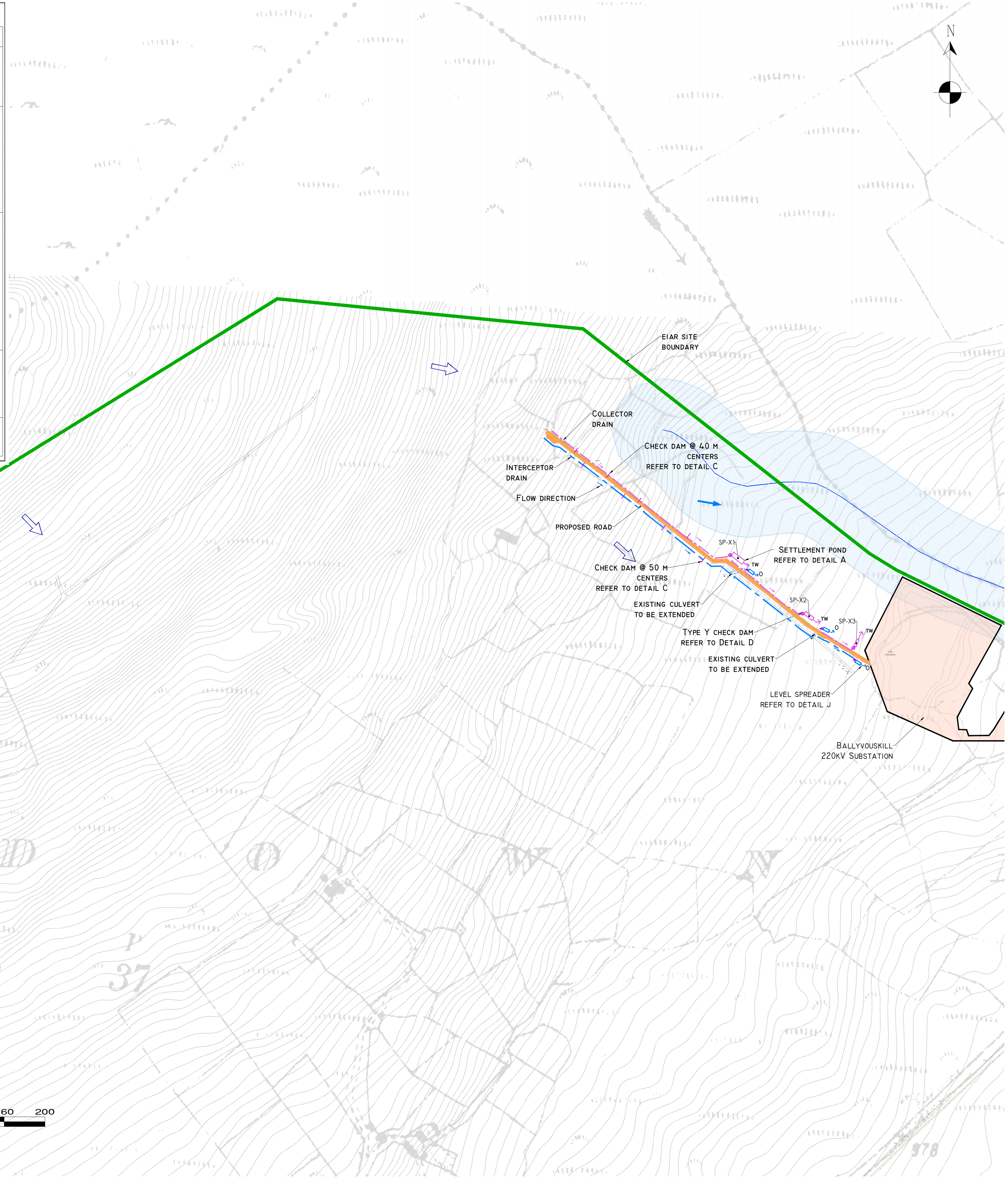
NOTIFY - The relevant authorities (Site Manager / Fisheries / NPWS / Local Authority etc.) should be notified immediately to ensure that measures can be implemented downstream to protect fisheries and other sensitive areas.

DRAINAGE NOTES:

1. Roadway surfacing design and construction to Engineer's Specification (i.e. by others).
2. Spare straw bales/silt fencing/ or similar, to be stored on site. The level of silt in runoff during construction is to be monitored visually and excessive silt levels in any area to be temporarily managed by placing silt fences, straw bales / or similar or additional check dams at the problem areas. Mobile siltbuster system to be available on-site for use as required also.
3. SUDS system to be constructed prior to, or at the same time as the access tracks. Interim measures such as the placement of straw bales/silt fencing/or similar approved method or additional check dams and silt fences to be employed in all instances where work carried out to construct the access tracks is likely to cause adverse environmental effects through increased silt loadings being generated during the construction phase.
4. Suitable prevention measures will be in place at all times to prevent the conveyance of significant volumes of silt to receiving watercourses. See notes on pollution prevention.
5. Interceptor swales / ditches to be used to collect upstream surface water flows. regular cross drains / discharge to field ditches/drains will be required to transfer / discharge surface water in interceptor drains to suitable field drain outfall points.
6. Drainage swales / ditches to be excavated adjacent to the access tracks. Regular cross drains to be located along access tracks to prevent excessive volumes of water collecting in the swales / ditches. Locations of cross drains to be agreed with the Engineer on site. Surface water will not be allowed to discharge directly into existing watercourses.
7. Where possible, a buffer zone of >20m to any existing watercourse will be required where over land discharges are proposed from access track swales / ditches.
8. Batters of all proposed swales / ditches to have a slope of between 1 : 1.5 to 1 : 2 depending upon depth of swale/ditch and will be left as cut to re-vegetate with local species.
9. Track side swales / ditches to be shallow with moderate gradients to prevent scouring. In steep areas check dams should be installed to reduce flow velocities and provide source control of silt containment. Where necessary these have been designated in conjunction with settlement ponds and silt traps, prior to discharge.
10. Settlement ponds to be constructed for silt removal at turbine bases and hard stand areas. Pond sizes depends on catchment area served. Sample pond sizes shown on Drawing D501.
11. straw bales / or similar and silt fences to be used also around spoil heaps to mitigate silt runoff. silt fences may be removed when suitable vegetation cover is established.
12. silt fences to be provide along edge of existing watercourse where works comes within <15m of edge of any ditch / ephemeral channels.
13. Slopes of the swales / ditches to be protected from erosion until vegetation has been established. Stripped vegetative layer (peat 'sod' or 'scraw') from excavations to be stored locally and used to line slopes and base of swales / ditches or longitudinal mounds of vegetation swales at field drain discharge points.
14. Areas stripped of vegetation should be kept to a minimum.
15. Clean stone flow control check dams to be made of locally won / geologically similar well graded stone. Aggregate size for stone check dams to be typically 20- 40mm clean stone. On sloping sections of the access tracks, 40mm check dams to be protected from washing away through the placement of 100m stone on the downhill face of the check dam and by wrapping in geotextile.
16. Build up of silt levels at check dams to be removed and disposed of appropriately. Silt levels at check dams to be visually inspected as part of an ongoing drainage maintenance programme during the construction phase. Where check dams become clogged with silt or vegetation, stone check dam to be removed and replaced subsequent to the removal of silt.
17. Spacing and frequency of check dams will be dependent upon longitudinal gradient of swale.
18. Location of filtration check dams (if required) to be agreed on site with Engineer. Settlement ponds to be constructed in a manner where they may be easily infilled at a later date (post completion of the turbine base and hardstand construction). Only suitable materials excavated from the pond to be used to form part of the embankment around the pond.
19. Oil fuel will be stored within bunded containment structures.
20. silt bags will be used on site at field drain discharge locations, as necessary.

MITIGATION / DRAINAGE COINTROLS AVAILABLE FOR USE ACROSS THE SITE

Management Type	Description of SUDS Drainage Control Methods
Avoidance Controls	1) Application of 50m buffer zones to natural Watercourses where possible 2) Application of 10m buffer zones to main drains where possible 3) Using small working areas 4) Working in appropriate weather, and suspending certain work activities in advance of forecasted wet weather
Source Controls:	1) Use of upstream interceptor drains and downstream collector drains / oversized swales, vee-drains, diversion drains, flumes and culvert pipes 2) erosion and velocity control measures such as: A) sand bags B) oyster bags filled with gravel C) filter fabrics D) and other similar/equivalent or appropriate systems 3) Using small working areas 4) Surrounding stockpiles with silt fencing 5) weathering off / sealing peat stockpiles
In-Line Controls:	1) Interceptor drains, vee-drains, oversized swales/collector drains 2) erosion and velocity control measures such as: A) sand bags B) oyster bags filled with gravel C) filter fabrics D) straw bales E) flow limiters F) weirs or baffles G) and/or other similar/equivalent or appropriate systems. 3) silt fences, filter fabrics 4) In stream Sedimats 5) collection sumps, temporary sumps, pumping systems 5) attenuation lagoons 6) sediment traps, stilling / settlement ponds
Water Treatment Controls:	1) Temporary sumps 2) attenuation ponds 3) Temporary storage lagoons 4) Sediment traps, Stilling / Settlement ponds 5) Proprietary settlement systems such as Siltbuster, and/or other similar/equivalent or appropriate systems. 6) Silt dewatering bags
Outfall Controls:	1) Levelspreaders 2) Buffered outfalls 3) Vegetation filters 4) Silt dewatering bags 5) Flow limiters and weirs



0 40 80 120 160 200
Metres

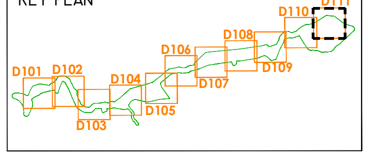
Drawing Legend :

Existing Drainage
- Rivers/streams
- Rivers/streams 50m buffer
- Lakes
- Lake 50m buffer
- Stream flow direction

Proposed WF Construction Drainage (*completed in advance of access road works)
- Upstream Interceptor Drain*
- Swales/Downstream Collector Drain
- Direction of flow
- Silt Fences*
- Level spreader
- Settlement pond - vegetation filter - level spreader
- Check Dam 'type A'/Silt trap*
- Check Dam 'type B'/Silt Trap
- Proposed WC crossing culverts/bridges
- Existing culverts proposed to be extended
- Proposed new culverts
- Existing culverts to be removed
- Collector Ditch Culvert
- Watercourse drain protection berm
- O — Overland Flow Discharge
- TW — Treated Water Discharge
- SP — Settlement Pond
- VS — Semi-Natural Vegetation Swale / Filter Bed /secondary SP
- SP-A3 — Settlement pond number
- Pumping Sump
- Ground slope direction

- EIAR site boundary
- Existing ground surface minor contour (1 m interval)
- Proposed road upgrade
- Proposed new roads
- Proposed road upgrade
- Proposed new roads
- Existing public road
- Substation
- Proposed borrow pit
- Permitted borrow pit
- Ballyvouskill 220kV Substation
- Knocknamork Permitted Layout
- Cut area
- Fill area

KEY PLAN



Drawing Notes
1. Drawings issued are for planning application purposes only.
2. Copyright, all rights reserved. No part here with may be copied or reproduced partially or wholly in any form whatsoever without the prior notice of the copyright owner Hydro-Environmental Services.
3. Do not scale off this drawing. Figured metric dimensions only should be taken off this drawing.
4. All dimensions are in metres.

Date	Description	Chkd	Signed

Revisions

HYDRO ENVIRONMENTAL SERVICES
22 Lower Main St
Dungarvan
Co. Waterford
Ireland
tel: +353 (0) 58-44122
fax: +353 (0) 58-44244
email: info@hydroenvironmental.ie
web: www.hydroenvironmental.ie

Client: Knocknamork Ltd

Job: Proposed Substation, Underground Cabling, Access Roads to Knocknamork Renewable Energy Development

Title: Proposed Drainage Layout

Figure No: D111

Drawing No: P1421-1-0722-A1-D111-00A	
Sheet Size: A1	Project No.: P1421-1
Scale: 1:2,000 (A1)	Drawn By: GD
Date: 15/07/2022	Checked By: MG

APPENDIX 4-5

HARVEST MANAGEMENT PLAN

Harvest Management Plan in Support of Felling Licence Application

Proposed Felling & Reforestation Methods	
Thinning (incl. CCF)	☒ N/A ☐ Harvester ☐ Chainsaw ☐ Forwarder ☐ Tractor/Quad ☐ Skyline ☐ Other (specify):
Clearfelling	☐ N/A ☒ Harvester ☒ Chainsaw ☒ Forwarder ☐ Tractor/Quad ☐ Skyline ☐ Other (specify):
Reforestation	☒ N/A ☐ Windrowing ☐ Pit planting ☐ Mounding ☐ Scrap mounding ☐ Scarification ☐ Other (specify):
Site access (i.e. via forest road)	☒ Present ☐ Planned ☐ Not required ☐ Other (specify)

Social & Environmental Features & Considerations		
Social	**Habitat & Biodiversity**	**Soil & Water**
☐ Recreational usage	☐ Designated area (SAC, SPA, etc.)	☐ Aquatic zone(s) on/adjoining site
☐ Adjoining dwelling(s)	☐ Broadleaves/diverse conifers	☒ Relevant watercourse(s)
☐ Right(s)-of-way present	☐ Hedgerows	☐ Water-related 'hotspots'
☐ Utilities (power lines/water main)	☐ Old/veteran trees	☐ Water abstraction point
☐ Sensitive landscape	☐ Large scale deadwood	☐ Peaty or peaty/gley
☐ Important viewpoint(s)	☐ Badger sett, rookery, etc.	☒ Steep slope(s)
☐ Archaeological site(s) & feature(s)	☐ Protected fauna	☐ Water setback(s) present & intact
☐ Cultural feature(s)	☐ Protected flora	☐ Supply of brash limited
☐ Anti-social (dumping, fire, etc.)	☐ Wetland habitat	☐ Other:
☐ Other (specify):	☐ Other (specify):	☐ Other:

Proposed Measures to Protect Social & Environmental Features & Considerations	
☐ Consult with local residents	☐ Establish excl. zones around arch. sites/features
☒ Erect safety signage	☒ Temporary bridging points (TBPs) required
☒ Onsite briefing of all operators, pre-commencement	☐ Install water setback at refor.
☒ Carefully selected refuelling/repair/storage depot	☐ Install dwelling setback at refor.
☐ Measures to protect right(s)-of-way	☐ Install public road setback at refor.
☐ Measures to protect service features	☐ Install archaeological setback at refor.
☐ Measures to protect habitats & biodiversity features	☐ Install biodiversity setback at refor.
☒ Limit operations to dry weather	☐ Install landscape setback at refor.
☒ Daily visual monitoring of ground conditions	☐ Inclusion of Refor. Objective 'CCF'
☒ Daily visual monitoring of water	☐ Inclusion of Refor. Objective 'BIO'

Proposed Measures to Protect Social & Environmental Features & Considerations (Cont..)	
☒ Water sampling	☐ Forest edge planting
☒ Install silt traps/barriers	☐ Environmental setback planting
☒ Drain blocking/slow-water dams	☐ Other (specify)
☒ Utilise brash mats along extraction routes	☐ Other (specify)
☒ Exclude machinery in areas adjoining aquatic zones, water abstraction points & water-related 'hotspots'	☐ Other (specify)

Ancillary Information (include relevant information to expand on above & to detail important aspects such as the sequencing of operations, the width of environmental setbacks & contingency planning. Ensure accurate cross-referencing and consistency with maps) *

Harvesting Plan

Harvesting operations to be carried out by fully-trained, experienced forest contractors, using appropriate equipment for clear felling the site to comply with *Forest Harvesting and the Environment Guidelines*. This will include harvester and low ground pressure forwarder with a 14 tonne bunk capacity.

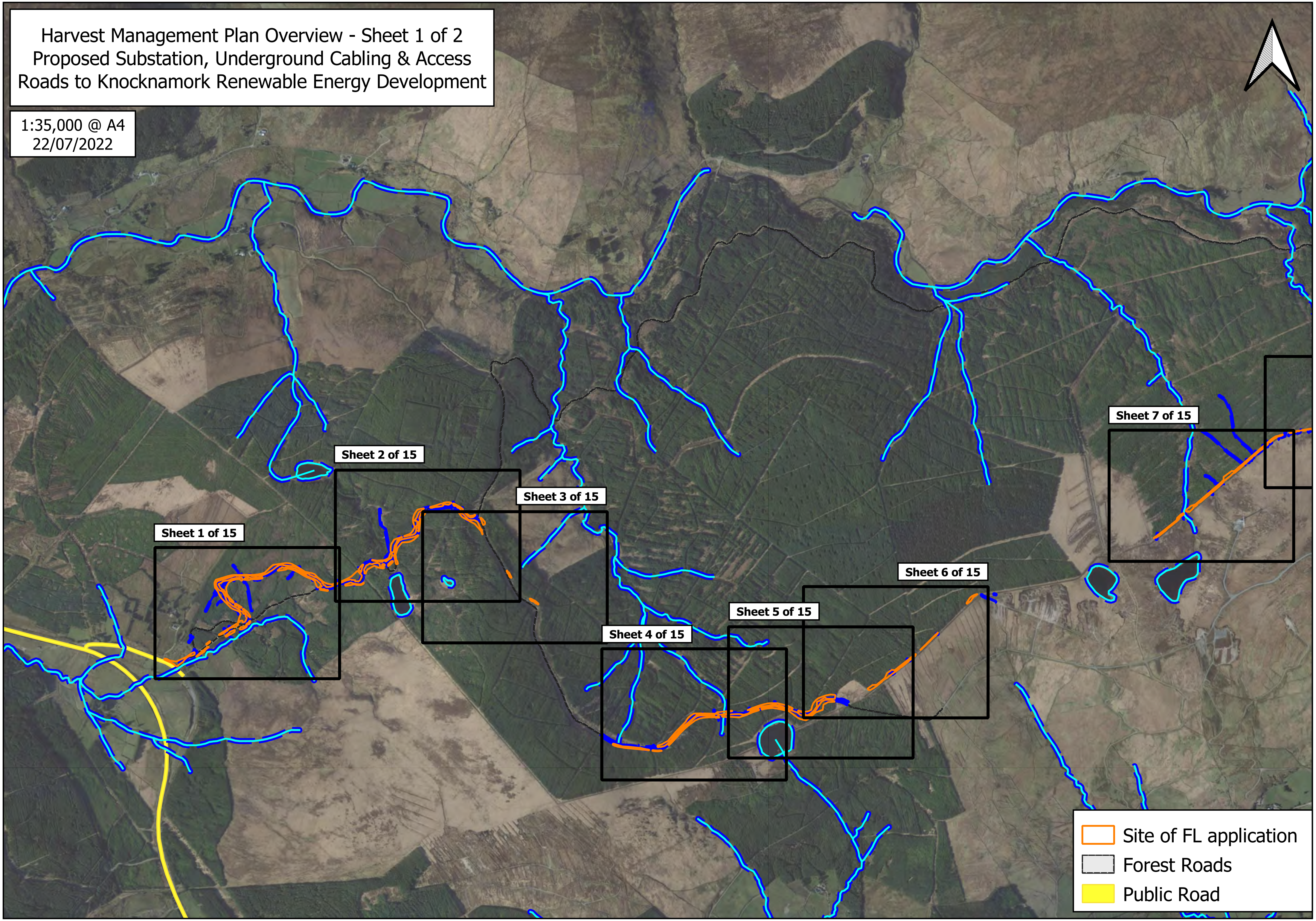
Onsite supervision will be present during operations to ensure that all operations are carried out appropriately and that water protection measures are adequate and remain effective throughout. If necessary, triggering contingency measures e.g to cease operations when necessary. Regular inspections during operations will allow for immediate corrective action in the case of unforeseen issues.

