Appendix 2A

Construction and Environmental Management Plan (CEMP)

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MWP

CONSTRUCTION AND ENVIRONMENTAL MANAGEMENT PLAN

Ballinlee Wind Farm

Ballinlee Green Energy Limited

September 2025

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Project No.	Doc. No.	Rev.	Date	Prepared By	Checked By	Approved By	Status
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1. Introduction

This Construction Environmental Management Plan (CEMP) outlines the scope of construction works, construction methodologies and environmental management measures which are to be implemented and followed for the proposed Ballinlee Wind Farm in order to ensure that the project is constructed in accordance with best practice and with the minimum impact on the surrounding environment. For the purposes of the CEMP, the Ballinlee Wind Farm project includes the wind farm, turbine delivery route works areas, the grid connection route, 110kV substation, borrow pits and all other ancillary infrastructure associated with the scheme.

1.1 CEMP Purposes and Objectives

This CEMP details the construction works and environmental management measures, which will be implemented during the construction phase of the Ballinlee Wind Farm.

The primary objective of this CEMP is to provide a framework for actions, responsibilities and protocols associated with environmental management with which the Appointed Contractor(s) are required to adhere to in order to construct the project in accordance with regulatory requirements and to reduce and/or avoid any adverse environmental impacts.

The CEMP document is a live document that will be updated as needed, including any conditions stipulated in the planning permission if granted. The version presented here outlines the fundamental work practices, construction management procedures, management responsibilities, mitigation measures, and monitoring proposals that must be adhered to.

The Appointed Contractor(s) will be responsible for updating the CEMP as the project progresses, including any changes to roles and responsibilities of personnel involved in the construction. Once updated, all site personnel will be required to familiarise themselves with the plan's requirements as they relate to their roles on-site.

While this version of the CEMP provides a benchmark for good practice, where avoidance or further minimisation of risks to the environment can be demonstrated through use of alternative methods or improvements to current practices, the Contractor will implement these wherever possible.

2. Project Overview

2.1 Wind Farm

Ballinlee Green Energy Ltd (the Applicant) propose to develop a wind farm (named Ballinlee Wind Farm) comprising of seventeen (17) No. wind turbines located on privately-owned predominantly agricultural lands in east County Limerick.

The wind farm site under consideration is located within the townlands of Ballincurra, Ballinlee South, Ballingayrour, Ballinrea, Knockuregare, Ballinlee North, Carrigeen and Camas South approximately 18km south of Limerick City and 3km southwest of Bruff, Co. Limerick. The site is situated in a rural area characterised by agricultural holdings and one-off residential dwellings. Some patches of forestry plantation occur within the proposed development and some on neighbouring properties.

Table 2-1 sets out the characteristics of the project elements for which development consent is being sought and all other associated project components.

Table 2-1: Characteristics of the Proposed Project

Proposed Development for which consent is sought	Core Wind Farm Components • Seventeen (17) No. wind turbines (turbine tip height of 160m, and 150m (T6)) with associated foundations and crane hardstand areas. • One (1) No. Permanent Meteorological Mast (92m height) and associated foundation, hardstand area and ancillary main crane hardstand area. • One (1) No. Electrical Substation (110kV) including Eirgrid compound, IPP, maintenance compounds, ancillary building, security fencing and all associated works. • Nine (9) No. site entrances. • New and upgraded internal site service tracks (approximately 10.8km of new internal access tracks to be constructed). • New clear span bridge over the Morningstar River. • Underground electric collector cable systems between turbines within the wind farm site. • Underground electric cabling systems between the wind farm site and connection point at existing Killonan 220/110kV substation. Associated Components of the Proposed Development • New temporary access track via R516 to facilitate turbine delivery route located in the townland of Tullovin. • Three (3) No. temporary construction site compounds (one approximately 95m x 50m and two approximately 55m x 25m). • Two (2) No. borrow pits to be used as a source of stone material during construction and for storage of excess excavated materials. • Nine (9) No. permanent and two (2) temporary deposition areas. • Associated surface water management systems. • Tree felling required for wind farm infrastructure.
Other Associated Project Components	• Whooper Swan Management Area works. • Habitat Enhancement areas works. • Landscaping, fencing and all associated works.

The proposed wind farm layout is shown in **Figure 2-1** below and on planning drawings **22635-MWP-00-00-DR-C-5006 to 22635-MWP-00-00-DR-C-5020.** A schedule of the proposed wind turbines and their corresponding grid co-ordinates (ITM) is set out in **Table 2-2**.

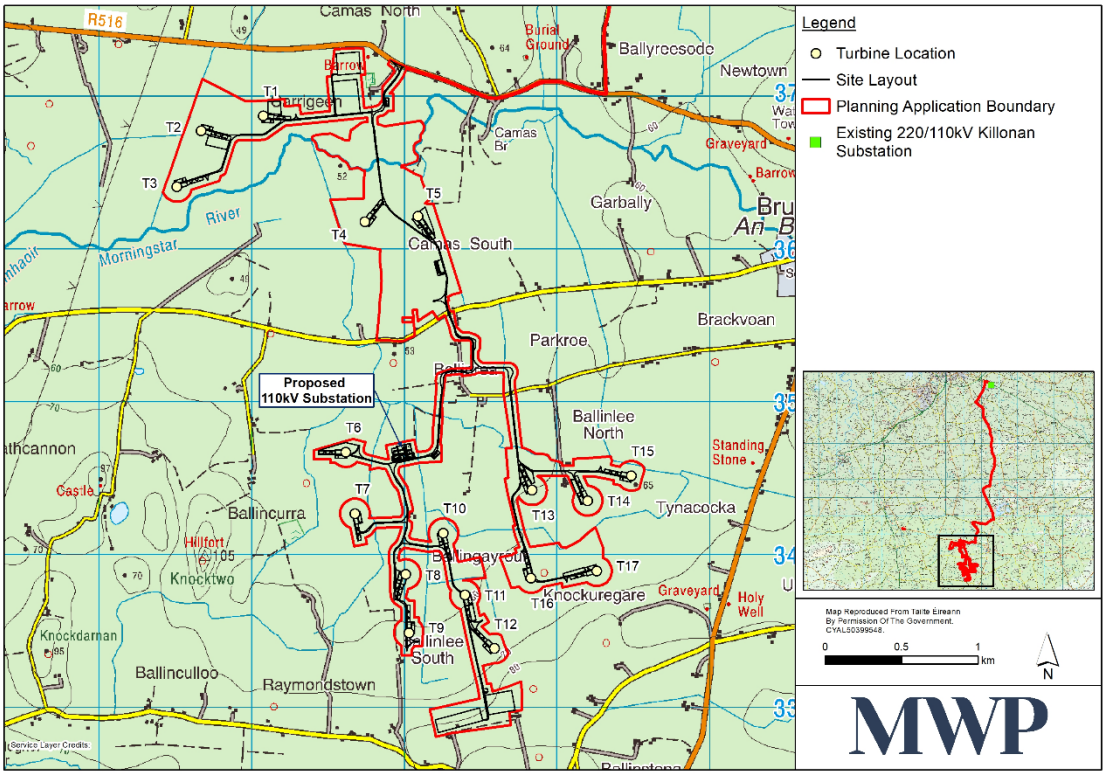

Figure 2-1: Proposed Wind Farm Layout

Table 2-2: Turbine ITM Coordinates

Turbine No	X Coordinate	Y Coordinate
T1	559035	636918
T2	558629	636821
T3	558471	636454
T4	559699	636226
T5	560048	636262
T6	559575	634719
T7	559635	634317
T8	559967	633921
T9	559988	633538
T10	560213	634189
T11	560355	633784
T12	560540	633452
T13	560792	634470
T14	561156	634401
T15	561442	634564