Where possible, harvesting and extraction processes will be undertaken during dry periods, to limit surface water run-off and soil compaction. Where brash material on site is limited, brash mats will be deployed to help reinforce sections of the extraction route outside of the existing hardcore forestry road. All operations to comply with *Forest Harvesting and the Environment Guidelines* and *Forestry and Water Quality Guidelines*.

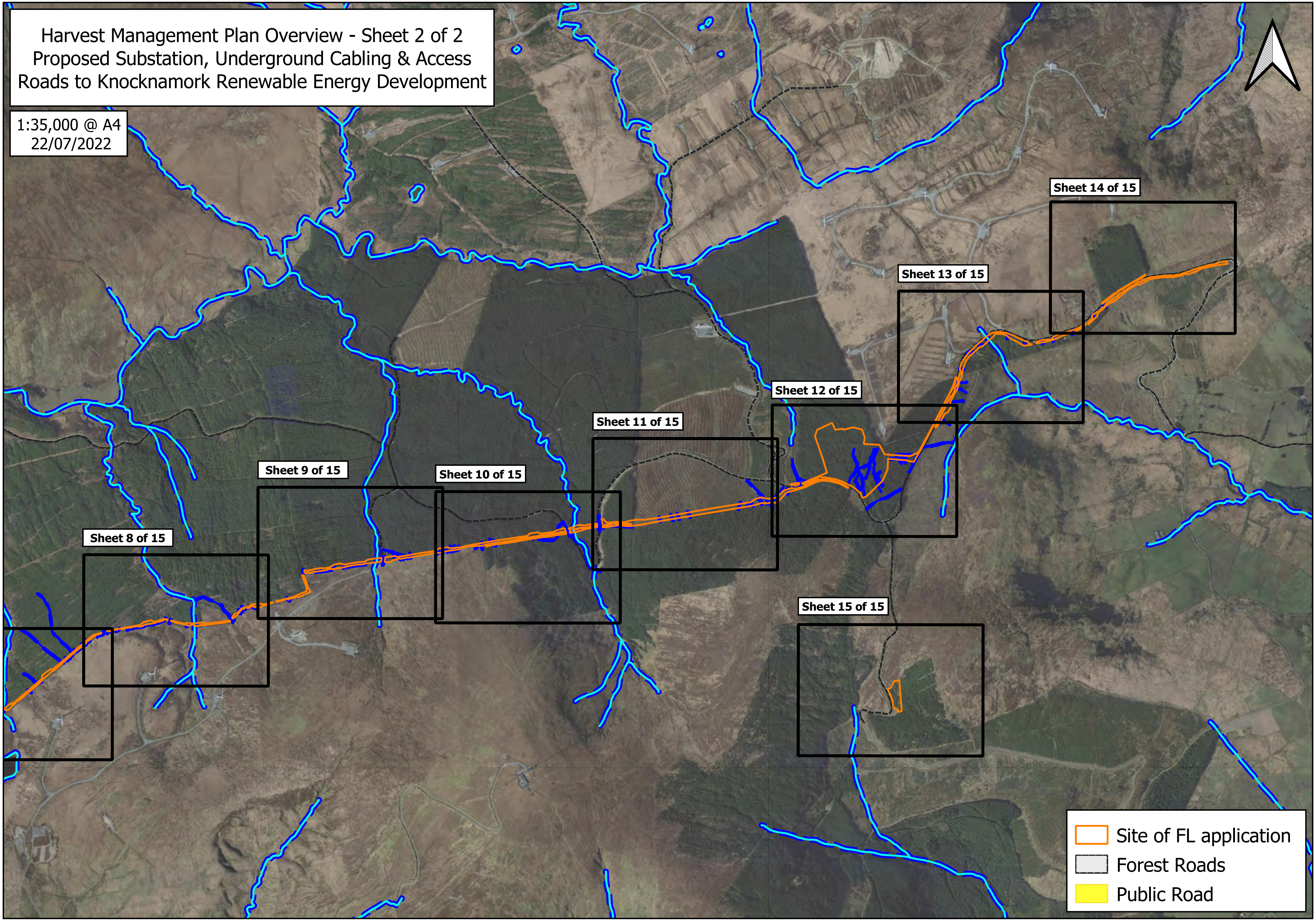
The extent of all necessary tree felling will be identified and demarcated with markings on the ground in advance of any felling commencing. 5m buffer zones will be established either side of the relevant watercourses within which there will be no traversal of machinery permitted. Similarly, 10m buffer zones will be established either side of aquatic zones (AZs). Note that prior to harvesting works all operatives will be made aware of such buffers and any site safety hazards.

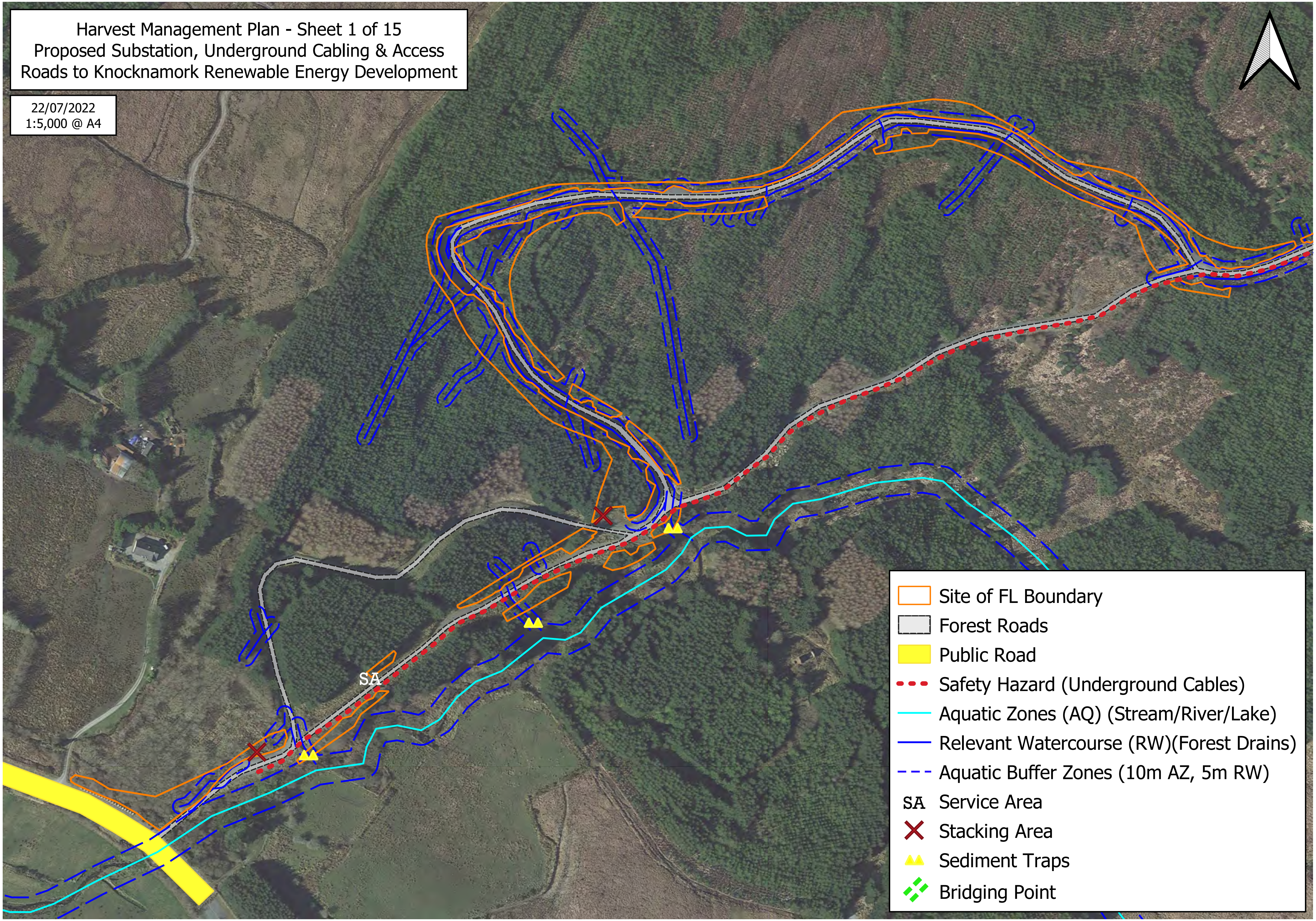
Silt traps will be installed within any relevant watercourses within or adjacent to the felling compartments, prior to the commencement of felling works, to preserve the turbidity and integrity of the downstream river catchment. These sediment traps will be monitored and maintained throughout the period of works and for a period afterwards until the site has stabilised. Additional traps may be placed along the edge of the adjacent aquatic zones, in locations where surface run-off may be possible. Temporary bridges will be used where machine routes cross relevant watercourses. Water sampling will be utilised upstream and downstream of felling at suitable sampling locations, taken from the stream/riverbank with no in-stream access permitted.

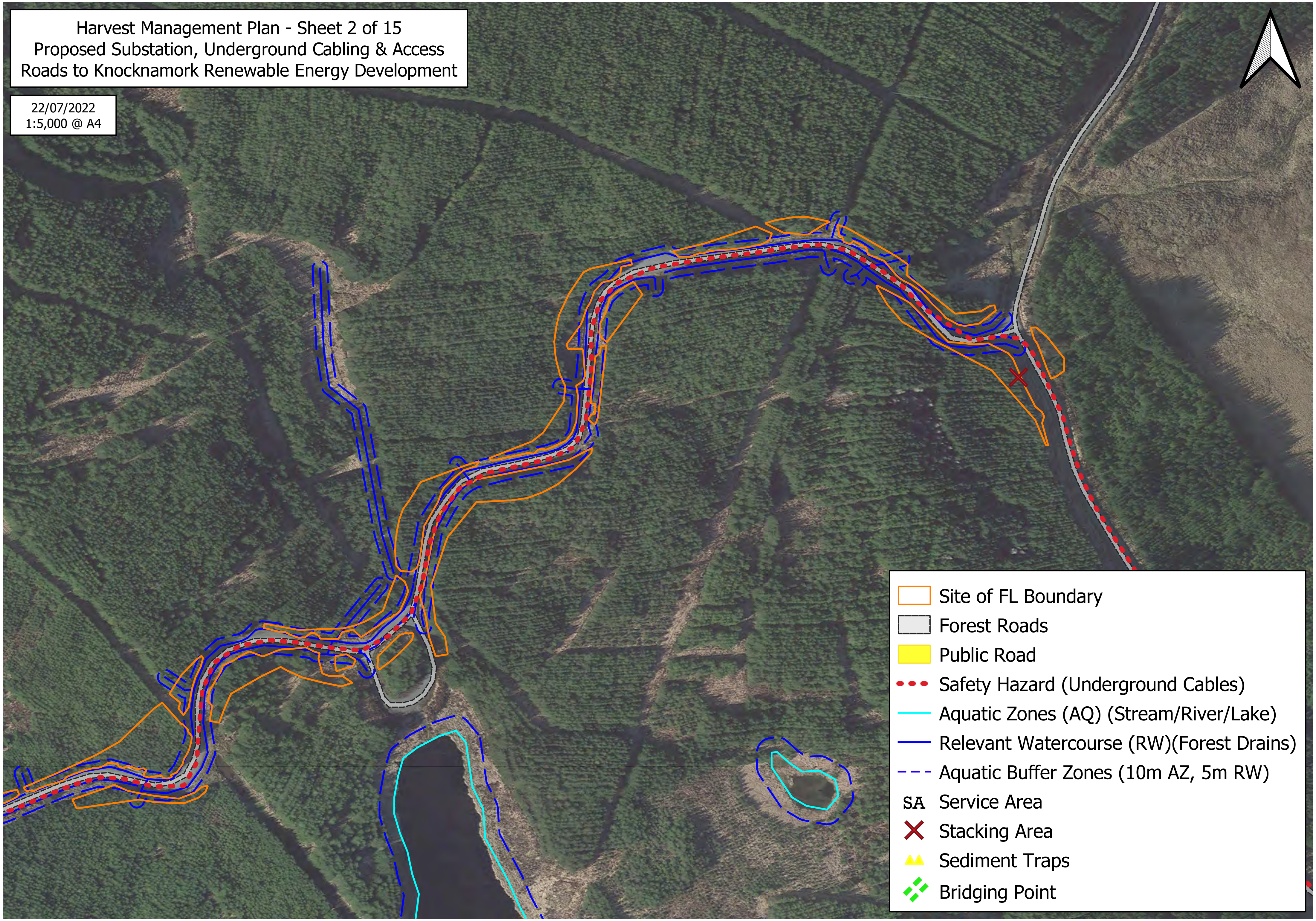
Timber will be stacked at intervals along existing roads, keeping back from any forestry drains to prevent contamination to watercourses. It is intended to extract timber from site using existing forest roads connecting to public roads, with felling seen on sheets 1 – 6 travelling west to the N22 and sheets 7 - 15 travelling east to the R582.

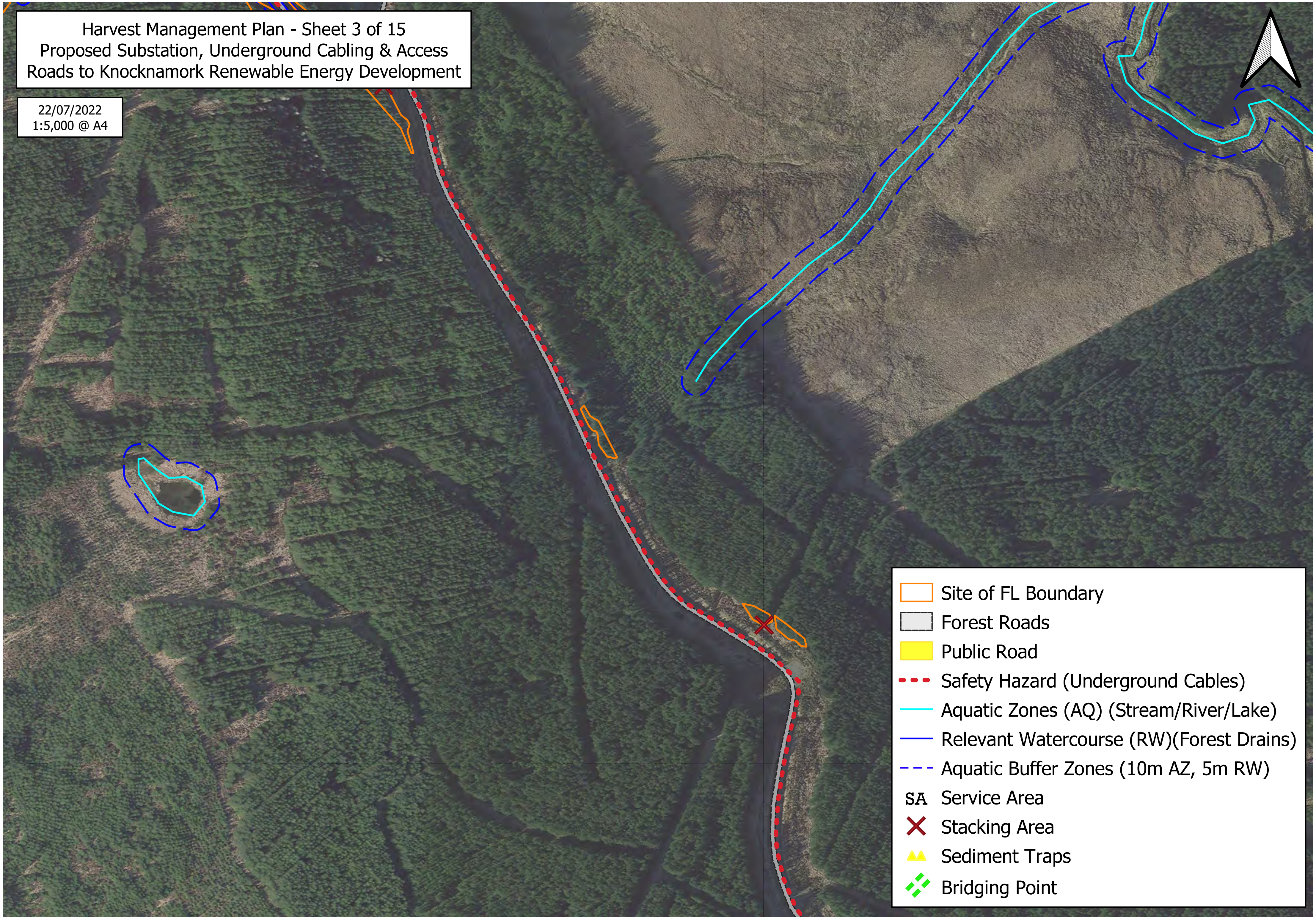


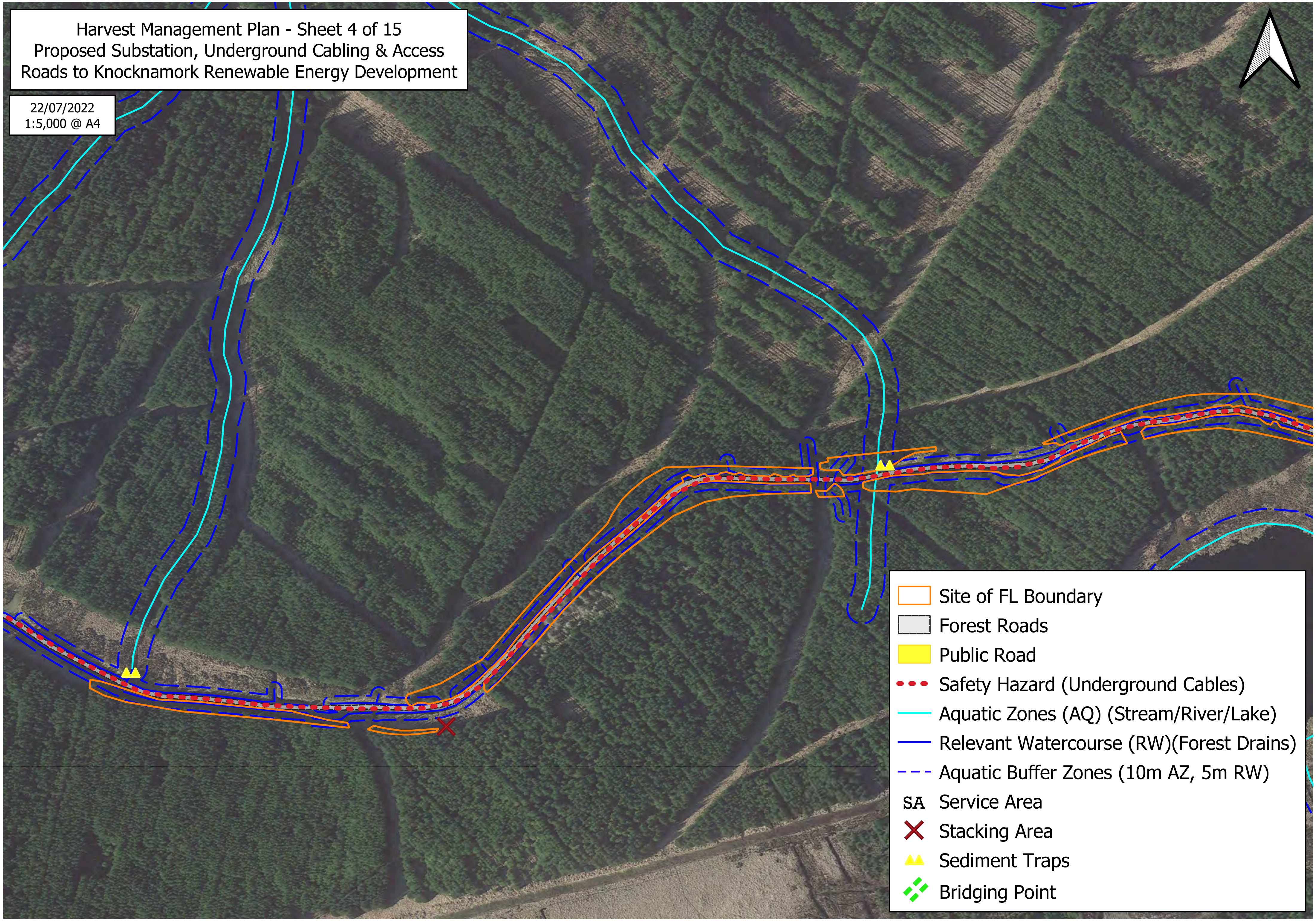
Harvest Management Plan Overview - Sheet 1 of 2
Proposed Substation, Underground Cabling & Access
Roads to Knocknamork Renewable Energy Development
1:35,000 @ A4
22/07/2022
Sheet 1 of 15
Sheet 2 of 15
Sheet 3 of 15
Sheet 4 of 15
Sheet 5 of 15
Sheet 6 of 15
Sheet 7 of 15
Site of FL application
Forest Roads
Public Road

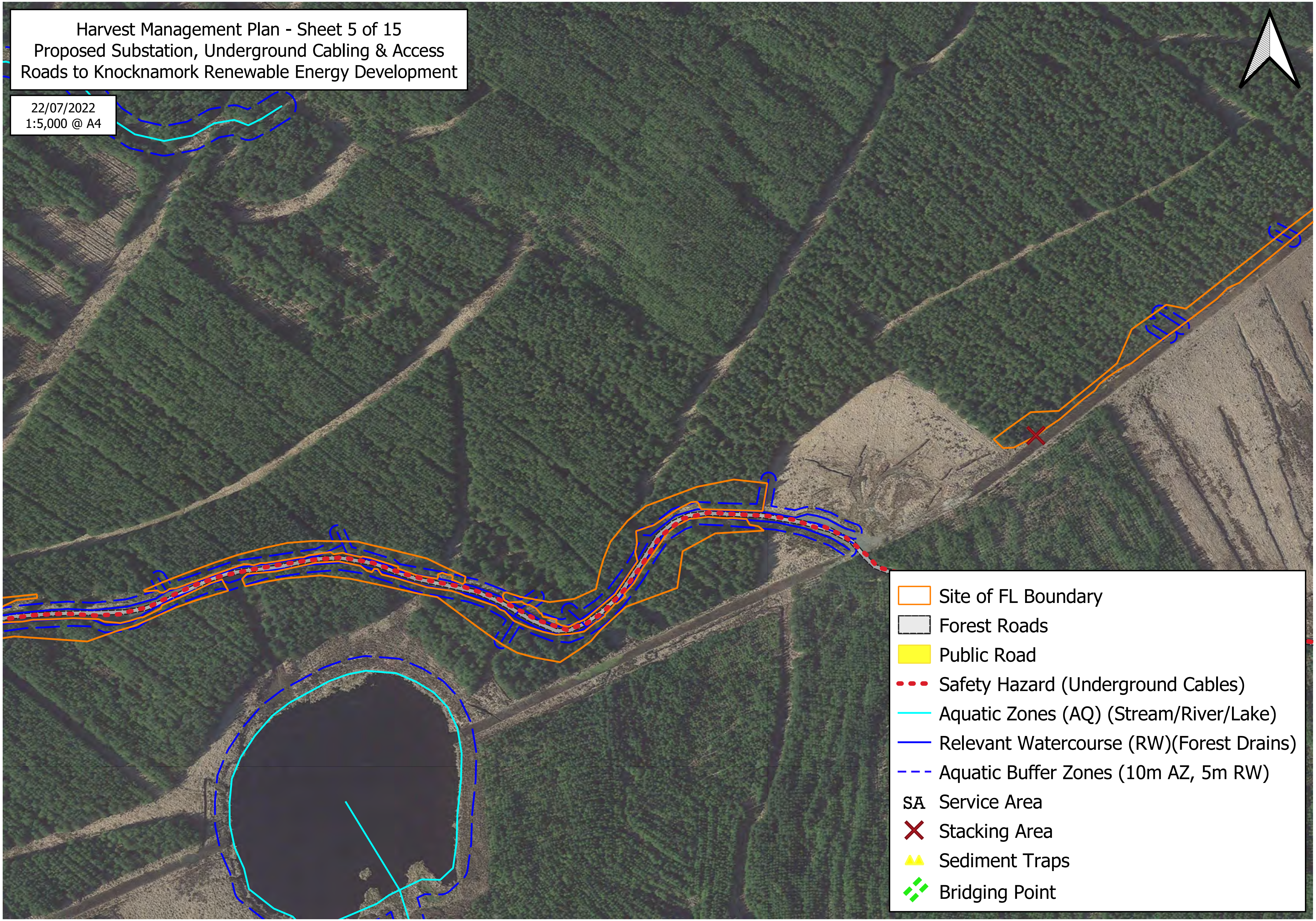

Harvest Management Plan Overview - Sheet 2 of 2
Proposed Substation, Underground Cabling & Access
Roads to Knocknamork Renewable Energy Development
1:35,000 @ A4
22/07/2022
Sheet 8 of 15
Sheet 9 of 15
Sheet 10 of 15
Sheet 11 of 15
Sheet 12 of 15
Sheet 13 of 15
Sheet 14 of 15
Sheet 15 of 15
Site of FL application
Forest Roads
Public Road

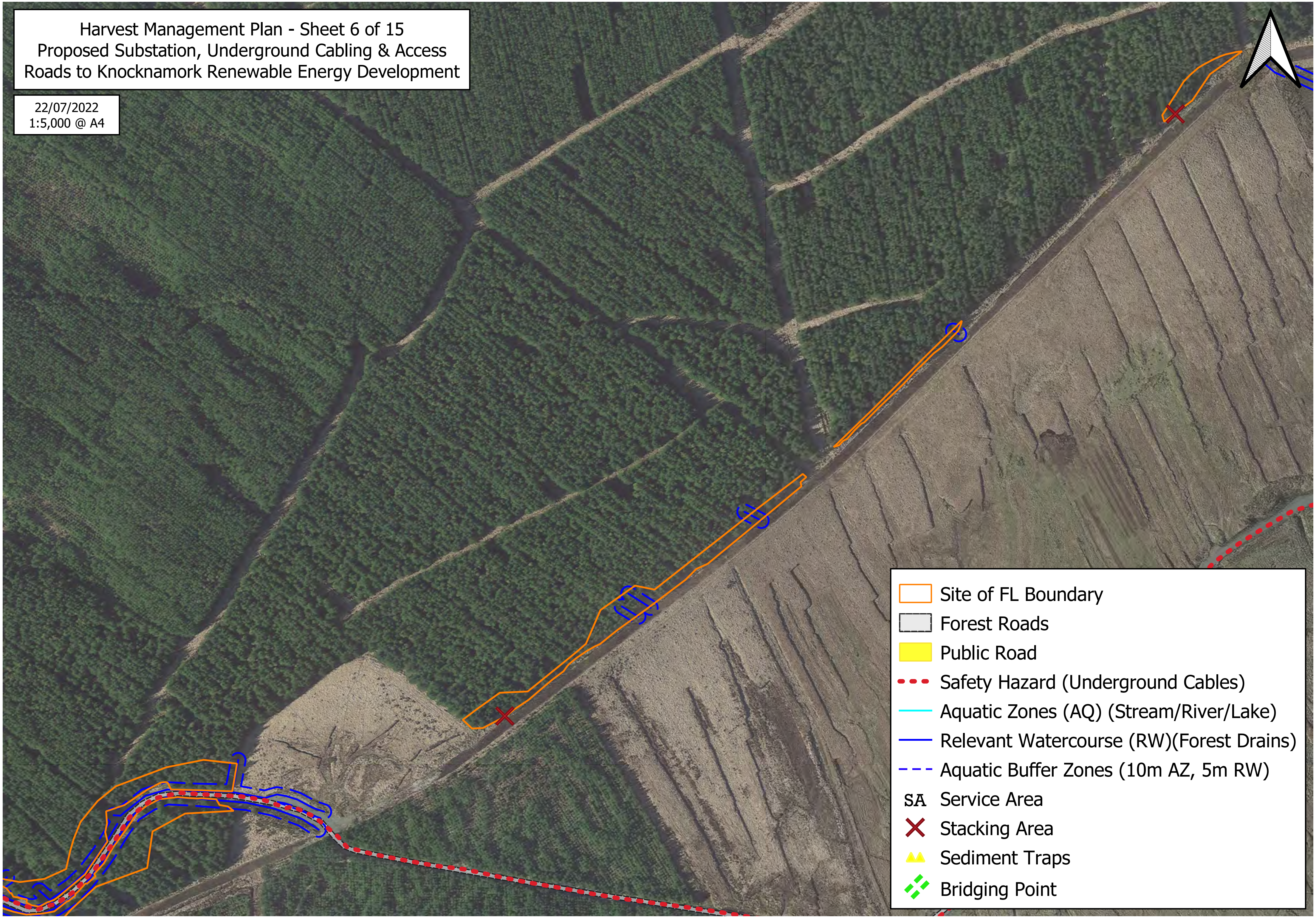

Harvest Management Plan - Sheet 1 of 15
Proposed Substation, Underground Cabling & Access
Roads to Knocknamork Renewable Energy Development
22/07/2022
1:5,000 @ A4
SA
Site of FL Boundary
Forest Roads
Public Road
Safety Hazard (Underground Cables)
Aquatic Zones (AQ) (Stream/River/Lake)
Relevant Watercourse (RW)(Forest Drains)
Aquatic Buffer Zones (10m AZ, 5m RW)
SA Service Area
Stacking Area
Sediment Traps
Bridging Point

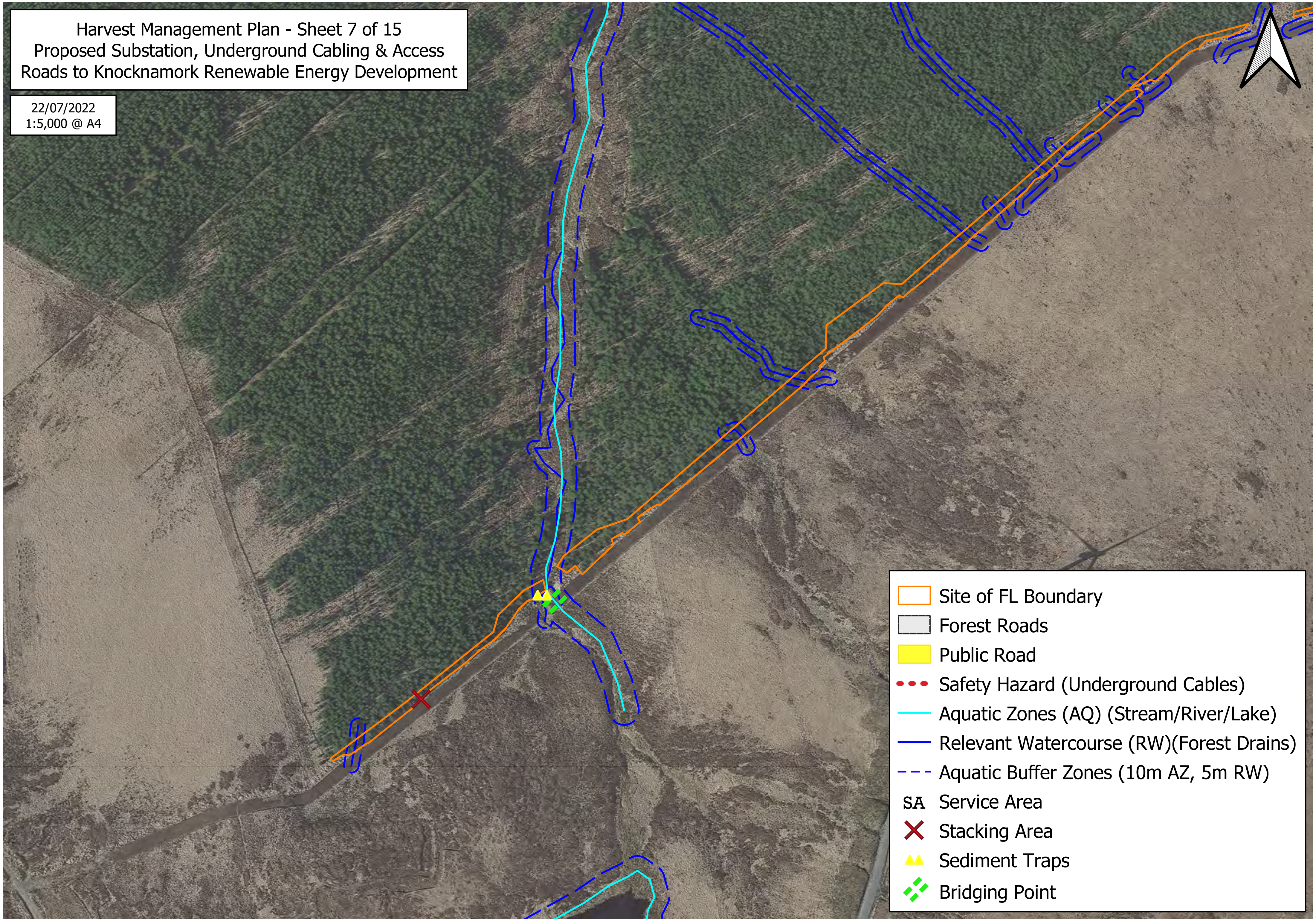

Harvest Management Plan - Sheet 2 of 15
Proposed Substation, Underground Cabling & Access
Roads to Knocknamork Renewable Energy Development
22/07/2022
1:5,000 @ A4
Site of FL Boundary
Forest Roads
Public Road
Safety Hazard (Underground Cables)
Aquatic Zones (AQ) (Stream/River/Lake)
Relevant Watercourse (RW)(Forest Drains)
Aquatic Buffer Zones (10m AZ, 5m RW)
SA Service Area
Stacking Area
Sediment Traps
Bridging Point

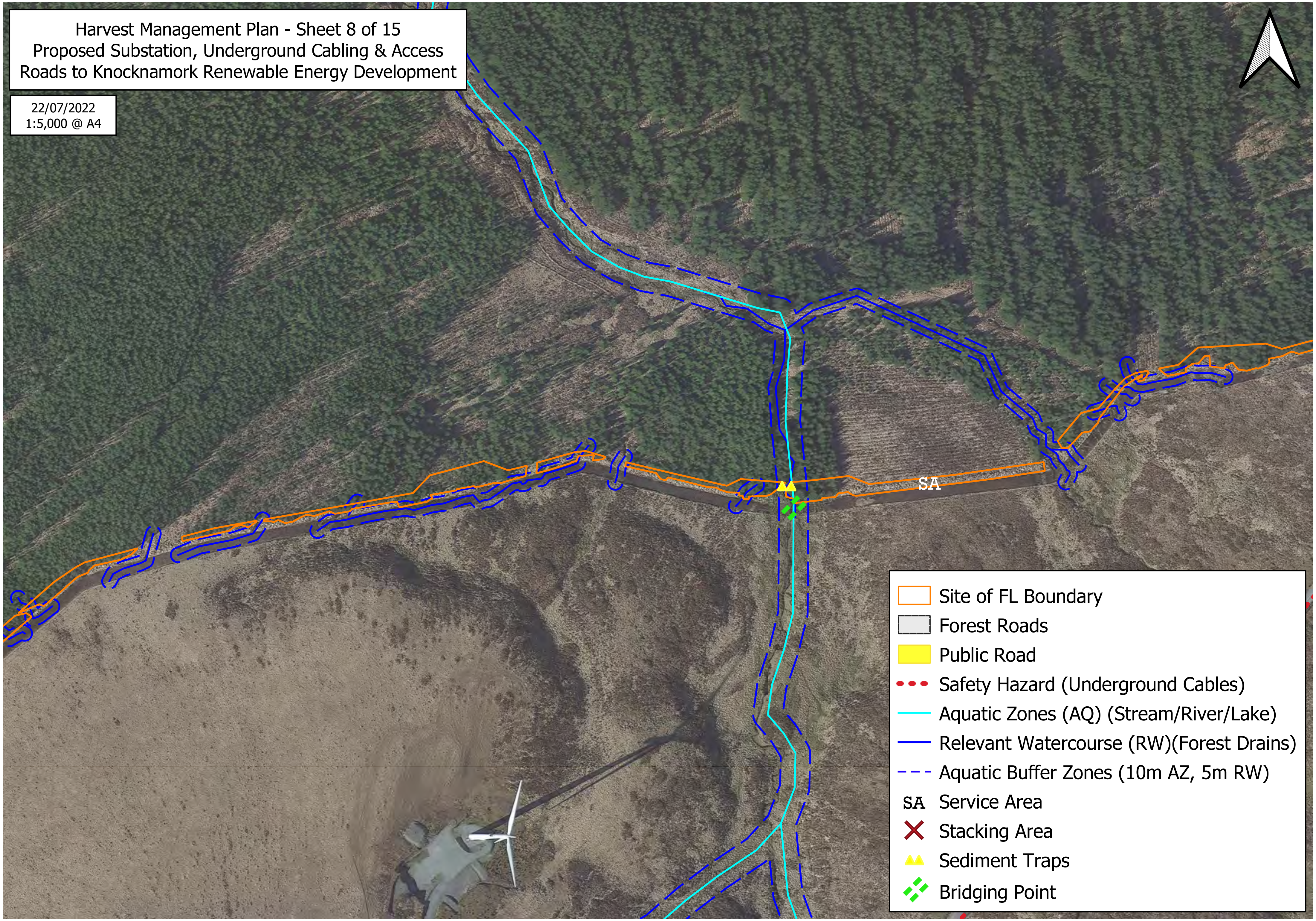

Harvest Management Plan - Sheet 3 of 15
Proposed Substation, Underground Cabling & Access
Roads to Knocknamork Renewable Energy Development
22/07/2022
1:5,000 @ A4
Site of FL Boundary
Forest Roads
Public Road
Safety Hazard (Underground Cables)
Aquatic Zones (AQ) (Stream/River/Lake)
Relevant Watercourse (RW)(Forest Drains)
Aquatic Buffer Zones (10m AZ, 5m RW)
SA Service Area
Stacking Area
Sediment Traps
Bridging Point