Turbine No	X Coordinate	Y Coordinate
T16	560787	633896
T17	561214	633948

2.2 Grid Connection Route

The proposed Ballinlee Wind Farm onsite 110kV substation will be connected to the existing 220/110kV Killonan substation which is located on the Tipperary Road (N24) East of Limerick City. This will allow the electrical energy generated from the wind farm to be exported onto the national grid. The proposed Ballinlee Wind Farm grid connection route is approximately 27.6km and is shown in **Figure 2-2** and on planning drawings **22635-MWP-00-00-DR-C-5021 to 22635-MWP-00-00-DR-C-5050.**

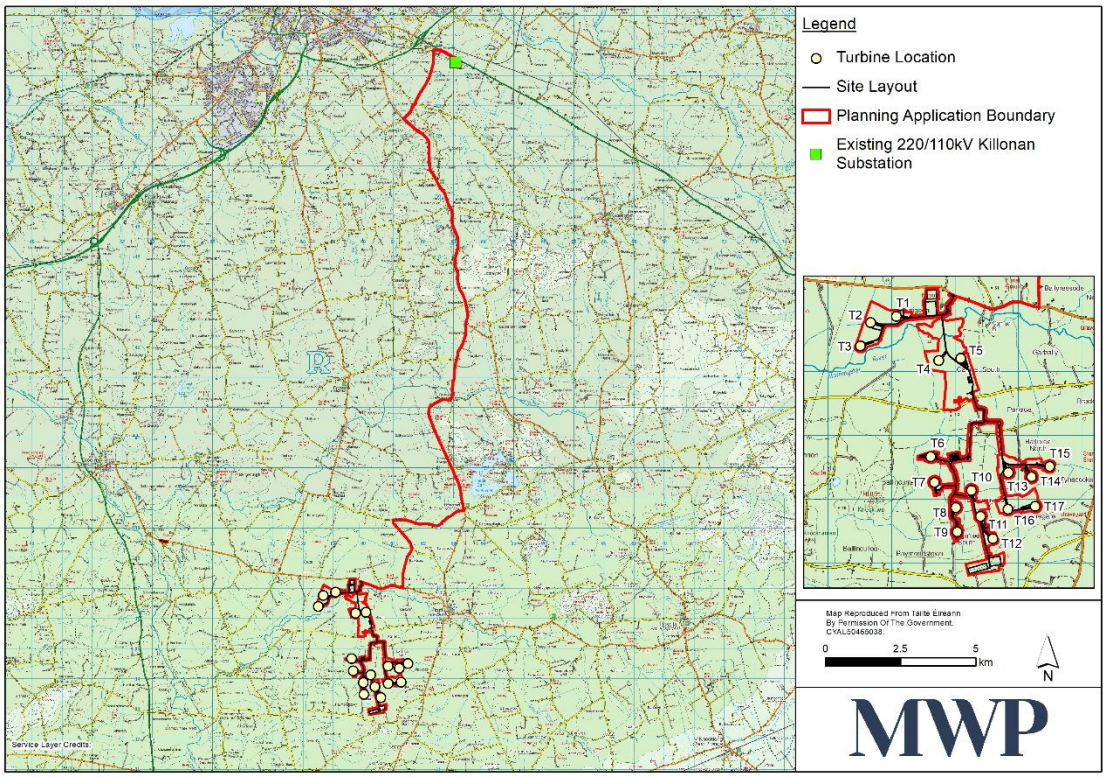

Figure 2-2: Proposed Grid Route Connection to 220/110kV Killonan Substation

3. Construction Works

3.1 Schedule of Construction Works

The proposed development duration would be of the order of 24 months followed by a 6 month commissioning period. The wind farm construction works are estimated to be phased as outline in **Table 3-1**. A number of these phases will run concurrently.

Table 3-1: Phases of Construction and Estimated Timeline

Phase	Activity	Description	Duration (Months)
1	Site Clearance	Tree felling and site preparation before mobilisation	0.5
2	Enabling Works	Enabling works on public roads, site entrances and sight lines	0.5
3	Site Establishment	Temporary Construction Compounds, pre-construction activities	0.5
4	SMA	Set up site drainage, attenuation and treatment for water	1.0
5	Access Tracks	Construction and upgrading internal access tracks	1.0
6	Borrow Pit	Establishment of borrow pit access track and storage areas	1.5
7	Turbine Hardstand	Construction of hardstand for cranes and turbines	4.0
8	Turbine Foundation	Earthworks and construction of foundations	4.0
9	Internal Cables	Open trenching/HDD for cables and ducts	3.0
10	Clear Span Bridge	Civil, Structural construction	3.0
11	IPP	Civil, Structural and Electrical construction	1.0
12	Substation	Civil, Structural and Electrical construction	1.0
13	Met Mast	Civil, Structural and Electrical construction	0.5
14	Turbine Delivery	Port to site laydown areas	2.0
15	Turbine Erection	Crane establishment and turbine erection	3.0
16	Replanting	Material distribution and replanting/planting within site	0.5
17	WF Commissioning	Approval and implementation of O&M for Wind Farm	6.0

3.2 Working Hours

Construction is proposed to occur within the following hours with exceptions:

7.00am – 7.00pm* (Monday – Saturday inclusive)

Public road working hours are from 7.00am – 7.00pm* (Monday - Friday inclusive) and Saturday 9.00am – 2.00pm

There will be restrictions between these hours to facilitate the residents and ensure public safety, works will be programmed to avoid peak local traffic e.g. school runs.

* The working day may extend occasionally at times when critical elements of work need to be advanced. Longer working days will occur for concrete pours for turbine bases and for turbine erection works which may spill over into weekends depending on how low wind periods fall. Any such exceptions will be agreed with the local authority.

3.3 Construction Personnel

It is expected that the construction works for the wind farm will require up to 80 personnel including site contractors, engineers, materials delivery personnel, environmental personnel, health and safety personnel and the civil works for the cable route will require at least 15 personnel. The electrical works will require less heavy machinery but more labour personnel, with an expected 25 personnel to complete the works. It is likely that both the onsite civil and grid connection works will take place simultaneously.

4. Construction Methodology

Whilst not all construction methodologies are included, the key elements of the civil works and activities associated with the construction phase of the wind farm and grid connection are outlined below. All contractors will comply with the Machinery Directive.

4.1 Site Preparation and Pre-Construction Surveys

4.1.1 Pre-Construction Surveys

Any detailed ground investigations, environmental surveys and archaeological testing required to support the construction process will be carried out and finalised.

4.1.2 Enabling Works

Prior to construction commencing, on site demarcation of the construction site boundary will be undertaken to prevent equipment tracking outside the planning boundary.

4.1.3 Forestry and Tree Felling

Felling of some existing forestry and trees is required within and around wind farm infrastructure to accommodate the construction of the turbine foundations and associated hardstands, access tracks, and turbine assembly, turbine delivery and for bat buffer purposes. See Table 4-1 showing the radius of forestry/tree felling around each turbine.

Table 4-1: Tree Felling Buffer around Turbines

Turbine No	Felling Radius (m)
T1	73.9
T2	89.4
T3	79.7
T4	97.1
T5	97.1
T6	97.1
T7	79.1
T8	89.4
T9	73.9
T10	89.4
T11	89.4
T12	89.4
T13	79.7
T14	89.4
T15	79.7
T16	79.7
T17	79.7

All forestry felling will be undertaken in accordance with a felling licence, using good working practices as outlined by the Department of Agriculture, Food and the Marine in their 'Standards for Felling and Reforestation' (2019). The guidelines deal with sensitive areas, erosion, buffer zone guidelines for aquatic zones, ground preparation and drainage, chemicals, fuel and machine oils. Any excess trees, brash and minor branch residues will be gathered from the site. Felling residue will be transferred to a truck for removal via chipping or baling and removed from the site. Any requirements for replanting will be discussed and agreed with the Forest Service. All conditions associated with a proposed felling licence will be complied with. A felling licence application will only be submitted once planning permission is received for the proposed development.

4.2 Construction Activities

4.2.1 Temporary Construction Compounds

Three temporary construction compounds will be established upon commencement of the construction phase. The three (3) No. site compounds will have dimensions of approximately 55m x 25m, 95m x 50m and 55m x 25m respectively. The compounds will be used as a secure storage area for construction materials and also contain temporary site units to provide welfare facilities for site personnel. Facilities will include office space, meeting

rooms, canteen area, a drying room and sanitary provisions. An example of a Typical Temporary Site Compound on a Wind Farm can be seen in **Plate 4-1**.

The locations of the temporary construction compounds are shown in **Figure 4-1**.

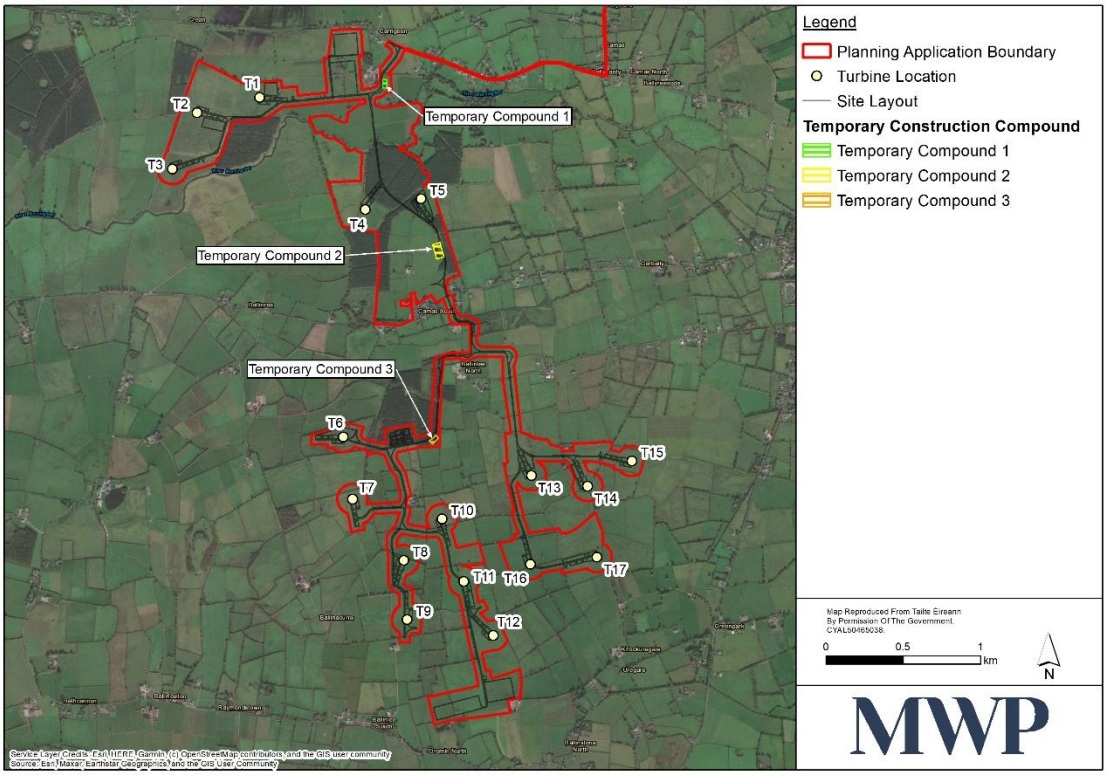

Figure 4-1: Temporary Construction Compound Locations

The compounds will be constructed early in the project in order to provide site offices and accommodation for staff and for the delivery of materials. Any surface water management, bunding, waste management measures etc. will also be put in place at the outset. Site security will be put in place adjacent to the entrances and will be maintained throughout all phases of the work. The layout of the temporary construction compounds are shown on planning drawings 22635-MWP-00-00-DR-C-5413 & 22635-MWP-00-00-DR-C-5414.

The temporary construction compounds will be constructed as follows:

1. The designated compound areas will be marked out at the corners using ranging rods or timber posts.
2. Swales and associated sediment settlement ponds will be installed around the perimeter to manage surface water.
3. The compounds will be established using construction methods similar to those used for the excavated access tracks.
4. All excavated material will be transported to the on-site deposition areas for storage or reuse.
5. A layer of geogrid or geotextile will be installed, followed by compacted layers of mostly site won crushed aggregate to create a hardstanding area for site offices and storage containers.
6. The final surface will be formed with a layer of Class 6F2 aggregate material imported from local quarries.

7. Each site compound will be graded and compacted before welfare container facilities are installed. A bunded containment area will be designated within the compounds for the storage of lubricants, oils, and site generators.
8. If necessary, the compounds will be fenced and secured with locked gates to prevent unauthorized access.
9. During the construction phase, a self-contained toilet block with a waste holding tank will be installed on-site. The service contractor(s) will maintain the facility regularly, and it will be removed upon completion of the construction phase.
10. Upon project completion, the compounds will be decommissioned by backfilling with excavated material and landscaping with topsoil as required.

Plate 4-1: Typical Temporary Site Compound on a Wind Farm

4.2.2 Site Entrances

The site is located mainly in agricultural flatlands west of the town of Bruff. Access to the site will be via the Regional and Local Road network. The R512 is located to the east of the site running from Bruff to Kilmallock. The closest National primary road is the N20 located to the west of the proposed site.

Nine (9 No.) entrances are proposed. These entrances are required to facilitate construction traffic delivering materials and to facilitate turbine deliveries, and operations and maintenance vehicles.

Entrances One (1 No.) Two (2 No.) Three (3 No.) Four (4 No.) Five (5 No.) Six (6 No.) and Seven (7 No.) will be used for the operational stage and construction stage. Entrances One (1 No.) and Two (2 No.) will serve the five wind turbines located to the south of the regional road R-516 and the north of the local road L-1414. Entrance Five (5 No.) will provide access to the new on-site 110kV substation, a new Meteorological mast, and seven turbines located to the south of the L-1414 and the north of the L-1550. Entrance Seven (7 No.) will provide access to five turbines south of the L-51217. Entrance Eight (8 No.) and Nine (9 No.) are part of the turbine delivery route, avoiding the Tullovin bridge, and both are off the R-516.

- Entrance No.1 off the R-516 Regional Road
- Entrance No.2 off the L-1414 Local Road
- Entrance No.3 off the L-1414 Local Road, opposite entrance No 2
- Entrance No.4 off the L-51217 Local Road, opposite entrance No 5

- Entrance No.5 off the L-51217 Local Road
- Entrance No.6 off the L-51217 Local Road, opposite entrance No 7
- Entrance No.7 off the L-51217 Local Road
- Entrance No. 8 off the R-516 Regional Road
- Entrance No. 9 off the R-516 Regional Road

On the approach of access tracks to public roads the gradient will be such that runoff from the access tracks will not flow out onto the public road. Existing roadside surface water will be piped across the site entrance. The site entrances are shown on planning drawings 22635-MWP-00-00-DR-C-5067 to 22635-MWP-00-00-DR-C-5070.

4.2.3 Internal Access Tracks

Internal site access tracks are required to interconnect elements of the site and allow access to all wind turbines and wind infrastructure. Existing tracks will be upgraded, and new tracks will be constructed to access each of the turbines, substation compound, meteorological mast and all other associated infrastructure. These access tracks will be constructed using excavated and floating track techniques depending on the ground conditions. Following construction, access tracks will be maintained to provide long-term access for maintenance of the wind turbines.

The total length of new and upgraded internal site service tracks required to facilitate the site is approximately 10.8km and is broken down as follows:

- 8.3km of new excavated tracks to be constructed,
- 2.0km of new floating tracks to be constructed.
- 0.5km of existing tracks to be upgraded.

Typical access track cross-sections are shown in Plate 4-2 and on planning drawing 22635-MWP-00-00-DR-C-5406 which includes details of each of the access track types.