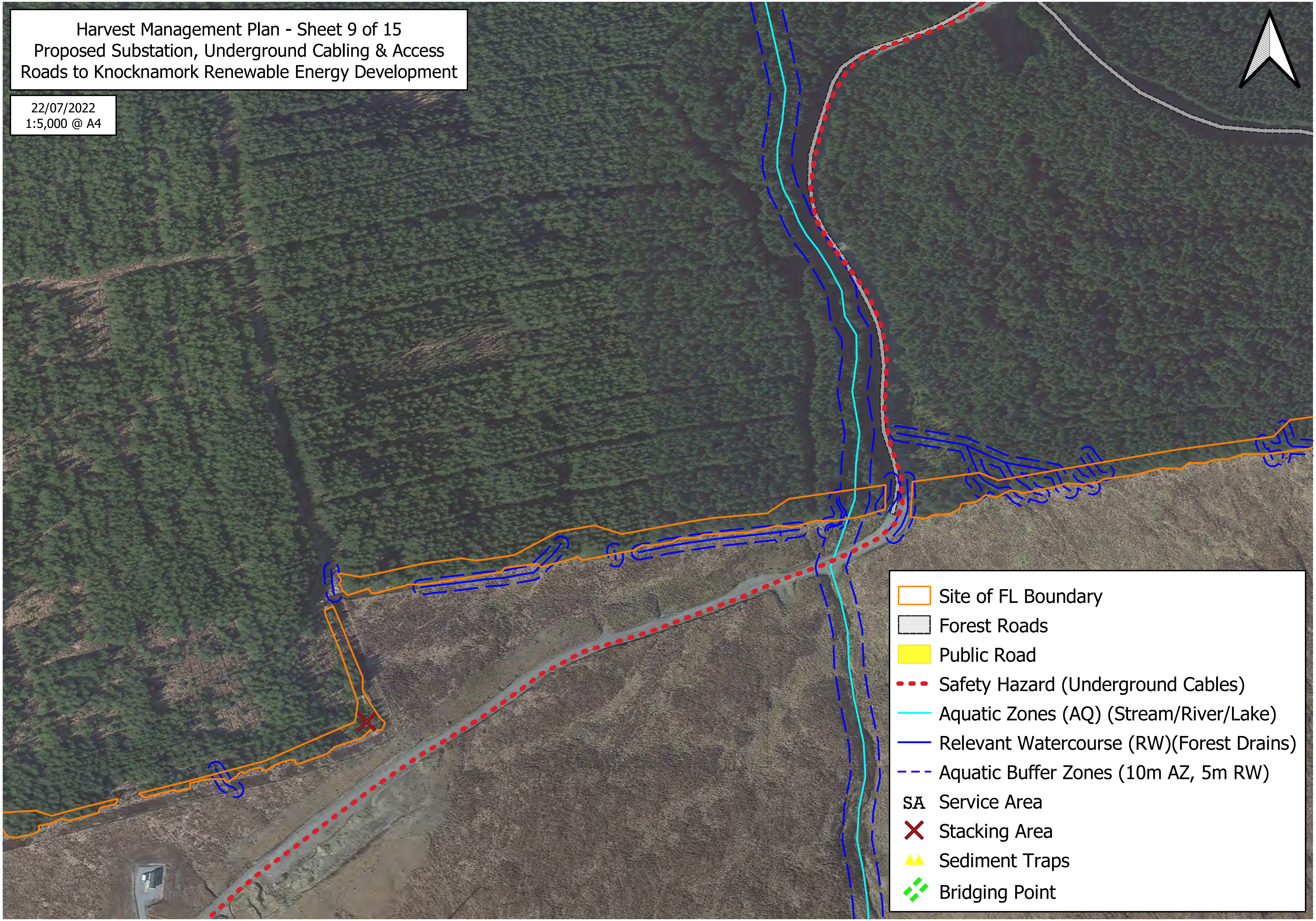

Harvest Management Plan - Sheet 4 of 15
Proposed Substation, Underground Cabling & Access
Roads to Knocknamork Renewable Energy Development
22/07/2022
1:5,000 @ A4
Site of FL Boundary
Forest Roads
Public Road
Safety Hazard (Underground Cables)
Aquatic Zones (AQ) (Stream/River/Lake)
Relevant Watercourse (RW)(Forest Drains)
Aquatic Buffer Zones (10m AZ, 5m RW)
SA Service Area
Stacking Area
Sediment Traps
Bridging Point


Harvest Management Plan - Sheet 5 of 15
Proposed Substation, Underground Cabling & Access
Roads to Knocknamork Renewable Energy Development
22/07/2022
1:5,000 @ A4
Site of FL Boundary
Forest Roads
Public Road
Safety Hazard (Underground Cables)
Aquatic Zones (AQ) (Stream/River/Lake)
Relevant Watercourse (RW)(Forest Drains)
Aquatic Buffer Zones (10m AZ, 5m RW)
SA Service Area
Stacking Area
Sediment Traps
Bridging Point

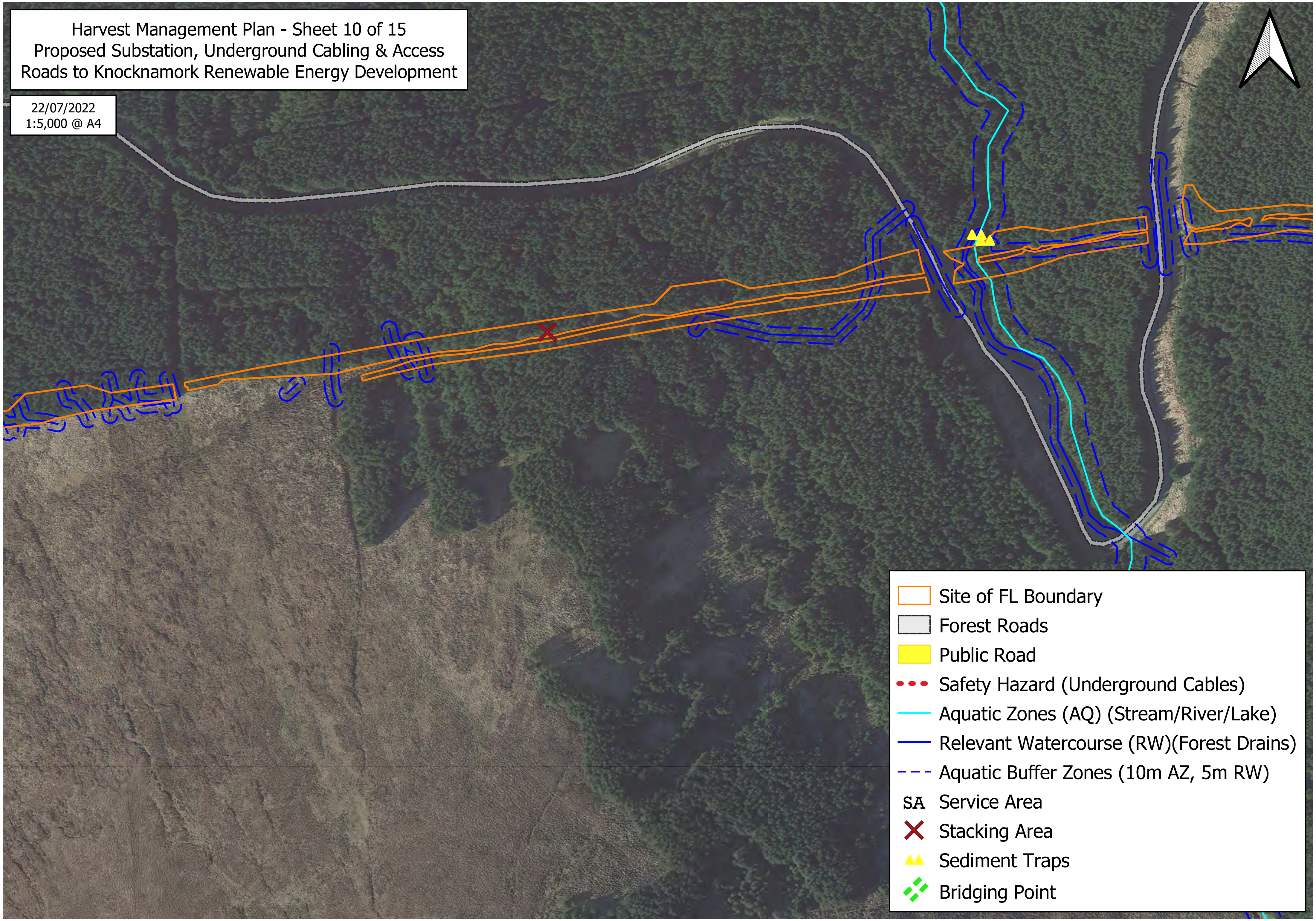

Harvest Management Plan - Sheet 6 of 15
Proposed Substation, Underground Cabling & Access
Roads to Knocknamork Renewable Energy Development
22/07/2022
1:5,000 @ A4
Site of FL Boundary
Forest Roads
Public Road
Safety Hazard (Underground Cables)
Aquatic Zones (AQ) (Stream/River/Lake)
Relevant Watercourse (RW)(Forest Drains)
Aquatic Buffer Zones (10m AZ, 5m RW)
SA Service Area
Stacking Area
Sediment Traps
Bridging Point

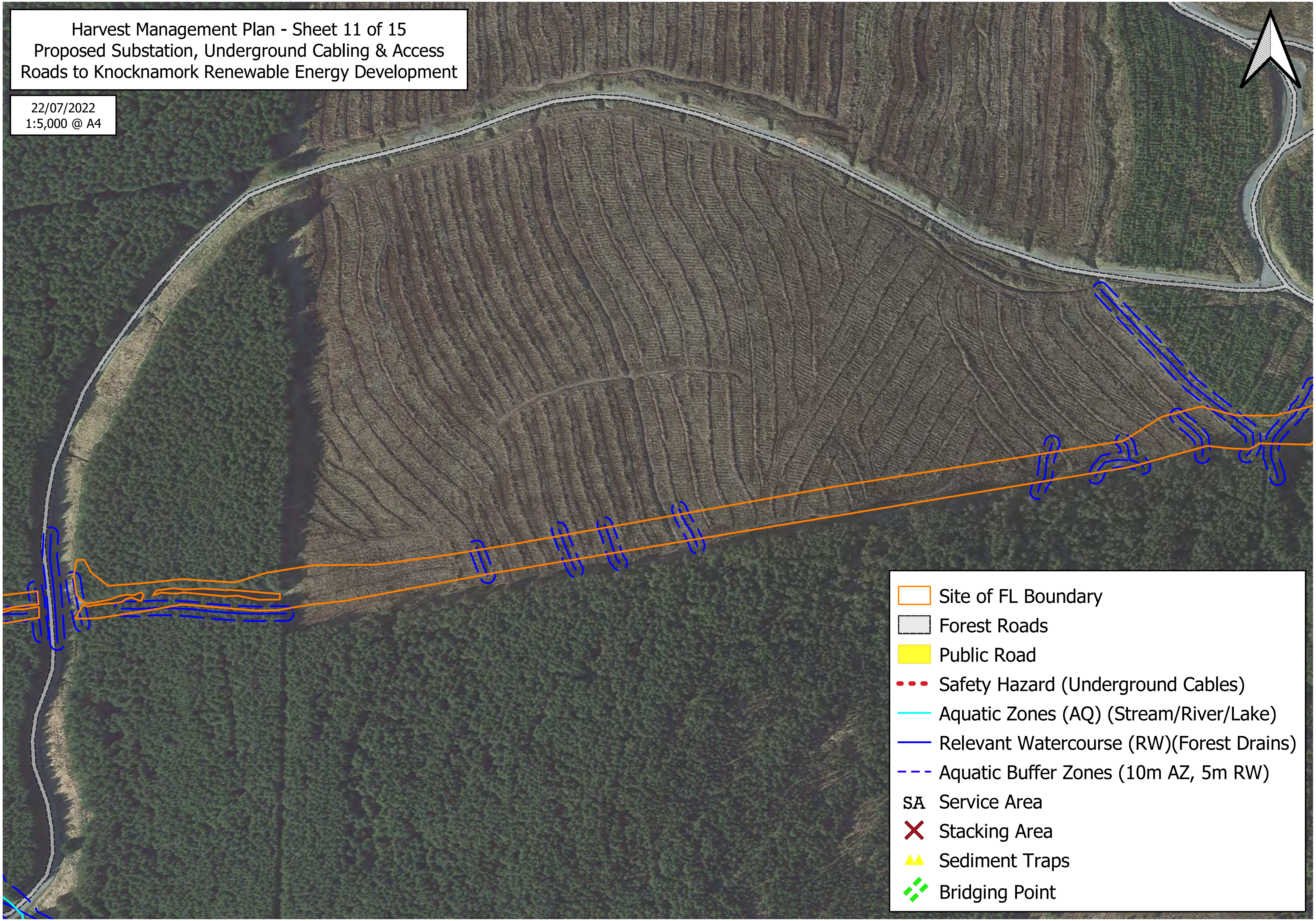

Harvest Management Plan - Sheet 7 of 15
Proposed Substation, Underground Cabling & Access
Roads to Knocknamork Renewable Energy Development
22/07/2022
1:5,000 @ A4
Site of FL Boundary
Forest Roads
Public Road
Safety Hazard (Underground Cables)
Aquatic Zones (AQ) (Stream/River/Lake)
Relevant Watercourse (RW)(Forest Drains)
Aquatic Buffer Zones (10m AZ, 5m RW)
SA Service Area
Stacking Area
Sediment Traps
Bridging Point

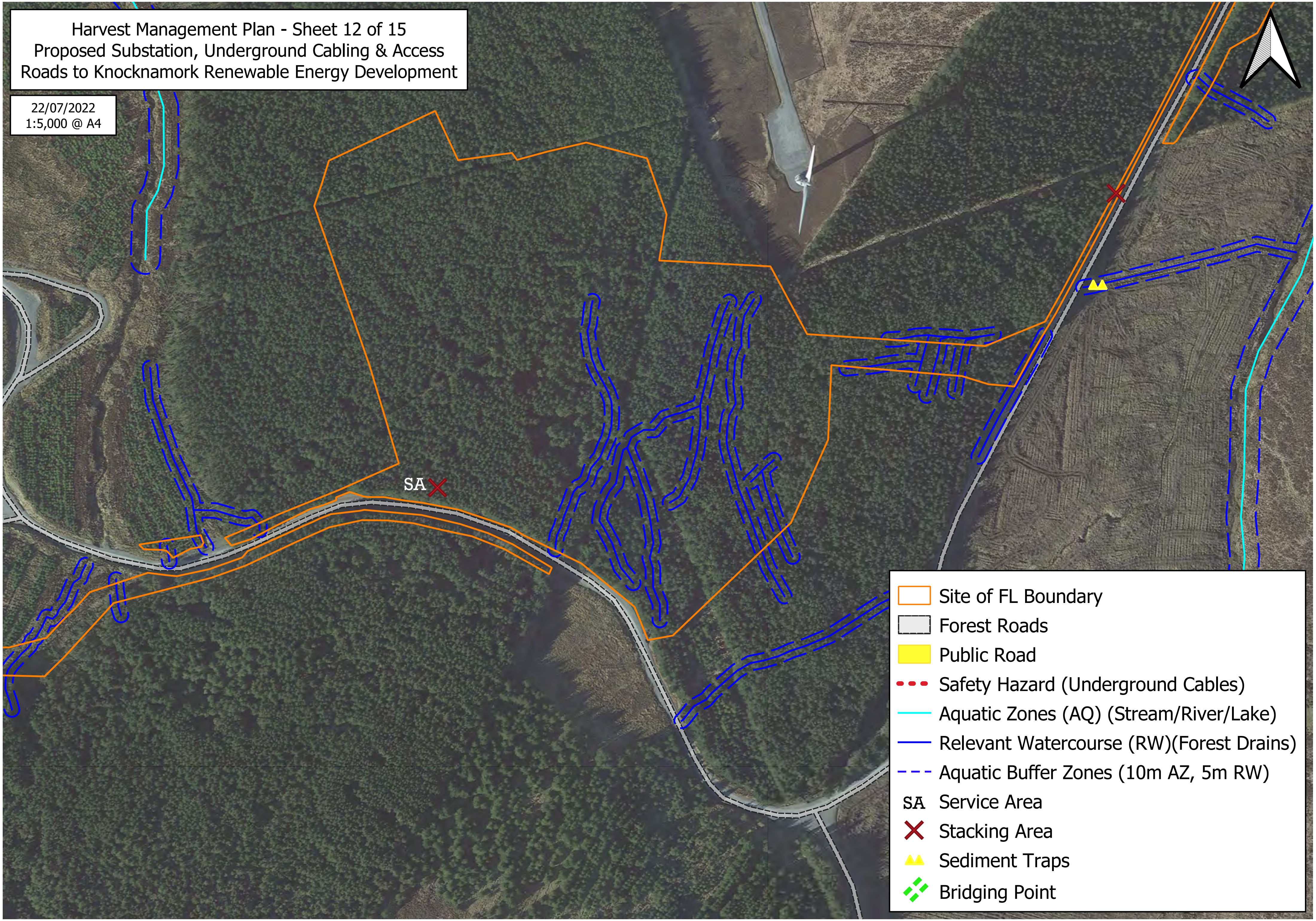

Harvest Management Plan - Sheet 8 of 15
Proposed Substation, Underground Cabling & Access
Roads to Knocknamork Renewable Energy Development
22/07/2022
1:5,000 @ A4
SA
Site of FL Boundary
Forest Roads
Public Road
Safety Hazard (Underground Cables)
Aquatic Zones (AQ) (Stream/River/Lake)
Relevant Watercourse (RW)(Forest Drains)
Aquatic Buffer Zones (10m AZ, 5m RW)
SA Service Area
Stacking Area
Sediment Traps
Bridging Point