4.2.3.1 New Excavated Tracks

The 8.3km of new excavated tracks will follow a typical cross-section with the following buildup:

- Minimum 150mm thick Class 6F2 material or similar.
- Minimum 450mm thick site won aggregate.
- Suitable geogrid or geotextile material as required where poor ground bearing occurs.

Typical access track construction and build-up for new excavated tracks is as follows:

1. The appointed contractor will liaise with the wind turbine supplier prior to the commencement of the works to ensure that the design of the new excavated tracks conforms with the wind turbine supplier's specifications and no works beyond that which have received planning permission will be undertaken.
2. The appointed contractor will survey the area for any unforeseen hazards prior to the commencement of works and set up warning signage as appropriate.
3. The appointed contractor will mark out the line of the new excavated track using a GPS / total station.
4. Surface water controls to ensure the separation of overland clean water flow from construction run-off will be implemented as outlined in Section 4.2.4.7.
5. Excavators will first remove any topsoil / vegetative layer which may be present. This material will be transported to an agreed temporary storage area and maintained for re-use during the restoration phase

of the wind farm construction. Topsoil / vegetative removal will be kept to a minimum in order to prevent any runoff of silt during heavy rainfall.

6. Excavators will continue to strip and excavate the soft subsoil underneath, which will be temporarily stored adjacent to the access tracks in accordance with approved methods with the use of an articulated dumper truck. Excavated material will only be temporarily stored on slopes under 5° and to a maximum height of under 1.0m until they are transported to the selected deposition areas where they will be permanently stored.
7. All excavations to be carried out will be battered back to a safe angle of repose (minimum slope angle of 45°) but where excavations are in solid rock the safe angle of repose may be increased to a slope angle of 60°.
8. Once a section of the excavated access track is exposed to suitable formation; a layer of geogrid or geotextile material may be placed along its formation depending on ground conditions which will be covered with site won aggregate as required and compacted in maximum 250mm layers.
9. The aggregate required for the new excavated access tracks is proposed to be used from either suitable excavated aggregate material from the borrow pits within the wind farm site and/or imported aggregate from the nearby quarries. All tracks will be finished with imported 150mm crushed aggregate of Class 6F2 material or similar aggregate type material. Sufficient passing bays will be constructed to allow for the safe movement of site traffic along the tracks.
10. The aggregate will be delivered to the required work area and spread out locally with the use of excavators and compacted with the use of a roller which will roll the aggregate in maximum 250mm layers on top of the geogrid / geotextile material to achieve the required design strength.
11. All new excavated access tracks will be constructed to a minimal drivable width of 5.0m with a maximum crossfall of 2.5% in order that water can flow off the tracks and reduce the risk of rutting / potholes occurring.
12. Trackside swales as per Section 4.2.4.7 will be constructed to manage clean and dirty water runoff along excavated access tracks.
13. The final running surface of the new excavated access tracks will be capped with a minimum 150mm layer of crushed aggregate Class 6F2 material or similar using a road grader.
14. Any surplus material generated from the excavated access track works will be transported back to the assigned deposition area for permanent storage.
15. Where drop offs greater than 1.0m in height occur alongside track edges; physical edge protection will be constructed to reduce the risk of vehicles overturning. Marker posts will also be erected to delineate track edges in poor weather.
16. The appointed contractor will ensure that on site personnel will be aware of environmental constraints / sensitive areas within the wind farm site in which works are to be avoided.

Plate 4-2: Typical new excavated access track on a wind farm

4.2.3.2 New Floating Tracks

The 2.0km of new floating tracks will follow a typical cross-section with the following buildup:

- Minimum 150mm thick Class 6F2 material or similar.
- Minimum 450mm thick site won aggregate.
- Suitable geogrid or geotextile material.

A typical floating track on a wind farm can be seen in Plate 4-3. The new floating access tracks will be constructed as follows:

1. The appointed contractor will liaise with the wind turbine supplier prior to the commencement of the works to ensure that the design of the tracks conforms with the wind turbine supplier's specifications and no works beyond that which have received planning permission will be undertaken.
2. The appointed contractor will survey the area for any unforeseen hazards prior to the commencement of works and set up warning signage as appropriate.
3. The appointed contractor will mark out the line of the proposed floated track using a GPS / total station.
4. Surface water controls to ensure the separation of overland clean water flow from construction run-off will be implemented as outlined in Section 4.2.4.7.
5. The intended floating track area is cleared of major protrusions such as rocks, trees, bushes etc. down to ground level but residual stumps and roots are left in place.
6. The local surface vegetation and soils are left in place where possible as the existing vegetation and root mat may be the strongest layer in the system and care will be taken to preserve this layer if possible.

7. Any local hollows and depressions are filled in with a suitable local lightweight fill such as tree brash, logs, or geogrid / geotextile material with aggregate.
8. A formation, 7 to 8m, wide is prepared where a layer of geogrid / geotextile is laid out by hand along the line of the proposed floated track.
9. The specification for geotextiles will be finalised by the design engineer at construction stage but past empirical experience on previous constructed wind farms within Ireland and Scotland has proven the suitability of floated access track construction.
10. Where surface water systems / controls are required, suitably sized HDPE surface waterpipes shall be laid on top of the installed geogrid / geotextile prior to the placement of aggregate. Cross drains will be laid at appropriate intervals to maintain the existing surface water regime on the site.
11. The material required for the floated access tracks is proposed to be provided from either suitable excavated aggregate material within the wind farm site and/or imported aggregate from the nearby quarries. All tracks will be finished with imported 150mm crushed aggregate of Class 6F2 material or similar aggregate type material.
12. Wide tracked 360° excavators will be used for constructing the floated tracks by cascading a minimum 450mm thickness of aggregate over the geogrid / geotextile. The aggregate will be suitably sized to achieve a sound interlock with the geogrid / geotextile material. It is common practice for floated access track construction on wind farms that the compaction of the aggregate is done by the wheels and tracks of construction plant alone.
13. An additional layer of geogrid / geotextile may be placed over the aggregate, if necessary, before a minimum capping layer of 150mm of Class 6F or similar material is laid out with excavators.
14. All floated access tracks will be constructed to a minimum drivable width of 6.0m with a maximum crossfall of 2.5% in order that water can flow off the tracks and reduce the risk of rutting / potholes occurring.
15. Trackside swales as per Section 4.2.4.7 will be constructed to manage clean and dirty water runoff along excavated access tracks.
16. Where drop offs greater than 1.0m in height occur alongside track edges; physical edge protection will be constructed to reduce the risk of vehicles overturning. Marker posts will also be erected to delineate track edges in poor visibility.
17. To allow for the safe movement of site traffic during the construction of floated tracks; a site traffic management plan will be prepared by the appointed contractor in accordance with the Traffic Management Plan (EIAR Volume III, Appendix 16A) submitted with this application. Care will be taken when reversing vehicles on floating tracks to ensure that they do not run along the edge of the track but stay within the delineated safe running zone.
18. The appointed contractor will ensure that on site personnel will be aware of environmental constraints / sensitive areas within the wind farm site in which works are to be avoided.

Plate 4-3: Typical floated track on a wind farm

4.2.3.3 Upgraded Existing Tracks

The 0.5km of upgraded existing tracks to be upgraded will follow a typical cross-section with the following buildup:

- Minimum 150mm thick Class 6F2 crushed aggregate or similar material.
- Minimum 450mm thick site won aggregate.
- Suitable geogrid or geotextile material where required depending on ground conditions.

The existing tracks will be upgraded/widened by removing organic material and soft subsoil to formation level and constructing a track on a layer of geogrid or geotextile as necessary. The construction build-up will be similar to that described for new excavated tracks in Section 4.2.3.1. Where required, the new widened track surface will be capped with a 150mm layer of crushed aggregate of Class 6F2 or similar.

All upgraded access tracks will be constructed with a maximum crossfall of 2.5% to ensure water runoff. Existing or new drains along the lower side of the track will form part of the dirty water drainage system, while drains on the higher side of the track will act as clean water drains.

Typically, the sequence for upgrading and widening existing access tracks will comprise the following:

1. The appointed contractor will liaise with the wind turbine supplier prior to the commencement of the works to ensure that the design of the tracks conforms with the wind turbine supplier's specifications and no works beyond that which have received planning permission will be undertaken.
2. The appointed contractor will survey the area for any unforeseen hazards prior to the commencement of works and set up warning signage as appropriate.
3. The appointed contractor will mark out the line of the upgraded/widened track using a GPS / total station.

4. Surface water controls to ensure the separation of overland clean water flow from construction run-off will be implemented as outlined in Section 4.2.4.7.
5. The material required for upgrading and widening works will be sourced from either the proposed on-site borrow pit(s), suitable excavated stone material within the wind farm site and/or imported aggregate from nearby quarries. All upgraded tracks will be finished with imported 150mm crushed aggregate of Class 6F2 material or similar. Passing bays will need to be constructed to allow for the safe movement of site traffic along the existing tracks.
6. Where stone is sourced from the borrow pit, it will be extracted using 30–60 Ton 360° excavators and loaded onto articulated dumper trucks that will deliver the aggregate to the required access track widening / upgrading locations.
7. Excavators will first remove any topsoil or vegetative layer present. This material will be transported to an agreed temporary storage area (e.g. turbine hardstand locations) and maintained for re-use during the restoration phase. Topsoil removal will be kept to a minimum to reduce the risk of silt runoff during rainfall events.
8. Excavators will then strip and excavate any soft subsoil to formation level. This material will be temporarily stored adjacent to the tracks in accordance with approved methods and later transported to designated deposition areas for permanent storage. Temporary storage will only occur on slopes under 5° and to a maximum height of 1.0m.
9. Once a section of the widened access track is exposed to suitable formation; a layer of geogrid or geotextile material may be placed along its formation depending on ground conditions.
10. Stone aggregate for widening will be placed over the geogrid or geotextile and spread locally with excavators. The material will be compacted in maximum 250mm layers using a roller to achieve the required design strength.
11. Upgrading of the existing track pavement may involve the placement of site-won aggregate compacted in 250mm layers over the existing track. A layer of geogrid or geotextile may also be placed along the existing track pavement prior to stone placement where required.
12. All upgraded / widened access tracks will be constructed to a minimum drivable width of 5.0m with a maximum crossfall of 2.5%.
13. Trackside swales as per Section 4.2.4.7 will be constructed to manage clean and dirty water runoff along widened and upgraded access tracks.
14. The final running surface of the new widened / upgraded access tracks will be capped with a minimum 150mm layer of crushed Class 6F2 aggregate or similar, laid out with a road grader.
15. Any surplus material generated from the track widening works will be transported back to the borrow pit to aid final reinstatement. Excavated topsoil and subsoil will be kept separate at the excavation and storage areas.
16. All excavations to be carried out will be battered back to a safe angle of repose (typically a max slope angle of 45°).
17. Where drop offs greater than 1.0m in height occur alongside track edges; physical edge protection will be constructed to reduce the risk of vehicles overturning. Marker posts will also be erected to delineate track edges in poor weather.
18. The appointed contractor will ensure that all on-site personnel are aware of environmental constraints / sensitive areas within the wind farm site in which works are to be avoided.

4.2.4 Surface Water Management Systems and Controls

4.2.4.1 Minor Watercourse / Surface Water Drain Crossing

Minor watercourse/surface water drain crossings will be needed and where the crossing of an existing natural or artificial surface water/ stream channel is unavoidable for an access track, turning head or wind turbine hardstand area. The crossing can either be a clear span crossing or closed pipe culvert depending on the site restrictions. The site restrictions can be, but are not limited to, boundary encroachment, existing vegetation or proximity to protected structures/areas.

If the appointed contractor proposes a closed conduit for crossings over surface water drains, minor watercourses or watercourses that are periodically dry then an agreement is required from the Office of Public Works (OPW) and Inland Fishers Ireland (IFI). All such crossings will be in accordance with the agreed management plan and/or conditions attached to a grant of planning permission and agreed with the OPW and IFI prior to construction.

Typically, this will be in the form of precast concrete or HDPE pipes. The invert of the pipe is submerged approximately 1/4 of its diameter below the original surface waterbed. Where natural gradients allow, a nominal back fall in the pipe will be incorporated to prevent scour and promote the settling of natural material along the invert of the pipe. An example of a permanent drain crossing is illustrated in Plate 4-4.

Plate 4-4: Typical surface water drain crossing

Clear span pre-cast concrete culverts are the preferred installation for crossing EPA listed watercourses or minor watercourses avoiding instream works, Clear span pre-cast concrete culverts have several advantages for this type of installation, as spans increase the height can increase accordingly allowing significant light penetration under the culvert. The increase in height is complimentary to the vertical alignment requirements for access track design.

The selection criteria for crossing natural streams and rivers within the site were:

A) Avoid crossing streams or rivers at acute angles.

B) Avoid meanders at the crossing location.

C) Cross where foundations could be constructed without excess excavation.

D) Consider vertical alignment requirements.

Construction of the clear span crossings will be supervised by the Construction Manager, a suitably qualified engineer, the project manager and the Environmental Manager in accordance with Inland Fisheries Ireland "*Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters, 2016*" and Office of Public Works "*Construction, Replacement or Alteration of Bridges and Culverts, 2013*".

The proposed installation works for a clear span pre-cast concrete culvert (see Plate 4-5 & 4-6) will comprise the following:

1. Prior to the commencement of works the design (Reports, calculations, drawings and Construction and Environmental Management Plan (CEMP)) of the culvert will be submitted for approval to the Office of Public Works (OPW) under Section 50 of the Arterial Drainage Act, 1945 and to Inland Fisheries Ireland (IFI).
2. Upon design approval the extent of the excavations required for the culvert foundations at either side of the watercourse will be marked out. The foundations are to be set to an agreed minimum distance by IFI from the existing watercourse so as not to impact on the riparian habitat. Health and safety measures such as lifebuoys on stakes will be installed and where appropriate life jackets will be provided to persons working near the watercourse.
3. Appropriate environmental control measures such as silt fences, silt traps and mats will be erected on both sides of the watercourse. These environmental control measures will reduce the potential for sedimentation of the watercourse.
4. Excavators will begin to excavate the foundations to formation level where all excavations will be battered back to a safe angle of repose (minimum slope angle of 45°) and comply with the appointed contractor(s) CEMP. All excavation works will stop in the event of heavy rainfall.
5. All excavated material will be transported to the on-site deposition areas located outside of the hydrology buffer zone; the buffer zones of watercourses are identified in Volume II Chapter 09 Water of this EIAR at the designated deposition areas. Some of the excavated material will subsequently be reused as backfill around the culvert abutments and structure upon installation. Bare ground will be minimised.
6. Once formation is reached at suitable ground conditions; steel reinforcement and shuttering will be installed. The culvert abutments will be prepared for the pouring of concrete by dewatering standing water within the excavations, which is likely to contain suspended solids, via a pump to an adequately sized sediment settlement pond located outside of the hydrology buffer zone. The standing water will be treated through the pond and clean filtration aggregate prior to outfall over vegetation away from the watercourse.
7. Ready-mix concrete will be delivered to the culvert abutments by a ready-mix concrete truck and placed into each abutment by means of an excavator. Upon completion the abutments will be covered and allowed to cure.
8. Following curing, the shuttering around the abutments will be struck and removed. A small temporary hardstand will be constructed so that a lifting crane, which will install the pre-cast concrete culvert components onto the abutments, can be set up.