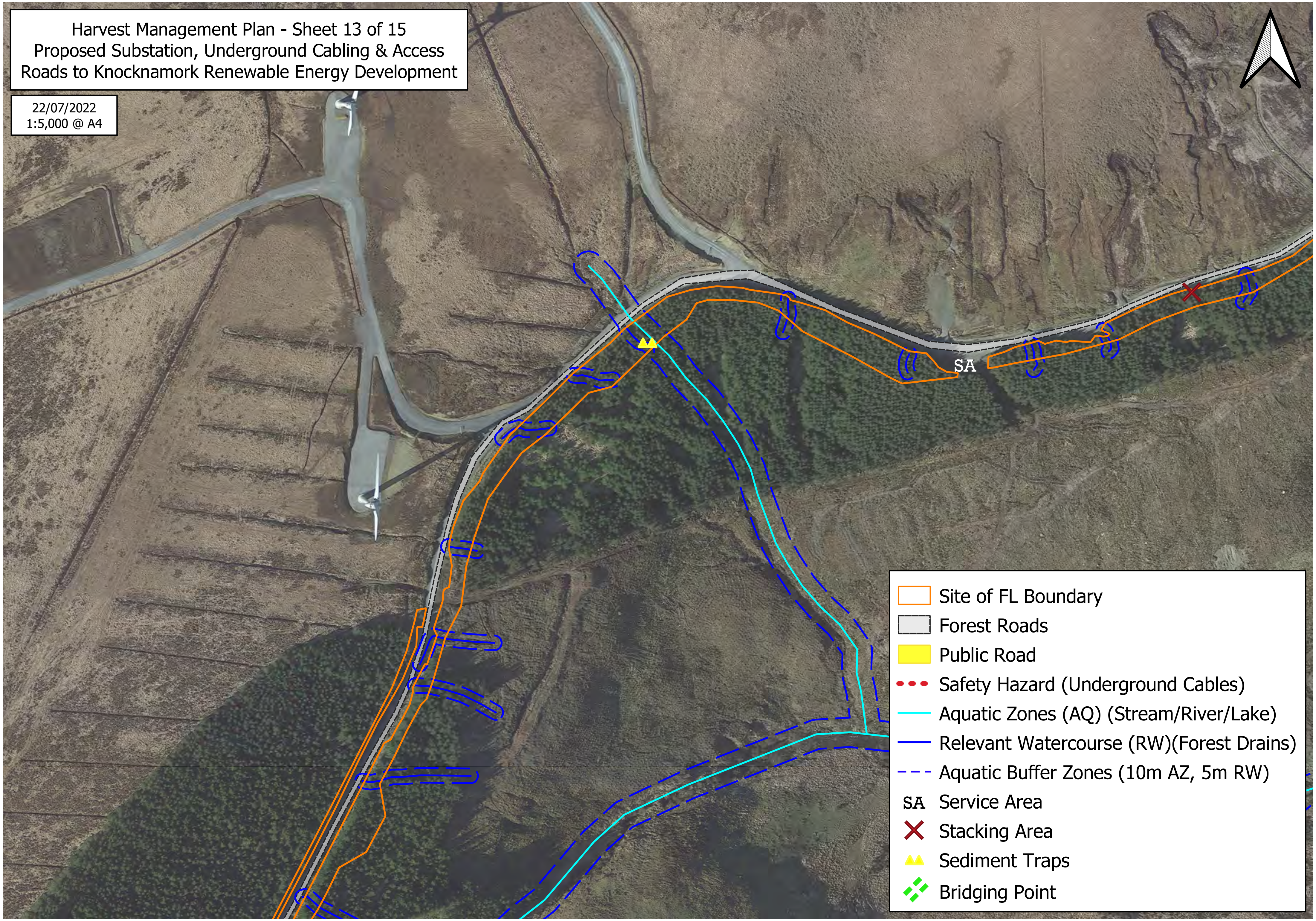


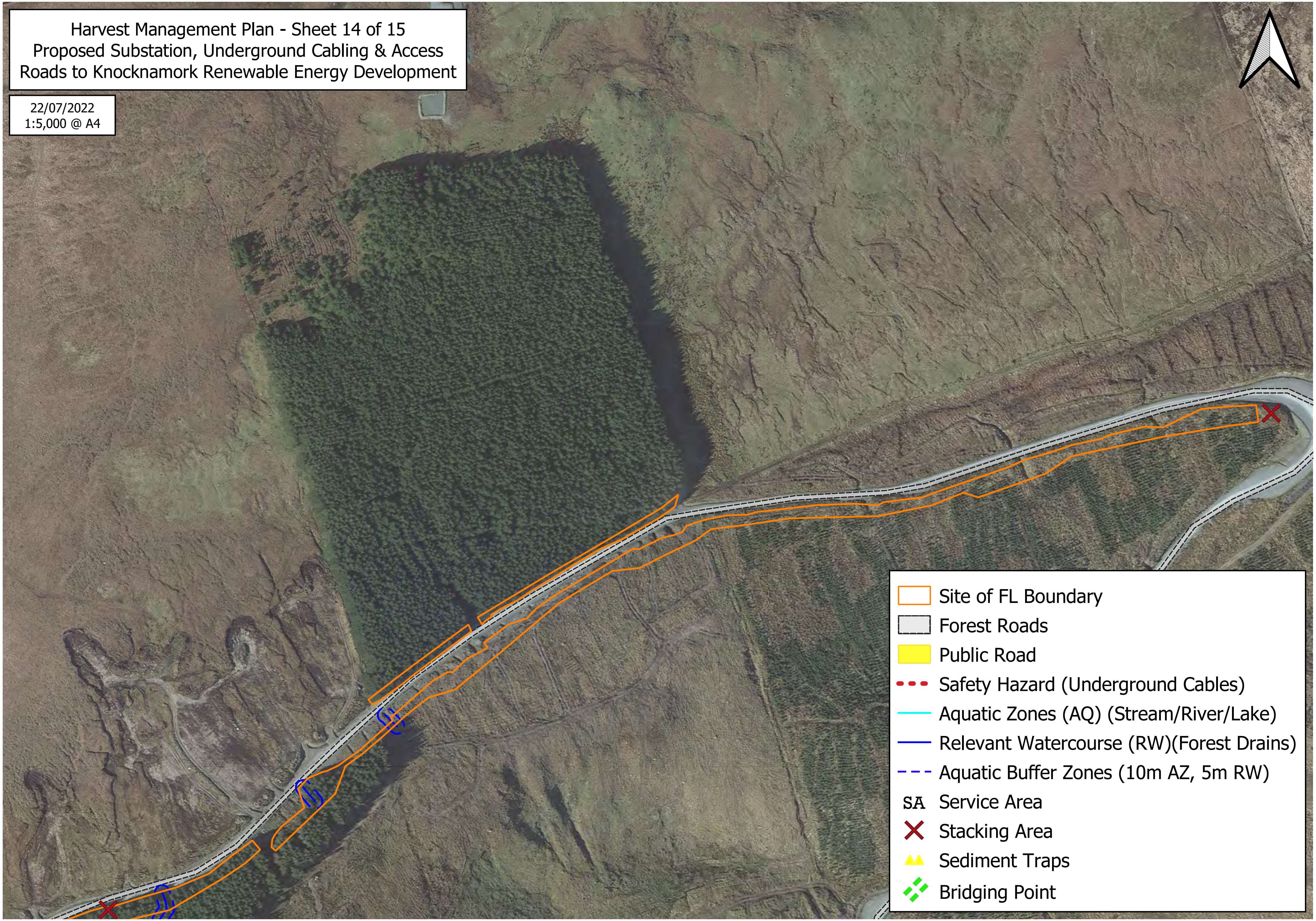
Harvest Management Plan - Sheet 9 of 15
Proposed Substation, Underground Cabling & Access
Roads to Knocknamork Renewable Energy Development
22/07/2022
1:5,000 @ A4
Site of FL Boundary
Forest Roads
Public Road
Safety Hazard (Underground Cables)
Aquatic Zones (AQ) (Stream/River/Lake)
Relevant Watercourse (RW)(Forest Drains)
Aquatic Buffer Zones (10m AZ, 5m RW)
SA Service Area
Stacking Area
Sediment Traps
Bridging Point

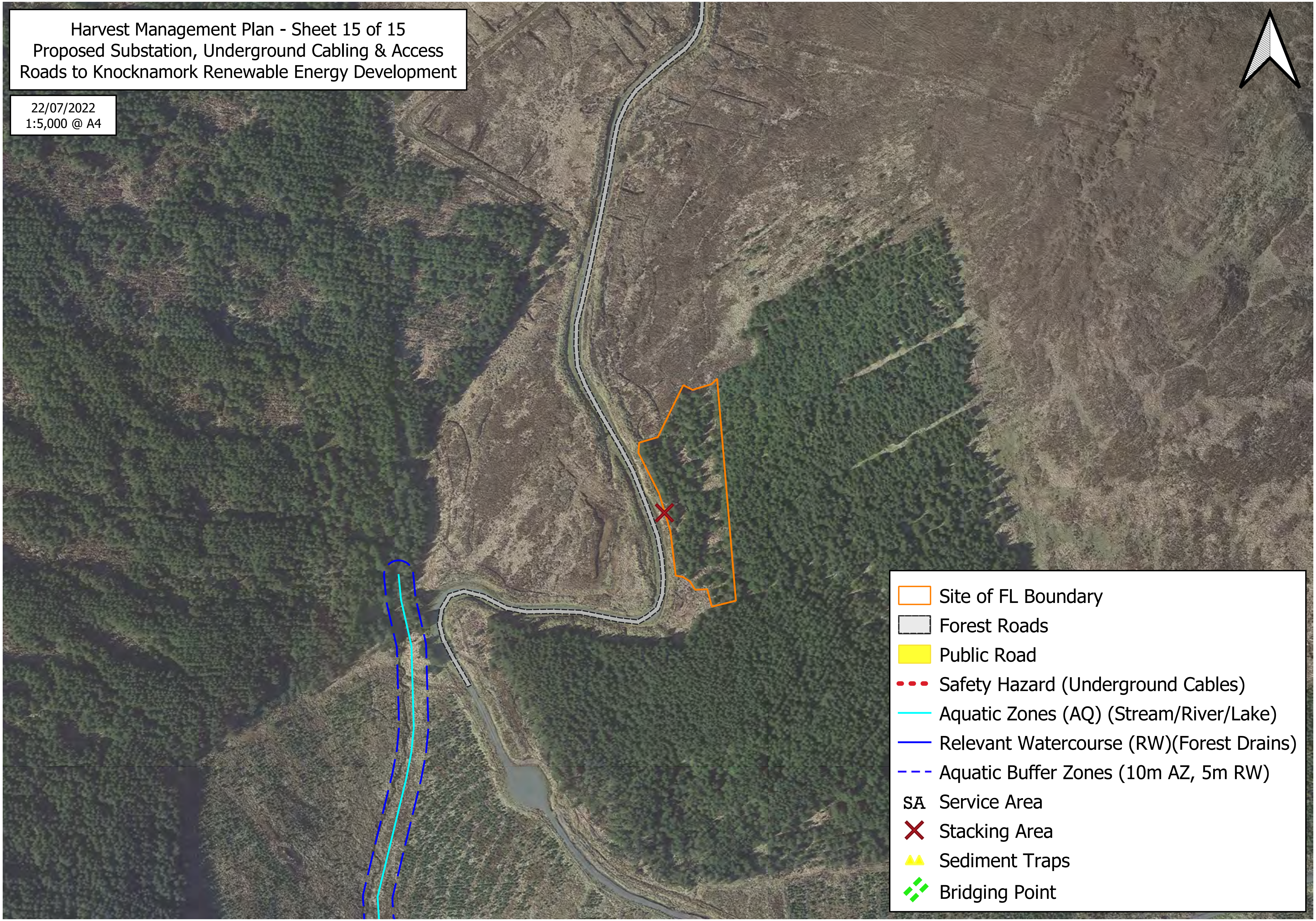

Harvest Management Plan - Sheet 10 of 15
Proposed Substation, Underground Cabling & Access
Roads to Knocknamork Renewable Energy Development
22/07/2022
1:5,000 @ A4
Site of FL Boundary
Forest Roads
Public Road
Safety Hazard (Underground Cables)
Aquatic Zones (AQ) (Stream/River/Lake)
Relevant Watercourse (RW)(Forest Drains)
Aquatic Buffer Zones (10m AZ, 5m RW)
SA Service Area
Stacking Area
Sediment Traps
Bridging Point


Harvest Management Plan - Sheet 11 of 15
Proposed Substation, Underground Cabling & Access
Roads to Knocknamork Renewable Energy Development
22/07/2022
1:5,000 @ A4
Site of FL Boundary
Forest Roads
Public Road
Safety Hazard (Underground Cables)
Aquatic Zones (AQ) (Stream/River/Lake)
Relevant Watercourse (RW)(Forest Drains)
Aquatic Buffer Zones (10m AZ, 5m RW)
SA Service Area
Stacking Area
Sediment Traps
Bridging Point


Harvest Management Plan - Sheet 12 of 15
Proposed Substation, Underground Cabling & Access
Roads to Knocknamork Renewable Energy Development
22/07/2022
1:5,000 @ A4
SA
Site of FL Boundary
Forest Roads
Public Road
Safety Hazard (Underground Cables)
Aquatic Zones (AQ) (Stream/River/Lake)
Relevant Watercourse (RW)(Forest Drains)
Aquatic Buffer Zones (10m AZ, 5m RW)
SA Service Area
Stacking Area
Sediment Traps
Bridging Point


Harvest Management Plan - Sheet 13 of 15
Proposed Substation, Underground Cabling & Access
Roads to Knocknamork Renewable Energy Development
22/07/2022
1:5,000 @ A4
SA
Site of FL Boundary
Forest Roads
Public Road
Safety Hazard (Underground Cables)
Aquatic Zones (AQ) (Stream/River/Lake)
Relevant Watercourse (RW)(Forest Drains)
Aquatic Buffer Zones (10m AZ, 5m RW)
SA Service Area
Stacking Area
Sediment Traps
Bridging Point


Harvest Management Plan - Sheet 14 of 15
Proposed Substation, Underground Cabling & Access
Roads to Knocknamork Renewable Energy Development
22/07/2022
1:5,000 @ A4
Site of FL Boundary
Forest Roads
Public Road
Safety Hazard (Underground Cables)
Aquatic Zones (AQ) (Stream/River/Lake)
Relevant Watercourse (RW)(Forest Drains)
Aquatic Buffer Zones (10m AZ, 5m RW)
SA Service Area
Stacking Area
Sediment Traps
Bridging Point


Harvest Management Plan - Sheet 15 of 15
Proposed Substation, Underground Cabling & Access
Roads to Knocknamork Renewable Energy Development
22/07/2022
1:5,000 @ A4
Site of FL Boundary
Forest Roads
Public Road
Safety Hazard (Underground Cables)
Aquatic Zones (AQ) (Stream/River/Lake)
Relevant Watercourse (RW)(Forest Drains)
Aquatic Buffer Zones (10m AZ, 5m RW)
SA Service Area
Stacking Area
Sediment Traps
Bridging Point

APPENDIX 4-6

WATERCOURSE CROSSINGS

Table 1 Underground Electrical Cabling Route – Culvert and Manmade Drain Crossings Methodology as shown in Figure 1

Culvert/Drain Crossing Reference No.	Culvert/ Drain Type	Cover from Road Level to Top of Culvert (m)	Width of Drain Channel (m)	Crossing Option Description	Crossing Option
1	Culvert not visible	Culvert not visible	Culvert not visible	Where no crossing currently exists, the cable will pass over the watercourse over a bottomless box culvert or pre-cast concrete slab in a standard trefoil arrangement.	Option A/Option C
2	Drain	-	0.5	Where no crossing currently exists, the cable will pass over the watercourse over a bottomless box culvert or pre-cast concrete slab in a standard trefoil arrangement.	Option A/ Option C
3	Drain	-	0.5	Where no crossing currently exists, the cable will pass over the watercourse over a bottomless box culvert or pre-cast concrete slab in a standard trefoil arrangement.	Option A/ Option C
4	Drain	-	0.4	Where no crossing currently exists, the cable will pass over the watercourse over a bottomless box culvert or pre-cast concrete slab in a standard trefoil arrangement.	Option A/ Option C
5	Drain	-	0.5	Where no crossing currently exists, the cable will pass over the watercourse over a bottomless box culvert or pre-cast concrete slab in a standard trefoil arrangement.	Option A/ Option C

Culvert/Drain Crossing Reference No.	Culvert/ Drain Type	Cover from Road Level to Top of Culvert (m)	Width of Drain Channel (m)	Crossing Option Description	Crossing Option
6	Drain	-	1.5	Where no crossing currently exists, the cable will pass over the watercourse over a bottomless box culvert or pre-cast concrete slab in a standard trefoil arrangement.	Option A/ Option C
7	300mm Concrete Pipe	-	0.3	Where cable ducts are to be installed over an existing culvert and sufficient cover cannot be achieved, the ducts will be laid in a much shallower trench, the depth of which will be determined by the cover available at the culvert crossing location. The ducts within the shallow formation trench will be encased in 6mm thick steel galvanized plates and backfilled with 35N concrete.	Option C
8	2 x 300mm diameter plastic pipe	1.5		Where cable ducts are to be installed over an existing culvert and sufficient cover cannot be achieved, the ducts will be laid in a much shallower trench, the depth of which will be determined by the cover available at the culvert crossing location. The ducts within the shallow formation trench will be encased in 6mm thick steel galvanized plates and backfilled with 35N concrete.	Option C
9	300mm diameter plastic pipe	1.5		Where cable ducts are to be installed over an existing culvert and sufficient cover cannot be achieved, the ducts will be laid in a much shallower trench, the depth of which will be determined by the cover	Option C

Culvert/Drain Crossing Reference No.	Culvert/ Drain Type	Cover from Road Level to Top of Culvert (m)	Width of Drain Channel (m)	Crossing Option Description	Crossing Option
				available at the culvert crossing location. The ducts within the shallow formation trench will be encased in 6mm thick steel galvanized plates and backfilled with 35N concrete.	
10	Drain	-	0.4	Where no crossing currently exists, the cable will pass over the watercourse over a bottomless box culvert or pre-cast concrete slab in a standard trefoil arrangement.	Option A/ Option C
11	300mm Concrete pipe	-	0.3	Where cable ducts are to be installed over an existing culvert and sufficient cover cannot be achieved, the ducts will be laid in a much shallower trench, the depth of which will be determined by the cover available at the culvert crossing location. The ducts within the shallow formation trench will be encased in 6mm thick steel galvanized plates and backfilled with 35N concrete.	Option C
12	600mm diameter concrete pipe	1	-	Where cable ducts are to be installed over an existing culvert and sufficient cover cannot be achieved, the ducts will be laid in a much shallower trench, the depth of which will be determined by the cover available at the culvert crossing location. The ducts within the shallow formation trench will be encased in 6mm thick steel galvanized plates and backfilled with 35N concrete.	Option C