9. Deliveries of the pre-cast concrete culvert components will arrive to site. These components will be individually fitted and manoeuvred into position by the lifting crane onto the concrete abutments. The components will be inspected to ensure that each unit is level and secure.
10. Backfilling on either side of the culvert will commence in accordance with the culvert supplier's specifications and the approval of the site engineer using excavated material.
11. The access track surface will be laid over the culvert structure using site won aggregate and compacted in maximum 250mm layers with the use of 10-20 Ton roller. An internal cable trench will be installed within the carriageway of the culvert so that it can cross over the watercourse.
12. Vegetated soil bunds, as per the Surface Water Management Plan (EIAR Volume III, Appendix 2E) will be installed to divert dirty water generated on the section of track over the culvert crossing into the dirty water system outside of the hydrology buffer zone. This will ensure that dirty water will not enter the clean watercourse.
13. Steel parapet railings and timber post and rail fencing will be installed at the sides and on the approaches to the culvert. This will prevent persons or vehicles falling into the watercourse while travelling across the culvert.

Plate 4-5: Typical clear span pre-cast concrete units in place over an existing watercourse

Plate 4-6: Completed clear span pre-cast concrete culvert over existing watercourse

4.2.4.2 Surface Water Drain Removal

Surface water drains in some instances are required to be removed or infilled due to the location of access tracks, turning heads or wind turbine hardstand areas. As these surface water drains are not listed on the EPA watercourse GIS map, they do not have a watercourse buffer zone as identified in in Volume II Chapter 09 Water of this EIAR. In these instances, a culvert is not practical, and removal is unavoidable. Disruption to the existing natural surface water network (drains, minor watercourses) will be mitigated by the construction of swales. The swales will be constructed first prior to the removal of the existing surface water drain. Surface water runoff that would have utilised the existing surface water drain being removed will be collected by the swale. The swales will convey surface water to, or in close proximity to, the same discharge point as the existing surface water drain that's being removed. The surface water swales will provide the same function as the surface water drains being replaced. Further information on swales is contained in Section 4.2.4.7.

All surface water drains removed will be in accordance with this application and/or conditions attached to a grant of planning permission and agreed with the Office of Public Works and Inland Fisheries Ireland prior to construction. Further information on the locations of surface water drains to be removed is included in planning drawings 22635-MWP-00-00-DR-C-5052 to 22635-MWP-00-00-DR-C-5066.

The typical construction/removal process for the removal of surface water drains is as follows:

1. The appointed contractor will survey the area for any unforeseen hazards prior to the commencement of works and set up warning signage as appropriate.
2. The appointed contractor will mark out the section of surface water drains to be removed.
3. The appointed contractor will ensure that on site personnel will be aware of environmental constraints / sensitive areas within the wind farm site in which works are to be avoided.
4. An excavator will be used to remove any debris from the surface water drains and relocation of the excavated debris.
5. Excavated material at the location or material transported elsewhere from the site will be used to infill the surface water drain.

6. Following completion, the area will be replanted to aid in habitat restoration and landscape integration.

4.2.4.3 Proprietary Treatment Device

There are two (2) No. proposed proprietary treatment devices for the substation compound and the independent power provider compound. The proprietary treatment devices are part of a treatment system to remove sediment, hydrocarbons and heavy metals from surface water that is runoff from the hardstanding areas within the compounds. Details of the proprietary treatment device are shown on planning drawing 22635-MWP-00-00-DR-C-5430.

The construction/installation of the proprietary treatment device will follow the manufacturer's specifications, below outlines the process for a proprietary treatment device:

1. The appointed contractor will survey the area for any unforeseen hazards prior to the commencement of works and set up warning signage as appropriate.
2. The appointed contractor will mark out the line of the detention basin using a GPS / total station.
3. The excavation must be deep enough to provide bedding and cover depth as determined by the type of surface pavement and loading. Asphalt and concrete pads should extend a minimum of 300mm horizontally beyond the unit in all directions.
4. All excavations to be carried out will be battered back to a safe angle of repose (minimum slope angle of 45°).
5. If space is a constraint, it will be necessary to shore up the excavation with suitable trench sheets and bracing systems to maintain a vertical wall from the bottom to the top of the excavation.
6. In areas where the water table is above the bottom of the excavation and/or the excavation is liable to flood, the excavation will be dewatered using suitable pumping equipment and this will continue until the installation is complete. The pumped water will be connected to a sediment settlement pond.
7. Excavate a hole of sufficient length and width to accommodate the tank and a minimum 225mm concrete surround and to a depth, which allows for the burial depth of the unit plus concrete base slab and haunch.
8. Construct a suitable concrete base slab appropriate to site conditions. Ensure that the slab is flat and level.
9. When the concrete base slab has set enough to support the installed load, add a concrete haunch so as to provide even support under the unit and then install the unit following the manufacturer's specifications.
10. In accordance with the manufacturer's specifications, pour no more than 300-mm depth of clean water into the unit, avoiding shock loads.
11. Place concrete backfill to approximately 300mm depth under and to the sides of the tank ensuring good compaction to remove voids. Care must be taken to avoid damage to the unit, follow the manufacturer's specifications.
12. Connect inlet and outlet drains and vent pipes when safe access to the backfill can be gained.

4.2.4.4 Detention Basin

There are two (2) No. proposed detention basins for the substation compound and the independent power provider compound. The detention basins provide attenuation storage for the surface water runoff from the hardstanding areas within the compounds. Following construction, the detention basin will be maintained as part of the Surface Water Management Plan (EIAR Volume III, Appendix 2E). Details of the detention basins are shown on planning drawing 22635-MWP-00-00-DR-C-5443.

The construction of the detention basins will follow the recommendations in CIRIA C753 SuDS manual 2015, however below outlines the construction process for a detention basin:

1. The appointed contractor will survey the area for any unforeseen hazards prior to the commencement of works and set up warning signage as appropriate.
2. The appointed contractor will mark out the line of the detention basin using a GPS / total station.
3. Surface water systems / controls to ensure the separation of overland clean water flow from construction run-off will be implemented as outlined in Section 4.2.4.7.
4. Excavators will first remove any topsoil / vegetative layer which may be present. This material will be transported to an agreed temporary storage area and maintained for re-use during the restoration phase of the wind farm construction. Topsoil / vegetative removal will be kept to a minimum in order to prevent any runoff of silt during heavy rainfall.
5. All excavations to be carried out will be battered back to a safe angle of repose (minimum slope angle of 45°).
6. The embankments will have a 1:4 slope and constructed and compacted to the design height, allowing for settling.
7. Pipes, headwalls, and other components related to the basin's inlets and outlets will be installed.
8. Measures like riprap, erosion-resistant vegetation, and temporary diversions will be implemented to prevent erosion during and after construction.
9. The basin's slopes and bottom will be stabilized, often with vegetation or erosion control materials, to prevent further erosion.
10. Any surplus material generated from the excavated access track works will be transported back to the assigned deposition area for permanent storage.
11. The appointed contractor will ensure that on site personnel will be aware of environmental constraints / sensitive areas associated with the detention basin.

4.2.4.5 Proprietary Discharge Control Device

There are two (2) No. proposed proprietary discharge control devices for the substation compound and the independent power provider compound. The proprietary discharge control device restricts the flow of the surface water runoff, which results in the water surcharging then entering the detention basin as attenuated surface water. The proprietary discharge control device is contained within a manhole and fixed to the outlet.

The construction/installation of the proprietary discharge control device varies depending on the product used but will follow the manufacturer’s specifications. Following construction, the proprietary discharge control device

will be maintained as part of the Surface Water Management Plan (EIAR Volume III, Appendix 2E). The below outlines the installation process using a proprietary discharge control device with a curved backplate:

1. The appointed contractor will survey the area for any unforeseen hazards prior to the commencement of works and set up warning signage as appropriate.
2. The appointed contractor will ensure that on site personnel will be aware of environmental constraints / sensitive areas within the wind farm site in which works are to be avoided.
3. The appointed contractor will mark out the location for the proprietary discharge control device within the manhole.
4. Four (4 No.) holes are drilled into the wall of the manhole, the curved backplate is fasted to the wall with bolts.
5. The proprietary discharge control device is then tested and commissioned following the manufacturers specifications.

4.2.4.6 Outlet

The surface water runoff from the IPP & EirGrid compound areas outfalls to an existing surface water drain, via a precast concrete headwall. There is no watercourse buffer zone at the location of the outfall. Details of the precast headwall are shown on planning drawing 22635-MWP-00-00-DR-C-5441.

The installation process varies depending on the precast headwall used, below outlines the construction process using a precast concrete headwall with no toe and sized for a maximum pipe diameter of 300mm:

1. The appointed contractor will survey the area for any unforeseen hazards prior to the commencement of works and set up warning signage as appropriate.
2. The appointed contractor will mark out the line of the detention basin using a GPS / total station.
3. The appointed contractor will ensure that on site personnel will be aware of environmental constraints / sensitive areas within the wind farm site in which works are to be avoided.
4. Surface water systems / controls to ensure the separation of overland clean water flow from construction run-off will be implemented as outlined in Section 4.2.4.9.
5. An excavator will remove any debris from the installation location and excavate to formation level of Headwall location. Details of the sub-base layer to be confirmed with site engineer based on site conditions.
6. Place and compact a minimum 350mm bed of 50mm construction sand or similar approved aggregate to minimum 50kn/m2 Bearing capacity.
7. After the digging bucket is removed, lifting chains and shackles are attached to the excavator. Then lifting hooks are threaded into the lifting points cast in the headwall.
8. Keeping outside the exclusion zone during lifting and following safety guidelines and onsite risk assessment, position the Headwall onto the bedded surface.
9. Install the headwall onto the end pipe of the pipeline. Then using approved grout fill in the void between headwall and the pipe.

10. Removing the chains and reattaching the appropriate bucket place 300mm of 50mm clean drainage stone or similar free drainage aggregate around the Headwall.
11. Backfill to the required level and approved angle of the embankment.

4.2.4.7 Swale

Swales are required to direct clean water to its natural flow path and dirty water to sediment settlement ponds. Cut off swales will direct the clean water away from construction areas and conveyance/attenuation swales will direct dirty water from construction areas. Swales are located next to any hardstanding areas and depending on the topography a cut off and conveyance swale can be together. Following construction, the swales will be maintained as part of the Surface Water Management Plan (EIAR Volume III, Appendix 2E). Typical swale cross-sections are shown on planning drawing 22635-MWP-00-00-DR-C-5407.

The construction of the swales will follow the recommendations in CIRIA C753 SuDS manual 2015, however below is a typical swale construction process:

1. The appointed contractor will mark out the line of the Swale using a GPS/total station.
2. The appointed contractor will survey the area for any unforeseen hazards prior to the commencement of works and set up warning signage as appropriate.
3. Surface water controls / devices to ensure the protection of the surrounding environment will be implemented as outlined in Section 4.2.4.9.
4. Excavators will first remove any topsoil / vegetative layer which may be present. This material will be transported to a designated temporary storage area and maintained for re-use during the restoration phase of the wind farm construction. Topsoil / vegetative removal will be kept to a minimum in order to prevent any runoff of silt during heavy rainfall.
5. Remaining excavated material will be used for the vegetated soil bunds that are constructed and compacted to the design height, allowing for settling.
6. The swale embankment will have a 1:1 slope and are constructed and compacted to the design height, allowing for settling.
7. Measures like riprap, erosion-resistant vegetation, and check dams will be implemented to prevent erosion, provide attenuation and reduce velocity.
8. The swale embankment and bottom will be stabilized, often with vegetation or erosion control materials, to prevent further erosion.
9. Any surplus material generated from the swale works will be transported back to the assigned deposition area for permanent storage.
10. The appointed contractor will ensure that on site personnel will be aware of environmental constraints and sensitive areas associated with swales. Prior to commencement of construction, baseline readings of water quality will be taken (turbity, pH, etc). These baselines will be used to set trigger levels for ongoing monitoring during construction. The frequency of monitoring is set out in Table 7-1.

4.2.4.8 Check Dam

Check dams are installed within swales and can be constructed using rocks, logs, sandbags, or silt fences. They are placed perpendicular to the flow of water, spanning the width of the swale. To ensure stability and function check dams will be keyed into the banks of the swale and extend beyond the abutments to prevent washouts

from overflow around the dam and excessive erosion due to scouring. Check dam details are shown on planning drawing 22635-MWP-00-00-DR-C-5407.

The construction process varies depending on the material used, below outlines the construction process using rocks:

1. The appointed contractor will survey the area for any unforeseen hazards prior to the commencement of works and set up warning signage as appropriate.
2. The appointed contractor will mark out the locations for check dams.
3. An excavator will remove a section of the swale embankment to ensure check dams are keyed in, place the rock material and compact it to the design height.

4.2.4.9 Silt Fence

Silt fences are installed as a means of containment, separating dirty water from clean water and to protect existing vegetation or infrastructure from sedimentation. Following construction, the silt fences will be maintained as part of the Surface Water Management Plan (EIAR Volume III, Appendix 2E). Refer to planning drawing 22635-MWP-00-00-DR-C-5407 for silt fence details. The installation process for a silt fence is as follows:

1. The appointed contractor will survey the area for any unforeseen hazards prior to the commencement of works and set up warning signage as appropriate.
2. The appointed contractor will mark out the locations for silt fences.
3. An excavator will remove any debris from the installation location.
4. The excavator will then dig a shallow trench (approximately 200mm deep) along the proposed silt fence location, upstream of the area to be protected.
5. Geotextile fabric will be placed in the trench, secured and anchored.
6. Either wood or steel posts will be installed typically 2-4m apart, depending on the specific application.
7. The fabric is then attached to the posts using staples, wire twists, or ties.
8. It will be ensured that the fabric is taut and secure to prevent underflow and ensure proper filtration.
9. The trench will be backfilled with the excavated material and compacted around the fabric to further secure the fence.

4.2.4.10 Vegetated Soil Bund

A fundamental principle of the surface water management is that clean water (uncontaminated surface water) flowing in the upstream catchment, including overland flow and flow in existing drains, is allowed to bypass the works areas without being contaminated by silt or mixing with dirty water (sediment laden surface water) from the construction area. In hydrological buffer zones and where space/area constraints limit placing a swale, a vegetated soil bund is used. Refer to planning drawing 22635-MWP-00-00-DR-C-5406 for vegetated soil bund details. The construction process for a vegetated soil bund is as follows:

1. The appointed contractor will survey the area for any unforeseen hazards prior to the commencement of works and set up warning signage as appropriate.
2. The appointed contractor will mark out the locations for vegetated soil bunds.

3. Excavated material at the location or material transported elsewhere from the site will be used to construct the vegetated soil bund.
4. An excavator will be used to lay this material at a shallow batter angle not exceeding 20 degrees and to a maximum height of 1.0 metres. The base of the vegetated soil bund will have a maximum width of 2.5 metres.
5. The excavator will compact and shape the bund before planting vegetation to stabilise the bund.

4.2.4.11 Sediment Settlement Pond

Contaminated runoff can be generated on the site access tracks, borrow pit, depositions areas, met mast area, construction compound, substation site and turbine hard standing areas and is mainly due to excavation for the infrastructure or movement of delivery vehicles and on-site traffic.

Conveyance swales carrying construction site runoff will be diverted into sediment settlement ponds that reduce flow velocities, allowing silt to settle and reducing the sediment loading. A modular approach has been adopted for the design of the sediment settlement ponds which have been sized to cater for a catchment area of 2,400m^2 works area.

The sediment settlement ponds have been designed as a three-stage tiered system and this has been proven to work effectively on wind farm construction sites. The three-stage system also facilitates effective cleaning with minimal contamination of water exiting the pond.