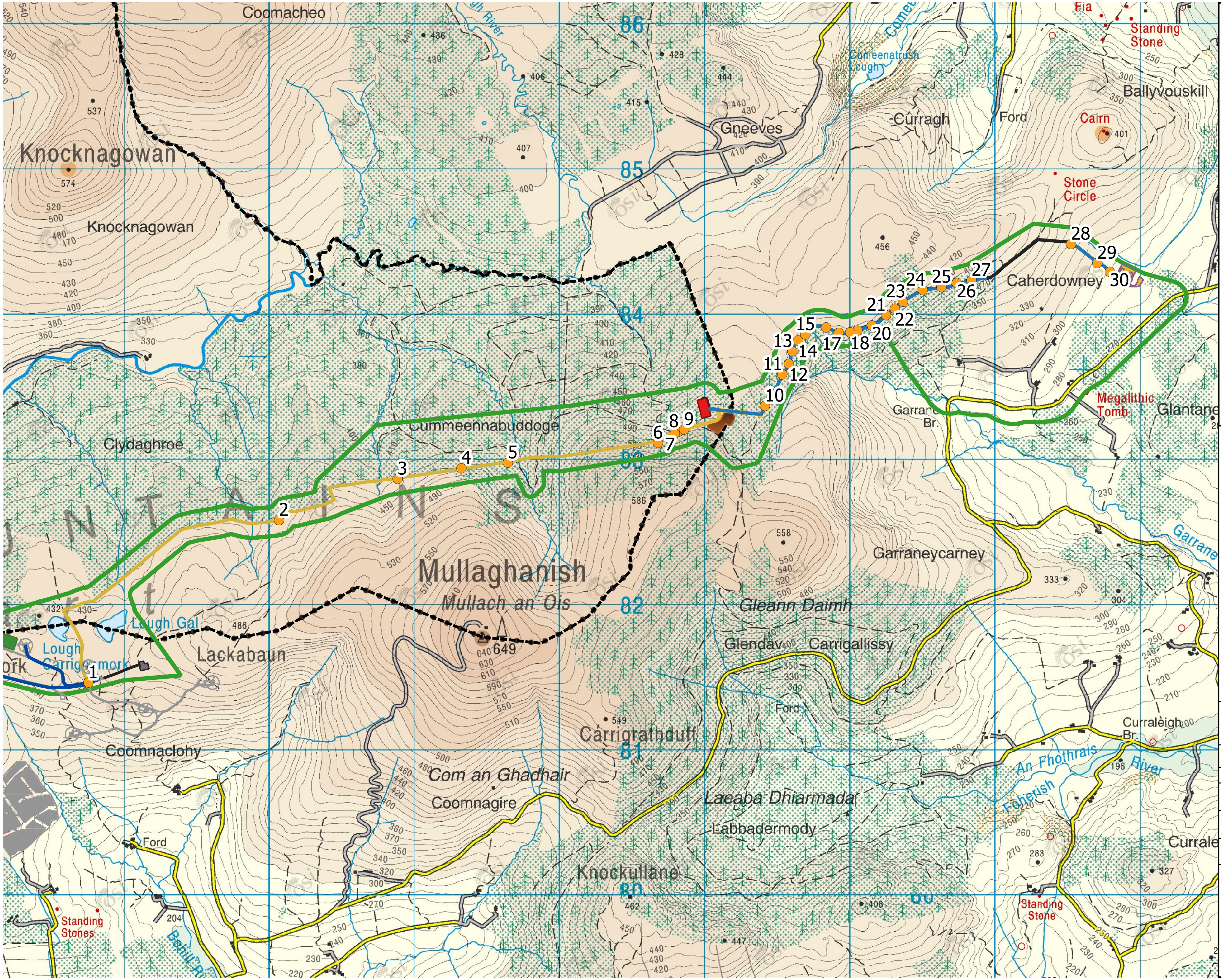
Culvert/Drain Crossing Reference No.	Culvert/ Drain Type	Cover from Road Level to Top of Culvert (m)	Width of Drain Channel (m)	Crossing Option Description	Crossing Option
13	450mm diameter concrete pipe	1.6	-	Where cable ducts are to be installed over an existing culvert and sufficient cover cannot be achieved, the ducts will be laid in a much shallower trench, the depth of which will be determined by the cover available at the culvert crossing location. The ducts within the shallow formation trench will be encased in 6mm thick steel galvanized plates and backfilled with 35N concrete.	Option C
14	300mm diameter corrugated pipe	0.6	-	Where cable ducts are to be installed over an existing culvert and sufficient cover cannot be achieved, the ducts will be laid in a much shallower trench, the depth of which will be determined by the cover available at the culvert crossing location. The ducts within the shallow formation trench will be encased in 6mm thick steel galvanized plates and backfilled with 35N concrete.	Option B
15	450mm diameter concrete pipe	1.6	-	Where cable ducts are to be installed over an existing culvert and sufficient cover cannot be achieved, the ducts will be laid in a much shallower trench, the depth of which will be determined by the cover available at the culvert crossing location. The ducts within the shallow formation trench will be encased in 6mm thick steel galvanized plates and backfilled with 35N concrete.	Option C

Culvert/Drain Crossing Reference No.	Culvert/ Drain Type	Cover from Road Level to Top of Culvert (m)	Width of Drain Channel (m)	Crossing Option Description	Crossing Option
16	450mm diameter concrete pipe	-	0.45	Where adequate cover exists above a culvert, the standard aforementioned trench arrangement will be used where the cable ducts pass over a culvert without any contact with the existing culvert or water course.	Option A
17	230mm diameter corrugated pipe	2	-	Where adequate cover exists above a culvert, the standard aforementioned trench arrangement will be used where the cable ducts pass over a culvert without any contact with the existing culvert or water course.	Option A
18	450mm diameter concrete pipe	-	0.45	Where adequate cover exists above a culvert, the standard aforementioned trench arrangement will be used where the cable ducts pass over a culvert without any contact with the existing culvert or water course.	Option A
19	300mm diameter corrugated pipe	2	-	Where adequate cover exists above a culvert, the standard aforementioned trench arrangement will be used where the cable ducts pass over a culvert without any contact with the existing culvert or water course.	Option A
20	450mm diameter concrete pipe	2	-	Where adequate cover exists above a culvert, the standard aforementioned trench arrangement will be used where the cable ducts pass over a culvert	Option A

Culvert/Drain Crossing Reference No.	Culvert/ Drain Type	Cover from Road Level to Top of Culvert (m)	Width of Drain Channel (m)	Crossing Option Description	Crossing Option
				without any contact with the existing culvert or water course.	
21	300mm diameter concrete pipe	1.6	-	Where cable ducts are to be installed over an existing culvert and sufficient cover cannot be achieved, the ducts will be laid in a much shallower trench, the depth of which will be determined by the cover available at the culvert crossing location. The ducts within the shallow formation trench will be encased in 6mm thick steel galvanized plates and backfilled with 35N concrete.	Option C
22	300mm diameter plastic pipe	1.9	-	Where adequate cover exists above a culvert, the standard aforementioned trench arrangement will be used where the cable ducts pass over a culvert without any contact with the existing culvert or water course.	Option A
23	300mm diameter plastic pipe	1.5	-	Where cable ducts are to be installed over an existing culvert and sufficient cover cannot be achieved, the ducts will be laid in a much shallower trench, the depth of which will be determined by the cover available at the culvert crossing location. The ducts within the shallow formation trench will be encased in 6mm thick steel galvanized plates and backfilled with 35N concrete.	Option C

Culvert/Drain Crossing Reference No.	Culvert/ Drain Type	Cover from Road Level to Top of Culvert (m)	Width of Drain Channel (m)	Crossing Option Description	Crossing Option
24	450mm diameter plastic pipe	2	-	Where adequate cover exists above a culvert, the standard aforementioned trench arrangement will be used where the cable ducts pass over a culvert without any contact with the existing culvert or water course.	Option A
25	Culvert pipe not visible	1.5		Where cable ducts are to be installed over an existing culvert and sufficient cover cannot be achieved, the ducts will be laid in a much shallower trench, the depth of which will be determined by the cover available at the culvert crossing location. The ducts within the shallow formation trench will be encased in 6mm thick steel galvanized plates and backfilled with 35N concrete.	Option C
26	Culvert pipe not visible	1.5		Where cable ducts are to be installed over an existing culvert and sufficient cover cannot be achieved, the ducts will be laid in a much shallower trench, the depth of which will be determined by the cover available at the culvert crossing location. The ducts within the shallow formation trench will be encased in 6mm thick steel galvanized plates and backfilled with 35N concrete.	Option C
27	280mm diameter plastic pipe	2	-	Where adequate cover exists above a culvert, the standard aforementioned trench arrangement will be used where the cable ducts pass over a culvert	Option A

Culvert/Drain Crossing Reference No.	Culvert/ Drain Type	Cover from Road Level to Top of Culvert (m)	Width of Drain Channel (m)	Crossing Option Description	Crossing Option
				without any contact with the existing culvert or water course.	
28	150mm diameter corrugated pipe	No cover	-	Where the culvert consists of a socketed concrete or sealed plastic pipe and sufficient depth is not available over the crossing, a trench will be excavated beneath the culvert and cable ducts will be installed in the standard formation 300mm below the existing pipe.	Option B
29	450mm diameter concrete pipe	0.5	-	Where the culvert consists of a socketed concrete or sealed plastic pipe and sufficient depth is not available over the crossing, a trench will be excavated beneath the culvert and cable ducts will be installed in the standard formation 300mm below the existing pipe.	Option B
30	2 x concrete pipes	0.5	-	Where the culvert consists of a socketed concrete or sealed plastic pipe and sufficient depth is not available over the crossing, a trench will be excavated beneath the culvert and cable ducts will be installed in the standard formation 300mm below the existing pipe.	Option B



Map Legend

- EIAR Study Boundary
- Access Road (Upgrade & New)
- 33kV Underground Cabling in the Permitted
- 110kV Underground Cabling
- 110kV Cabling and Access Road
- Ballyvouskill 220kV Substation
- Proposed 110kV Substation Location
- Proposed Borrow Pit
- Permitted Borrow Pit Extension
- Omitted 38kV Electrical Substation and Batte
- County Boundary
- Culvert Crossings

Drawing Title	Culvert and Drain Crossings
Project Title	Proposed Substation, Underground Cabling & Access Roads to Knocknamork Renewable Energy Development
Drawn By: NMcH	Checked By: EOS
Project No.: 210732	Drawing No.: Figure 1
Scale: 1:8000	Date: 14.07.2022

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: www.mkoireland.ie

APPENDIX 4-7

DECOMMISSIONING PLAN

Decommissioning Plan

Proposed Substation, Underground Cabling & Access Roads to Knocknamork Renewable Energy Development

DOCUMENT DETAILS

Client:	**Knocknamork Ltd.**
Project Title:	**Proposed Substation, Underground Cabling & Access Roads to Knocknamork Renewable Energy Development**
Project Number:	**210732**
Document Title:	**Decommissioning Plan**
Document File Name:	**Decommissioning Plan - F - 2022.07.13**
Prepared By:	**MKO** **Tuam Road** **Galway** **Ireland** **H91 VW84**

Planning and Environmental Consultants

Rev	Status	Date	Author(s)	Approved By
01	Draft	27.06.2022	KMcG	EOS/OC
02	Draft	05.07.2022	KMcG	EOS/OC
03	Final	14.07.2022	KMcG	EOS/OC

Table of Contents

TABLE OF TABLES

TABLE OF FIGURES

1. INTRODUCTION

This Decommissioning Plan has been prepared by MKO on behalf of Knocknamork Ltd. for the decommissioning of the Proposed Development as detailed in Chapter 4 of the Environmental Impact Assessment Report (EIAR). In addition, this Decommissioning Plan includes reference to the Permitted Development (Pl. Ref. No. 19/4972).

This document is being prepared alongside an Environmental Impact Assessment Report (EIAR) as part of applications for planning permission for the Proposed Development to An Bord Pleanála (ABP), Cork County Council (CCC) and Kerry County Council (KCC). Decommissioning of the Permitted Development will be scheduled to take place after its proposed 25-year lifespan and this will in turn trigger the decommissioning of the Proposed Development.

This report provides the environmental management framework to be adhered to during the decommissioning phase of the Proposed Development and it incorporates the mitigating principles to ensure that the work is carried out in a way that minimises the potential for any environmental impacts to occur.

1.1 Scope of the Decommissioning Plan

This report is presented as a guidance document for the decommissioning of the Proposed Development

Where the term 'site' is used in the Decommissioning Plan it refers to all works associated with the Proposed Development, including enabling works. The Decommissioning Plan clearly outlines the mitigation measures and monitoring proposals that are required to be adhered to in order to complete the works in an appropriate manner and.

The report is divided into eight sections, as outlined below:

Section 1 provides a brief introduction as to the scope of the report.

Section 2 outlines the Proposed Development details, detailing the targets and objectives of this plan along with providing an overview of works methodologies that will be adopted throughout decommissioning.

Section 3 sets out details of the environmental controls to be implemented on site including the mechanisms for implementation. A waste management plan is also included in this section.

Section 4 outlines the Emergency Response Procedure to be adopted in the event of an emergency in terms of site health and safety and environmental protection.

Section 5 sets out a programme for the timing of the works.

Section 6 consists of a summary table of all mitigation measures to be adhered to during the decommissioning-phases.

Section 7 consists of a summary table of all monitoring requirements for the decommissioning-phase.

Section 8 outlines the proposals for reviewing compliance with the provisions of this report

2. PROPOSED DEVELOPMENT DETAILS

2.1 Site Location and Description

The Proposed Development site which straddles the county boundary between Co. Kerry and Co. Cork is located approximately 6 kilometres southwest of the town of Millstreet and 3 kilometres northwest of the village of Ballyvourney. The Grid Reference co-ordinates of the approximate start and end points for the Proposed Development site are E514036, N581567 and E525824, N584341 respectively. Land-use on the site and in the wider area comprises a mix of commercial forestry, wind farm development, cutover peat bog and some agricultural pastures.

The Permitted Development comprises 7 no. turbines, up to 70,000m^2 of solar panels on ground mounted steel frames and all associated works. Planning permission was granted by Cork County Council on 2nd January 2020 (Ref. No. 19/4972).

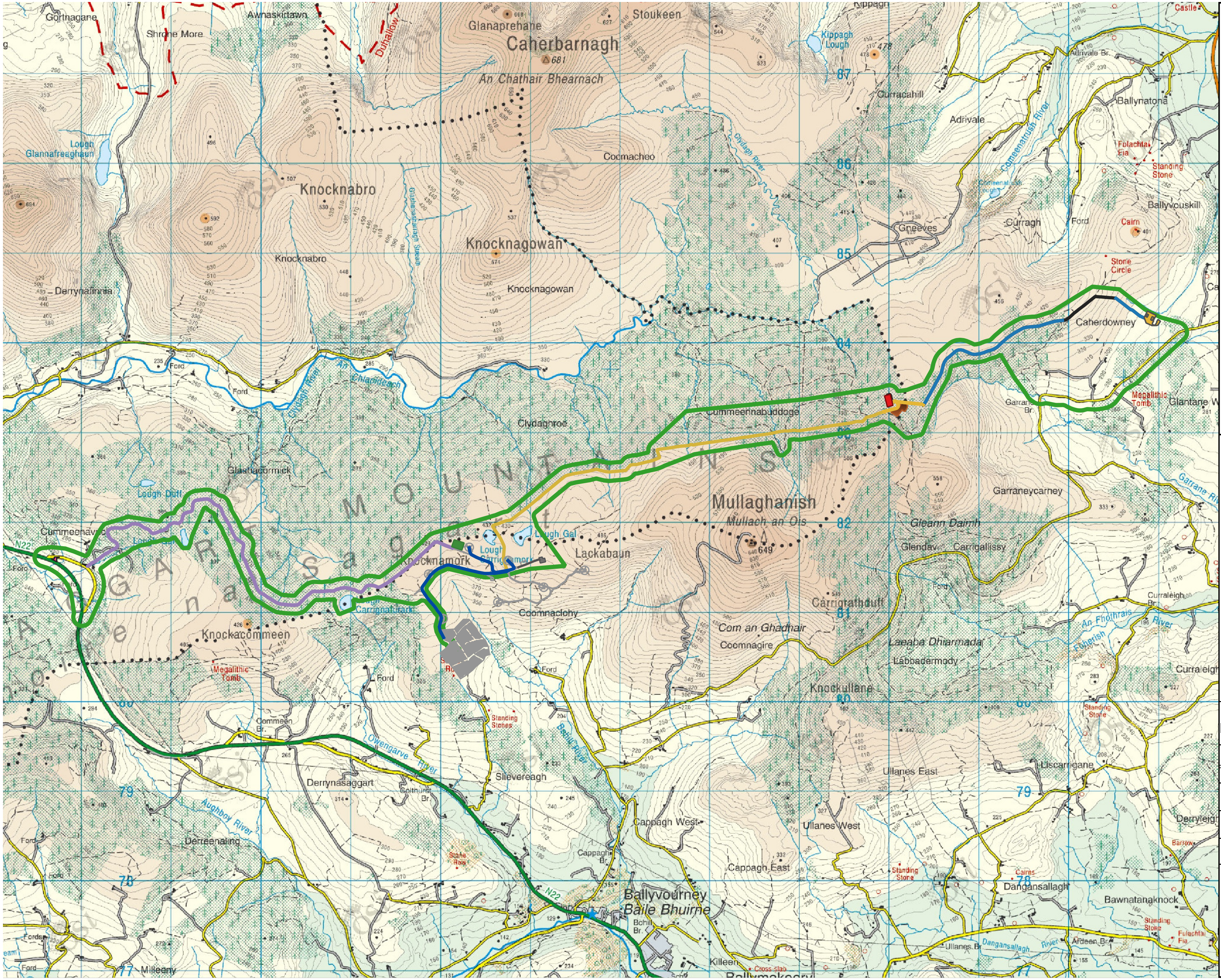
The Proposed Development comprises the construction of a 110kV electrical substation, underground cabling and access roads, and all associated works. A detailed description of the Proposed Development is provided in section 4.2 of the EIAR.

2.2 Description of the Proposed Development

The proposed development in it's entirety, including the works subject of a proposed application for planning permission to ABP, CCC and KCC, comprises the provision of the following:

i. *110 kV electrical substation with 2 no. control buildings with welfare facilities, all associated electrical plant and apparatus, security fencing, underground cabling, waste water holding tank and all ancillary works;*
ii. *Underground electrical cabling (110kV);*
iii. *Underground electrical cabling (33kV);*
iv. *Access Roads (new and upgrade of existing)*
v. *Temporary access road;*
vi. *Upgrade of access junctions;*
vii. *Amendments to the Permitted Development (Ref. No. 19/4972), including extension to the borrow pit and the omission of the 38kV Electrical Substation, 38KV underground cabling and Battery Storage compound;*
viii. *Borrow pit;*
ix. *Site Drainage;*
x. *Forestry Felling; and*
xi. *All associated site development works and apparatus.*

The site layout showing individual elements of the Proposed Development is shown in Figure 2-1. As construction will be completed, elements of the project that will be developed as a temporary facilitator will either be removed, restored to its original condition or will naturally revegetate. This includes the temporary access road which will need to be constructed again to facilitate transport of turbines offsite during decommissioning of the permitted development.



Map Legend

- EIAR Study Boundary
- Access Road (Upgrade & New)
- Temp Road
- 33kV Underground Cabling and Access Roads
- 33kV Underground Cabling in Permitted Development
- 110kV Underground Cabling
- 110kV Underground Cabling and Access Road
- Ballyvouskill 220kV Substation
- Proposed 110kV Substation Location
- Proposed Borrow Pit
- Permitted Borrow Pit Extension
- Omitted 38kV Electrical Substation and Battery Compound

N

Drawing Title	Proposed Development Layout
Project Title	Proposed Substation, Underground Cabling & Access Roads to Knocknamork Renewable Energy Development
Drawn By: NMcH	Checked By: EOS
Project No.: 210732	Drawing No.: Figure 4-1
Scale: 1:55000	Date: 28.06.2022

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoirelan

All access roads and hardstanding areas will form part of a site roadway network which will be left in situ for future use. It is intended that decommissioning will only remove underground cabling (33kV) from the site with ducting left in-situ, and reinstate areas where infrastructure is removed. As mentioned previously given the Proposed Development is an integral part of the Permitted Development, the decommissioning will occur in tandem with the decommissioning of the Permitted Development (Pl. Ref. No. 19/4972).

2.3 Targets and Objectives

The decommissioning phase works will be completed to approved standards, which include specified materials, standards, specifications and codes of practice. This Decommissioning Plan has considered environmental issues and this is enhanced by the works proposals as part of decommissioning.

The key site targets are as follows:

- Ensure decommissioning works and activities are completed in accordance with mitigation and best practice approach presented in the accompanying Environmental Impact Assessment Report (EIAR) and associated planning documentation.
- Ensure decommissioning works and activities have minimal impact/disturbance to local landowners and the local community.
- Ensure decommissioning works and activities have minimal impact on the natural environment.
- Adopt a sustainable approach to decommissioning; and,
- Provide adequate environmental training and awareness for all project personnel.

The key site objectives are as follows:

- Using recycled materials if possible, e.g. soil and overburden material for backfilling and reinstatement.
- Ensure sustainable sources for materials supply where possible.
- Avoidance of any pollution incident or near miss as a result of working around or close to existing watercourses and having emergency measures in place.
- Avoidance of vandalism.
- Keeping all watercourses free from obstruction and debris.
- Correct implementation of the sustainable drainage system (SuDS) drainage design principles.
- Keep impact of decommissioning works to a minimum on the local environment, watercourses, and wildlife.
- Correct fuel storage and refuelling procedures to be followed.
- Good waste management and housekeeping to be implemented.
- Air and noise pollution prevention to be implemented.
- Monitoring of the works and any adverse effects that it may have on the environment. Decommissioning methods will be altered where it is found there is the potential to have an adverse effect on the environment.

2.4 Decommissioning Methodologies Overview

2.4.1 Introduction

An experienced main contractor will be appointed to undertake the of the decommissioning of the Proposed Development. The main contractor will comply with the Construction and Environmental Management Plan (CEMP) prepared for the construction phase and implemented during operation and any revisions made to this document throughout the phase in which it is adopted. An overview of the anticipated decommissioning methodologies is provided below

2.4.2 Decommissioning Plan

The proposed anticipated decommissioning methodology is summarised under the following main headings:

- Underground Cabling
- Transport Route Accommodation Works

2.4.2.1 Underground Cabling

The electrical and fibre optic cabling that connects each turbine and solar array to the proposed onsite 110 kV substation will be removed from the 33kV underground cable ducting. The cabling will be pulled from the cable duct using a mechanical winch which will extract the cable and re-roll it on to a cable drum. This will be undertaken at each of the joint bays/pull pits along the underground cabling route. The original pulling pits will be excavated using a mechanical excavator and will be fully re-instated once the cables are removed.

The cable ducting will be left in-situ as it is considered the most environmentally prudent option, avoiding unnecessary excavation and soil disturbance for an underground element that is not visible. The site roadways along the cabling routes could be in use for purposes other than the operation of the development by the time the decommissioning of the Permitted Development is to be considered, and therefore it may be more appropriate to leave the site roads in situ for future use. It is envisaged that the roads will provide a useful means of extracting the commercial forestry crop which exists on the site, along with general agricultural use.

2.4.2.2 Transport Route Accommodation Works

During the construction of the Proposed Development, a number of road and junction improvements and temporary works will be completed to provide access to the site during materials delivery. All these accommodation areas will be re-used during decommissioning. This includes the re-instatement and re-establishment of the temporary access road from the N22 to the old N22 alignment to facilitate the removal of abnormally large vehicle loads. The use of this temporary access road will be carefully managed, and the route will be blocked with traffic bollards when not in use for component removal. On completion of the component removal from the site, the temporary access road and accommodation areas will be fully re-instated.

3. ENVIRONMENTAL MANAGEMENT

The following sections give an overview of the drainage design, dust and noise control measures, a waste management plan for the site and the implementation of the environmental management procedures for the site.

3.1 Site Drainage

The site drainage features for this site during its construction and operation are outlined in Section 4.5 of the EIAR which accompany this application. As this Decommissioning Plan is a working document and is presented as an Appendix to the EIAR, the drainage measures are not included in this document. When the final plan is prepared prior to decommissioning and presented as a standalone document, all drainage measures will be included in that document as required. The drainage proposals will be developed further prior to the commencement of decommissioning if deemed necessary. However, it should be noted that by the time decommissioning is undertaken after the planned 25-year lifespan of the Permitted Development, the areas within the site will have revegetated resulting in a resumption of the natural drainage management that will have existed prior to any construction. It is not anticipated that the decommissioning phase will interrupt this restored drainage regime in any way with the works proposed.

3.2 Refuelling, Fuel and Hazardous Materials Storage

The plant and equipment used during decommissioning will require refuelling during the works. Appropriate management of fuels will be required to ensure that incidents relating to refuelling are avoided. The following mitigation measures are proposed to avoid release of hydrocarbons at the site:

- Road-going vehicles will be refuelled off site wherever possible.
- On-site refuelling will be carried out at designated refuelling areas at various locations throughout the site. Machinery will be refuelled directly by a fuel truck that will come to site as required
- Only designated trained and competent operatives will be authorised to refuel plant on site. Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations.
- Fuel volumes stored on site should be minimised. Any fuel storage areas will be bunded appropriately.
- The plant used will be regularly inspected for leaks and fitness for purpose;
- An emergency plan for the decommissioning phase to deal with accidental spillages will be developed. Spill kits will be available to deal with and accidental spillage in and outside the refuelling area.
- A programme for the regular inspection of plant and equipment for leaks and fitness for purpose will be developed at the outset of the decommissioning phase

3.3 Dust Control

Dust can be generated from on-site activities during decommissioning such as backfilling of foundations and travelling on site roads during prolonged periods of dry weather. The extent of dust generation will depend on the type of activity undertaken, the location, the nature of the dust, i.e. soil, and the weather. In addition, dust dispersion is influenced by external factors such as wind speed and direction and/or, periods of dry weather. Site traffic movements also have the potential to generate dust as they travel along the haul route.

Proposed measures to control dust include:

- Any site roads with the potential to give rise to dust will be regularly watered, as appropriate, during dry and/or windy conditions.
- The designated public roads outside the site and along the main transport routes to the site will be regularly inspected by the Site Manager for cleanliness and cleaned as necessary.
- Material handling systems and material storage areas will be designed and laid out to minimise exposure to wind.
- Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods.
- The transport of material, which has significant potential to generate dust, will be undertaken in tarpaulin-covered vehicles where necessary.
- All site related traffic will have speed restrictions on un-surfaced roads to 15 kph.
- Daily inspection of the site to examine dust measures and their effectiveness.
- When necessary, sections of the haul route will be swept using a truck mounted vacuum sweeper

3.4 Noise Control

The operation of plant and machinery, including site vehicles, is a source of potential impact that will require mitigation at all locations within the site. Proposed measures to control noise include:

- Diesel generators will be enclosed in sound proofed containers to minimise the potential for noise impacts.
- Plant and machinery with low inherent potential for generation of noise and/or vibration will be selected. All plant and equipment to be used on-site will be modern equipment and will comply with the European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations.
- Regular maintenance of plant will be carried out in order to minimise noise emissions. Particular attention will be paid to the lubrication of bearings and the integrity of silencers.
- All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the works.
- Compressors will be of the “sound reduced” models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers.
- Machines, which are used intermittently, will be shut down during those periods when they are not in use.
- Training will be provided by the Site Manager to drivers to ensure smooth machinery operation/driving, and to minimise unnecessary noise generation; and,
- Local areas of the haul route will be condition monitored and maintained, if necessary

3.5 Invasive Species Management

The soil material that will be imported to site as part of the foundation backfilling will be free of any invasive species (listed under the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011). The site manager will take steps to ensure this sourcing suitably clean material and verify the quality of the material by having it inspected prior to bringing it to site by a suitably qualified ecologist. Prior to decommissioning, a suitably qualified ecologist will complete an invasive species survey of the source material used for the site reinstatement works as well as along the cable route to identify invasive species at joint bay locations where excavation to expose the cabling for removal will be required.

3.6 Traffic Management

A Traffic Management Plan will be prepared in advance of any decommissioning works. The removal of development components from site will be undertaken for a specialist haulier. The traffic management arrangements as outlined in the EIAR will be agreed in advance of decommissioning with the competent authority.

3.7 Waste Management

This section of the Decommissioning Plan provides a Waste Management Plan (WMP) which outlines the best practice procedures during the decommissioning of the Proposed Development. The WMP will outline the methods of waste prevention and minimisation by recycling, recovery and reuse at each stage of decommissioning. Disposal of waste will be a last resort.

3.7.1 Legislation

The Waste Management Act 1996 and its subsequent amendments provide for measures to improve performance in relation to waste management, recycling and recovery. The Act also provides a regulatory framework for meeting higher environmental standards set out by other national and EU legislation.

The Act requires that any waste related activity has to have all necessary licenses and authorisations. It will be the duty of the Waste Manager on the site of the Proposed Development to ensure that all contractors hired to remove waste from the site have valid Waste Collection Permits. It will then be necessary to ensure that the waste is delivered to a licensed or permitted waste facility. The hired waste contractors and subsequent receiving facilities must adhere to the conditions set out in their respective permits and authorisations.

The Department of the Environment provides a document entitled, '*Best Practice Guidelines for the Preparation of Resource Management Plans for Construction and Demolition Projects' (2021).* It is important to emphasise that no demolition will take place at this site, however, this document was referred to throughout the process of completing this WMP.

3.7.2 Waste Management Hierarchy

The waste management hierarchy sets out the most efficient way of managing in the following order:

Prevention and Minimisation:

The primary aim of the WMP will be to prevent and thereby reduce the amount of waste generated at each stage of the project.

Reuse of Waste:

Reusing as much of the waste generated on site as possible will reduce the quantities of waste that will have to be transported off site to recovery facilities or landfill.

Recycling of Waste:

There are several established markets available for the beneficial use of Construction and Demolition waste such as using waste concrete as fill for new roads.

At all times during the implementation of the WMP, disposal of waste to landfill will be considered only as a last resort.

3.7.3 Waste Arising from Decommissioning

The relevant components will be removed from site for re-use, recycling or waste disposal. Any structural elements that are not suitable for recycling will be disposed of in an appropriate manner. All lubrication fluids will be drained down and put aside for appropriate collection, storage, transport and disposal. Any materials which cannot be re-used or recycled will be disposed of by an appropriately licenced contractor.

The waste types arising from the decommissioning of the Proposed Development are outlined in Table 3-1 below.

Table 3-1 Expected waste types arising during the Decommissioning Phase

Material Type	Example	EWC Code
Cables	Electrical wiring	17 04 11
Metals	Copper, aluminium, lead and iron	17 04 07

3.7.3.1 Reuse

Many construction materials can be reused several times before they have to be disposed of:

- Electrical wiring can be reused on similar wind energy projects

3.7.3.2 Recycling

If a certain type of construction material cannot be reused onsite, then recycling is the most suitable option.

All waste that is produced during the decommissioning phase including dry recyclables will be deposited in the on-site skip initially and sent for subsequent segregation at a remote facility. The anticipated volume of all waste material to be generated at the Proposed Development is low which provides the justification for adopting this method of waste management.

3.7.3.3 Implementation

3.7.3.3.1 *Roles and Responsibilities*

Prior to the commencement of the decommissioning, a Construction Waste Manager will be appointed by the Contractor. The Construction Waste Manager will oversee the implementation of the objectives of the plan, ensuring that all hired waste contractors have the necessary authorisations and that the waste management hierarchy is adhered to. The person nominated must have sufficient authority so that they can ensure everyone working on the decommissioning adheres to the management plan.

3.7.3.3.2 *Training*

It is important for the Construction Waste Manager to communicate effectively with colleagues in relation to the aims and objectives of the waste management plan. All employees working on site during the decommissioning phase of the project will be trained in materials management and thereby, should be able to:

- Distinguish reusable materials from those suitable for recycling.
- Ensure maximum segregation at source.
- Co-operate with site manager on the best locations for stockpiling reusable materials.
- Separate materials for recovery; and
- Identify and liaise with waste contractors and waste facility operators.

3.7.3.3.3 *Record Keeping*

The WMP will provide systems that will enable all arisings, movements and treatments of construction waste to be recorded. This system will enable the contractor to measure and record the quantity of waste being generated. It will highlight the areas from which most waste occurs and allows the measurement of arisings against performance targets. The WMP can then be adapted with changes that are seen through record keeping.

The fully licensed waste contractor employed to remove waste from the site will be required to provide documented records for all waste dispatches leaving the site. Each record will contain the following:

- Consignment Reference Number
- Material Type(s) and EWC Code(s)
- Company Name and Address of Site of Origin
- Trade Name and Collection Permit Ref. of Waste Carrier
- Trade Name and Licence Ref. of Destination Facility
- Date and Time of Waste Dispatch
- Registration no. of Waste Carrier vehicle
- Weight of Material
- Signature of Confirmation of Dispatch detail
- Date and Time of Waste Arrival at Destination
- Site Address of Destination Facility

3.7.3.4 Waste Management Plan Conclusion

The WMP will be properly adhered to by all staff involved in the project which will be outlined within the induction process for all site personnel. The waste hierarchy should always be employed when designing the plan to ensure that the least possible amount of waste is produced during decommissioning. Reuse of certain types of construction wastes will cut down on the cost and requirement of raw materials therefore further minimising waste levels.

This WMP has been prepared to outline the main objectives that are to be adhered to and it will be updated as required prior to decommissioning.

3.8 Environmental Management Implementation

3.8.1 Roles and Responsibilities

The Site Manager and/or Environmental Clerk of Works (ECoW) are the project focal point relating to decommissioning-related environmental issues.

In general, the ECoW will maintain responsibility for monitoring the decommissioning works and Contractors/Sub-contractors from an environmental perspective. The ECoW will act as the regulatory interface on environmental matters. The Site Manager will be responsible for reporting to and liaising with Kerry and Cork County Councils and other statutory bodies as required.

The Site Manager in consultation with the ECoW will be responsible for employing the services of a suitably qualified ecologist and any other suitably qualified professionals as required throughout the decommissioning works.

4. EMERGENCY RESPONSE PLAN

An Emergency Response Plan (ERP) is presented in this section of the Decommissioning Plan. It provides details of procedures to be adopted in the event of an emergency in terms of site health and safety and environment protection

4.1 Emergency Response Procedure

The site ERP includes details on the response required and the responsibilities of all personnel in the event of an emergency. The ERP will require updating and submissions from the contractor/PSCS and sub-contractors as decommissioning progresses. Where sub-contractors that are contracted on site are governed by their own emergency response procedure a bridging arrangement will be adopted to allow for inclusion of the sub-contractor's ERP within this within this document.

This is a working document that requires updating throughout the various stages of the project.

4.1.1 Roles and Responsibilities

The chain of command during an emergency response sets out who is responsible for coordinating the response. The Site Supervisor/Construction Manager will lead the emergency response which makes them responsible for activating and coordinating the emergency response procedure. The other site personnel who can be identified at this time who will be delegated responsibilities during the emergency response are presented in Figure 4-1. In a situation where the Site Supervisor/ Construction Manager is unavailable or incapable of coordinating the emergency response, the responsibility will be transferred to the next person in the chain of command outlined in Figure 4-1. This will be updated throughout the various stages of the project.

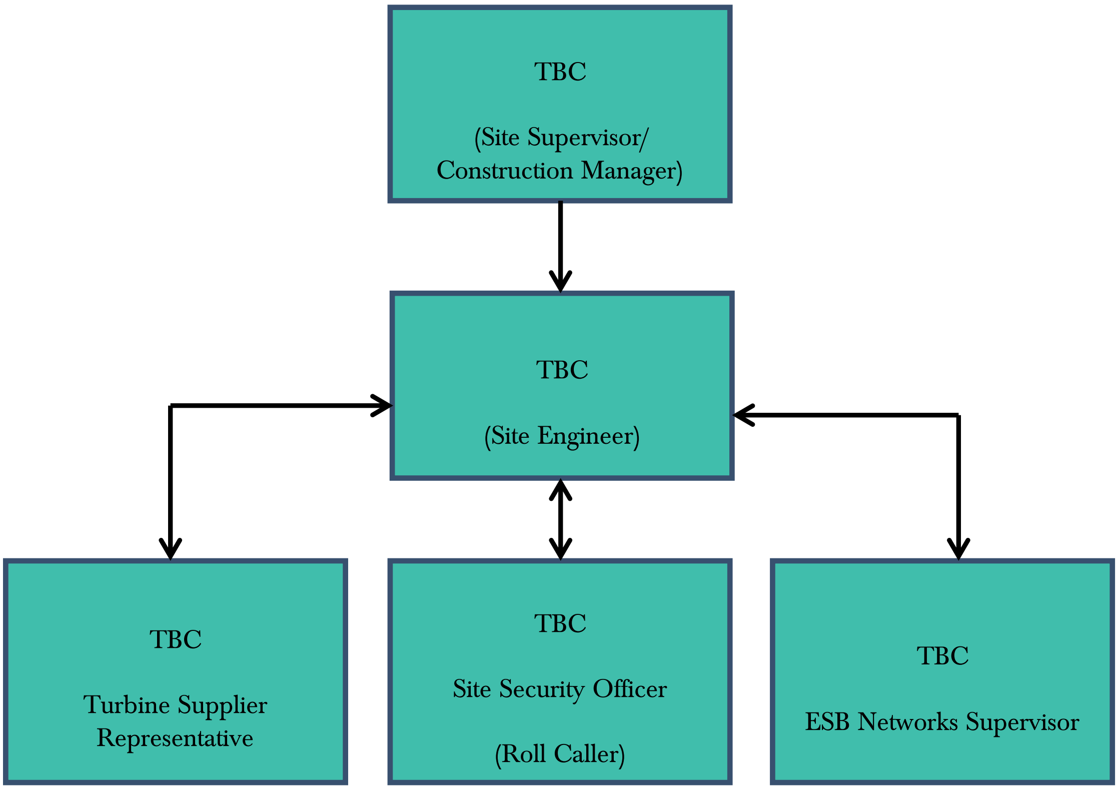


Figure 4-1 Emergency Response Procedure Chain of Command

4.1.2 Initial Steps

To establish the type and scale of potential emergencies that may occur, the following hazards have been identified in Table 4-1 below as being potential situations that may require an emergency response in the event of an occurrence.

Table 4-1 Hazards associated with potential emergency situations

Hazard	Emergency Situation
Construction Vehicles: Dump trucks, tractors, excavators, cranes etc.	Collision or overturn which has resulted in operator or third-party injury.
Abrasive wheels/Portable Tools	Entanglement, amputation or electrical shock associated with portable tools
Contact with services	Electrical shock or gas leak associated with an accidental breach of underground services
Fire	Injury to operative through exposure to fire
Falls from heights including falls from scaffold towers, scissor lifts, ladders and roofs	Injury to operative after a fall from a height
Sickness	Illness unrelated to site activities of an operative e.g. heart attack, loss of consciousness, seizure

In the event of an emergency situation associated with, but not restricted to, the hazards outlined in Table 4-1 the site supervisor/Construction Manager will carry out the following:

- Establish the scale of the emergency situation and identify the number of personnel, if any, have been injured or are at risk of injury.
- Where necessary, sound the emergency siren/foghorn that activates an emergency evacuation on the site. The Site Supervisor/Construction Manager must proceed to the assembly point if the emergency poses any significant threat to their welfare and if there are no injured personnel at the scene that require assistance. The Site Supervisor/Construction Manager will be required to use their own discretion at that point. In the case of fire, the emergency evacuation of the site should proceed, without exception. The site evacuation procedure is outlined in Section 4.1.3.
- Make safe the area if possible and ensure that there is no identifiable risk exists with regard to dealing with the situation e.g. if a machine has turned over, ensure that it is in a safe position so as not to endanger others before assisting the injured.
- Contact the required emergency services or delegate the task to someone. If delegating the task, ensure that the procedures for contacting the emergency services as set out in Section 4.2 is followed.
- Take any further steps that are deemed necessary to make safe or contain the emergency incident e.g. cordon off an area where an incident associated with electrical issues has occurred.
- Contact any regulatory body or service provider as required e.g. ESB Networks the numbers for which as provided in Section 4.3.
- Contact the next of kin of any injured personnel where appropriate

4.1.3 Site Evacuation/Fire Drill

A site evacuation/fire drill procedure will provide basis for carrying out the immediate evacuation of all site personnel in the event of an emergency. The following steps will be taken:

- Notification of the emergency situation. Provision of a siren or foghorn to notify all personnel of an emergency situation.
- An assembly point will be designated in the construction compound area and will be marked with a sign. All site personnel will assemble at this point.
- A roll call will be carried out by the Site Security Officer to account for all personnel on site.
- The Site Security Officer will inform the Site Supervisor/Construction Manager when all personnel have been accounted for. The Site Supervisor/Construction Manager will decide the next course of action, which be determined by the situation that exists at that time and will advise all personnel accordingly.

All personnel will be made aware of the evacuation procedure during site induction. The Fire Services Acts of 1981 and 2003 require the holding of fire safety evacuation drills at specified intervals and the keeping of records of such drills.

4.1.4 Spill Control Measures

Every effort will be made to prevent an environmental incident during the decommissioning phase of the project. Oil/fuel spillages are one of the main environmental risks that will exist on the site which will require an emergency response procedure. The importance of a swift and effective response in the event of such an incident occurring cannot be over emphasised. The following steps provide the procedure to be followed in the event of such an incident:

- Stop the source of the spill and raise the alarm to alert people working in the vicinity of any potential dangers.
- If applicable, eliminate any sources of ignition in the immediate vicinity of the incident.
- Contain the spill using the spill control materials, track mats or other material as required. Do not spread or flush away the spill.
- If possible, cover or bund off any vulnerable areas where appropriate such as drains, watercourses or sensitive habitats.
- If possible, clean up as much as possible using the spill control materials.
- Contain any used spill control material and dispose of used materials appropriately using a fully licensed waste contractor with the appropriate permits so that further contamination is limited.
- Notify the ECoW immediately giving information on the location, type and extent of the spill so that they can take appropriate action.
- The ECoW will inspect the site and ensure the necessary measures are in place to contain and clean up the spill and prevent further spillage from occurring.
- The ECoW will notify the appropriate regulatory body such as Kerry and Cork County Councils, and the Environmental Protection Agency (EPA), if deemed necessary.

The importance of a swift and effective response in the event of such an incident occurring cannot be over emphasised. Environmental incidents are not limited to just fuel spillages. Therefore, any environmental incident must be investigated in accordance with the following steps.

- The ECoW must be immediately notified.
- If necessary, the ECoW will inform the appropriate regulatory authority. The appropriate regulatory authority will depend on the nature of the incident.
- The details of the incident will be recorded on an Environmental Incident Form which will provide information such as the cause, extent, actions and remedial measures used following the incident. The form will also include any recommendations made to avoid reoccurrence of the incident.
- If the incident has impacted on a sensitive receptor such as an archaeological feature the ECoW will liaise with the Project Archaeologist.

- A record of all environmental incidents will be kept on file by the ECoW and the Main Contractor. These records will be made available to the relevant authorities such as Kerry and Cork County Councils, EPA if required.

The ECoW will be responsible for any corrective actions required as a result of the incident e.g. an investigative report, formulation of alternative works methodologies or environmental sampling, and will advise the Main Contractor as appropriate.

4.2 Contact the Emergency Services

In the event of requiring the assistance of the emergency services the following steps should be taken:

Stay calm. It is important to take a deep breath and not get excited. Any situation that requires 999/112 is, by definition, an emergency. The dispatcher or call-taker knows that and will try to move things along quickly, but under control.

Know the location of the emergency and the number you are calling from. This may be asked and answered a couple of times but do not get frustrated. Even though many emergency call centres have enhanced capabilities meaning they are able to see your location on the computer screen they are still required to confirm the information. If for some reason you are disconnected, at least emergency crews will know where to go and how to call you back.

Wait for the call-taker to ask questions, then answer clearly and calmly. If you are in danger of assault, the dispatcher or call-taker will still need you to answer quietly, mostly "yes" and "no" questions.

If you reach a recording, listen to what it says. If the recording says your call cannot be completed, hang up and try again. If the recording says all call takers are busy, WAIT. When the next call-taker or dispatcher is available to take the call, it will transfer you.

Let the call-taker guide the conversation. He or she is typing the information into a computer and may seem to be taking forever. There is a good chance, however, that emergency services are already being sent while you are still on the line.

Follow all directions. In some cases, the call-taker will give you directions. Listen carefully, follow each step exactly, and ask for clarification if you do not understand.

Keep your eyes open. You may be asked to describe victims, suspects, vehicles, or other parts of the scene.

Do not hang up the call until directed to do so by the call taker.

Due to the remoteness of the site it may be necessary to liaise with the emergency services on the ground in terms of locating the site. This may involve providing an escort from a designated meeting point that may be located more easily by the emergency services. This should form part of the site induction to make new personnel and sub-contractors aware of any such arrangement or requirement if applicable. A list of emergency contacts is presented in Table 4-2.

4.3 Contact Details

A list of emergency contacts is presented in Table 4-2. A copy of these contacts will be included in the Site Safety Manual and in the site offices and the various site welfare facilities.

Table 4-2 Emergency Contacts

Contact	Telephone no.
Emergency Services – Ambulance, Fire, Gardaí	999/112
Doctor –Millstreet Medical Centre	029 70124
Hospital –Millstreet Community Hospital	029 70003
ESB Emergency Services	1850 372 999
Gas Networks Ireland Emergency	1850 20 50 50
Gardaí –Millstreet Garda Station	029 70003
Health and Safety Co-ordinator - Health & Safety Services	TBC
Health and Safety Authority	1890 289 389
Inland Fisheries Ireland (IFI)	1890 347 424
Project Supervisor Construction Stage (PSCS): TBC	TBC
Project Supervisor Design Stage (PSDS): TBC	TBC
Client: Knocknamork Ltd.	TBC

4.3.1 Procedure for Personnel Tracking

All operatives on site without any exception will have to undergo a site induction where they will be required to provide personal contact details which will include contact information for the next of kin.

In the event of a site operative becoming in an emergency situation where serious injury has occurred and hospitalisation has taken place, it will be the responsibility of the Site Manager or next in command if unavailable to contact the next of kin to inform them of the situation that exists.

4.4 Induction Checklist

Table 4-3 provides a list of items highlighted in this ERP which must be included or obtained during the mandatory site induction of all personnel that will work on the site. This will be updated throughout the various stages of the project.

Table 4-3 Emergency Response Plan Items Applicable to the Site Induction Process

ERP Items to be included in Site Induction	Status
All personnel will be made aware of the evacuation procedure during site induction	
Due to the remoteness of the site, it may be necessary to liaise with and assist the emergency services on the ground in terms of locating the site. This may involve providing an escort from a designated meeting point that may be located more easily by the emergency services. This should form part of the site induction to make new personnel and sub-contractors aware of any such arrangement or requirement if applicable.	
All operatives on site without any exception will have undergo a site induction where they will be required to provide personal contact details which will include contact information for the next of kin.	

5. PROGRAMME OF WORKS

5.1 Decommissioning Schedule

The decommissioning phase will take approximately 6-8 months to complete from commencing the removal of development components to the final reinstatement of the site.

At this time, it is not possible to determine when decommissioning will take place.

The phasing and scheduling of the main decommissioning task items are outlined in Figure 5-1 below, where the 1st January has been shown as an indicative start date for decommissioning to commence.

ID	Task Name	Task Description	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
1	Site Health and Safety									
2	Turbine Decommissioning	Disconnect power output								
3	Turbine Dismantling	Disassemble turbine components								
4	Turbine Removal	Transport of all turbine componenets off site								
5	Cable Removal	Remove Underground cables from ducting								
6	Solar Array Decommissioning	Disconnect power ouput								
7	Solar Array Removal	Disassemble and transport of all solar array components off site								
8	Turbine foundations backfill	Reinstate foundation areas by covering with soil material								
9	Accomodation Areas Reinstatement	Reinstate soil berm and boundary treatments								

Figure 5-1 Indicative Decommissioning Schedule

6. MITIGATION PROPOSALS

All mitigation measures relating to the pre-commencement, construction and operational phases of the Proposed Development were set out in the various sections of the EIAR and NIS prepared as part of the planning permission applications to ABP, KCC and CCC.

This section of the Decommissioning Plan groups together all of the mitigation measures presented in the above documents. The Mitigation Measures are presented in Table 6-1 below.

By presenting the mitigation proposals in the below format, it is intended to provide an easy to audit list that can be reviewed and reported on during the decommissioning phase of the project.

Table 6-1 Mitigation Measures

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
		Decommissioning Phase		
MM1	EIAR Section 4	Prior to the end of the operational period the Decommissioning Plan will be updated in line with decommissioning methodologies that may exist at the time and will agreed with the competent authority at that time.		
MM2	DP Section 3	Prior to decommissioning, a suitably qualified ecologist will complete an invasive species survey of the source material used for the site reinstatement works. The invasive species survey will also be undertaken along the cable route to identify invasive species at joint bay locations where excavation to expose the cabling for removal will be required.		
MM3	EIAR Section 4 DP Section 3 NIS Section 6	The effectiveness of drainage measures in the natural drainage regime that will have resumed by the time of decommissioning will be monitored continuously by the ECoW or supervising hydrologist on-site. The ECoW or supervising hydrologist will respond to changing weather, ground or drainage conditions on the ground as the project proceeds, to ensure the effectiveness of the drainage design is maintained in so far as is possible. This may require the installation of additional check dams, interceptor drains or swales as deemed necessary on-site.		
MM4	EIAR Section 4 DP Section 3	The following mitigation measures are proposed to avoid release of hydrocarbons at the site: - Road-going vehicles will be refuelled off site wherever possible; - On-site refuelling will be carried out at designated refuelling areas at various locations throughout the site. Machinery will be		

Ref. No.	Reference Location	Mitigation Measure	Audit Result	Action Required
		refuelled directly by a fuel truck that will come to site as required - Only designated trained and competent operatives will be authorised to refuel plant on site. - Fuel volumes stored on site should be minimised. Any fuel storage areas will be bunded appropriately; - The plant used will be regularly inspected for leaks and fitness for purpose; and, - An emergency plan for the decommissioning phase to deal with accidental spillages will be developed (refer to Section 4) Spill kits will be available to deal with and accidental spillage in and outside the refuelling area. A programme for the regular inspection of plant and equipment for leaks and fitness for purpose will be developed at the outset of the decommissioning phase.		
MM5	EIAR Section 13 DP Section 3	A Traffic Management Plan will be prepared in advance of any decommissioning works. The removal of development components from site will be undertaken by a specialist haulier. The traffic management arrangements will be agreed in advance of decommissioning with the competent authorities Kerry and Cork County Councils.		

7. MONITORING PROPOSALS

All monitoring proposals relating to the construction and operational phases of the Proposed Development were set out in the various sections of the Environmental Impact Assessment Report (EIAR) and Natura Impact Statement (NIS) which accompanies this application.

This section of the DP groups together all of the monitoring proposals presented in the planning documentation. The monitoring proposals are presented in Table 7-1 below.

By presenting the monitoring proposals in the below format, it is intended to provide an easy to audit list that can be reviewed and reported on during the operational phase of the project. The tabular format in which the below information is presented, can be further expanded upon during the course of operation to provide a reporting template for site compliance audits

Table 7-1 Schedule of Monitoring Proposals

Ref. No.	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
Decommissioning Phases					
MX1	DP Section 3	Prior to decommissioning, a suitably qualified ecologist will complete an invasive species survey of the source material used for the site reinstatement works and the junction upgrade adjacent and along the cable route to identify invasive species at joint bay locations where excavation to expose the cabling for removal will be required.	As required	As required	Project Ecologist
MX2	DP Section 3	The Site Manager in consultation with the ECoW will be responsible for employing the services of a suitably qualified ecologist and any other suitably qualified professionals as required throughout the decommissioning works.	As required	As required	Site Manager
MX3	DP Section 3	In general, the ECoW will maintain responsibility for monitoring the decommissioning works and Contractors/Sub-contractors from an environmental perspective. The ECoW will act as the regulatory interface on environmental matters. The Site Manager will be responsible for reporting to and liaising with Kerry and Cork County Councils and other statutory bodies as required	As required	As required	ECoW/ Site Manager
MX4	EIAR Section 8	Regular inspections of all installed drainage systems will be undertaken, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water in parts of the systems where it is not intended	As Required	Weekly	ECoW
MX5	CEMP Section 3	Training and supervision of drivers to ensure smooth machinery operation/driving, and to minimise unnecessary noise generation during the decommissioning phase.	As Required	As Necessary	ECoW

Ref. No.	Reference Location	Monitoring Measure	Frequency	Reporting Period	Responsibility
MX6	CEMP Section 4	Daily general visual inspections of site operations and inspections of all watercourses within the site and in the surrounding area by the ECoW or a suitably qualified and competent person as delegated by the ECoW	Weekly / As Required	As Necessary	ECoW

8. COMPLIANCE AND REVIEW

8.1 Site inspections and Environmental Audits

Routine inspections of decommissioning activities will be carried out on a daily and weekly basis by the ECoW and the Site Supervisor/Construction Manager to ensure all controls to prevent environmental impacts, relevant to the decommissioning activities taking place at the time, are in place.

Environmental inspections will ensure that the works are undertaken in compliance with this Decommissioning Plan and all other planning application documents. Only suitably trained staff will undertake environmental site inspections.

8.2 Auditing

An Environmental audit will first be carried out prior to the decommissioning phase of the Proposed Development to ensure the construction and/or operational phase mitigation measures that are still in place as required are adequate. Further environmental audits will be carried out on a monthly basis during the decommissioning phase of the project and on completion of the decommissioning works.

In contrast to monitoring and inspection activities, audits are designed to shed light on the underlying causes of non-compliance, and not merely detect the non-compliance itself. In addition, audits are the main means by which system and performance improvement opportunities may be identified. Environmental audits will be carried out by the ECoW on behalf of the appointed contractor. It is important that an impartial and objective approach is adopted. Environmental audits will be conducted at planned intervals to determine whether the Decommissioning Plan is being properly implemented and maintained. The results of environmental audits will be provided to project management personnel.

8.3 Environmental Compliance

The following definitions shall apply in relation to the classification of Environmental Occurrences during the decommissioning of the wind farm:

Environmental Near Miss: An occurrence which if not controlled or due to its nature could lead to an Environmental Incident.

Environmental Incident: Any occurrence which has potential, due to its scale and nature, to migrate from source and have an environmental impact beyond the site boundary.

Environmental Exceedance Event: An environmental exceedance event occurs when monitoring results indicate that limits for a particular environmental parameter (as indicated in the Environmental Monitoring Programme) has been exceeded.

An exceedance will immediately trigger an investigation into the reason for the exceedance occurring and the application of suitable mitigation where necessary.

Exceedance events can be closed out on achieving a monitoring result below the assigned limit for a particular environmental parameter.

Environmental Non-Compliance: Non-fulfilment of a requirement and includes any deviations from established procedures, programs and other arrangements related to the Decommissioning Plan.

8.4 Corrective Action Procedure

A corrective action is implemented to rectify an environmental problem on-site. Corrective actions will be implemented by the Site Supervisor/Construction Manager, as advised by the Site Environmental Clerk of Works. Corrective actions may be required as a result of the following;

- Environmental Audits;
- Environmental Inspections and Reviews;
- Environmental Monitoring;
- Environmental Incidents; and,
- Environmental Complaints.

A Corrective Action Notice will be used to communicate the details of the action required to the main contractor. A Corrective Action Notice is a form that describes the cause and effect of an environmental problem on site and the recommended corrective action that is required. The Corrective Action Notice, when completed, will include details of close out and follow up actions.

If an environmental problem occurs on site that requires immediate attention direct communications between the Site supervisor/Construction Manager and the ECoW will be conducted. This in turn will be passed down to the site staff involved. A Corrective Action Notice will be completed at a later date.

8.5 Decommissioning Phase Plan Review

This Decommissioning Plan will be updated and reviewed prior to commencement of decommissioning works. Further updates will be completed to the plan during decommissioning works to adapt to specific situations that are encountered that need to be considered by the plan. This decommissioning plan is informed by the Scottish Natural Heritage report (SNH) *Research and Guidance on Restoration and Decommissioning of Onshore Wind Farms* (SNH, 2013)