Following construction, the sediment settlement ponds will be maintained as part of the Surface Water Management Plan (EIAR Volume III, Appendix 2E). Details of the sediment settlement ponds are shown on planning drawing 22635-MWP-00-00-DR-C-5407. A typical example is seen in Plate 4-7.

The construction of the sediment settlement ponds will follow the recommendations in CIRIA C753 SuDS manual 2015, however below outlines the construction process for a settlement pond:

1. The appointed contractor will survey the area for any unforeseen hazards prior to the commencement of works and set up warning signage as appropriate.
2. The appointed contractor will mark out the location of the sediment settlement pond using a GPS / total station.
3. Excavators will first remove any topsoil / vegetative layer which may be present. This material will be transported to an agreed temporary storage area and maintained for re-use during the restoration phase of the wind farm construction.
4. Excavators will continue to strip and excavate the soft subsoil underneath, which will be temporarily stored adjacent to the access tracks in accordance with approved methods with the use of an articulated dumper truck. Excavated material will only be temporarily stored on slopes under 5° and to a maximum height of under 1.0m until they are transported to the selected deposition areas where they will be permanently stored.
5. Once the excavation is exposed to the design formation level; a 200mm layer of aggregate will be placed as a base.
6. A layer of sand, typically between 50-100mm, is placed and compacted using a wacker plate to ensure no damage to the lining membrane.
7. An impermeable lining membrane is placed in the excavation, over the weirs and secured to the top of the pond using pins or rocks.

8. The inlet structure is installed connecting the conveyance swale to the sediment settlement pond followed by the outlet structure. The outlet structure consists of a 1500mm x 200mm depth layer of various aggregate types from course to fine, fine aggregate placed closest to the pond.
9. Baffle walls consist of a 20mm plywood sheet installed 1000mm downstream of the inlet, sitting 200mm above the max water level and 500mm below the water level. The plywood sheets are fixed to steel fence post that are driven into the ground outside the area of the pond.
10. Additional 100 x 50 mm timber posts will be laid across the weirs to form a knife edge weir and fixed into position following the same method as the baffle walls.
11. Any surplus material generated will be transported back to the assigned deposition area for permanent storage.
12. Physical edge protection will be constructed to reduce the risk of vehicle collision. Marker posts will also be erected to delineate track edges in poor weather.
13. The ponds will be fenced and secured to prevent unauthorized access.
14. The appointed contractor will ensure that on site personnel will be aware of environmental constraints / sensitive areas associated with swales.

Plate 4-7: Construction stage wind farm sediment settlement pond

4.2.4.12 Wheel wash

Construction traffic which includes but not limited to excavated material, imported material, site won material, construction material deliveries, site establishment will gather organic material (soil, water and vegetation) on the wheels of the construction vehicles. Wheel washes are proposed at all construction entrances to remove the organic material; the wheel wash discharges to a dirty water conveyance swale which directs the wheel wash water to a sediment settlement pond. The Surface Water Management Plan (EIAR Volume III, Appendix 2E) provides further information on the function of the wheel wash in removing the organic material when leaving the site onto the public roads.

The construction/installation of the wheel wash varies depending on the device used but will follow the manufacturer's specifications, below outlines the process for installing a wheel wash:

1. The appointed contractor will survey the area for any unforeseen hazards prior to the commencement of works and set up warning signage as appropriate.
2. The appointed contractor will mark out the locations ensuring there is ample space for trucks to drive on and off the wheel wash.
3. An excavator will remove any debris from the installation location.
4. The excavator will prepare a surface for the wheel wash, according to the manufacturer's specifications.
5. Following the manufacturer's instructions the wheel wash system will be assembled/unloaded/installed.

6. All parts will be securely fastened, and connections will be watertight and connected to the dirty water conveyance swale.
7. The appointed contractor will ensure that on site personnel will be aware of environmental constraints / sensitive areas associated with the wheel wash.

4.2.5 Major Watercourse Crossing

One (1) No. clear-span bridge is required as part of the proposed development over the Morningstar River to provide access to northern and southern parts of the site. The bridge will span over 24 metres and will consist of an in-situ concrete foundation, precast cill beam & abutments supporting four precast/prestressed concrete bridge beams. Details of the clear span bridge over the Morningstar River are shown in the planning drawing 22635-MWP-00-00-DR-C-5401. A typical example of a clear-span bridge can be seen in Plate 4-8.

The new clear-span bridge over the Morningstar River will be constructed as follows:

1. The appointed contractor will liaise with relevant project stakeholders, including environmental consultants and structural engineers, to ensure all works comply with planning permissions and design specifications.
2. Prior to the commencement of works, the appointed contractor will survey the bridge location to identify any unforeseen hazards and establish appropriate safety measures, including the installation of warning signage.
3. The construction area will be marked out using GPS or a total station to accurately define the bridge alignment and excavation boundaries.
4. Vegetation within the construction zone will be removed to facilitate site access while ensuring that any required ecological mitigation measures, such as tree protection or habitat preservation, are implemented.
5. Topsoil will be stripped from the designated construction area and stored for potential reuse in site restoration and revegetation.
6. A suitable working platform will be prepared, including the installation of crane pads to accommodate heavy lifting operations required for bridge beam placement.
7. Excavation will be carried out to prepare for the construction of abutments and other structural components, ensuring compliance with geotechnical requirements.
8. Dewatering measures will be implemented as necessary to manage groundwater and prevent water ingress into the construction area.
9. A blinding bedding layer will be installed at the foundation level to create a stable base for structural elements.
10. Aggregate will be placed and compacted to provide a solid foundation for the abutments and other load-bearing structures.
11. Formwork (shuttering) will be installed to shape the concrete structures and ensure precise alignment of the bridge components.
12. Reinforcement steel will be placed in accordance with the structural design to provide additional strength to the concrete elements.

13. Precast abutment walls, cill beams, bridge beams will be positioned and securely fastened in place using appropriate lifting equipment and structural fixings.
14. The bridge deck surface will be constructed, ensuring a durable and weather-resistant finish suitable for long-term use.
15. Backfilling will be carried out around the structural elements to provide stability and integrate the bridge into the surrounding landscape.
16. The site will be graded to ensure effective surface water overland flow and minimize the risk of erosion or water accumulation.
17. Vegetation will be replanted in disturbed areas to restore the natural environment and support ecological recovery.
18. Vegetated soil bunds, as per the Surface Water Management Plan (EIAR Volume III, Appendix 2E) will be installed to divert dirty water generated on the sections of track either side of the bridge within the hydrology buffer zone, over the bridge into the dirty water system outside of the hydrology buffer zone. This will ensure that dirty water will not enter the clean watercourse.

Plate 4-8: Completed Clear-Span Bridge over existing watercourse

4.2.6 Traffic Management

For the construction of the wind farm approximately 61% of aggregate required for the construction of the access tracks, crane hardstands and the substation compound will come from site won aggregate extracted from two proposed on-site borrow pits. The remaining 39% of aggregate will be imported aggregate delivered to site for the capping of access tracks and hardstands. In addition to the imported aggregate reinforced concrete will be delivered for the construction of the seventeen (17) No. turbine bases. It is anticipated that a succession of trucks with capacities of 8 m^3 and 20 tonnes for aggregate, and 7 m^3 for concrete will transport the material at a peak frequency of 14 to 18 trucks/hour. Peaks in construction traffic are typically associated with the pouring of turbine foundations. Specialist vehicles will be used for the delivery of the wind turbine components and substation transformers.

During the construction of the grid connection route, deliveries of quarry and building materials to site will be made. All deliveries are expected to be on flatbed trucks, hopper trucks or concrete mixer trucks. Materials such as aggregates and concrete will be sourced locally. Heavy vehicles would typically arrive and depart at a uniform rate throughout the day. The proposed grid connection route site would operate for 12 hours per day during the construction period. However, hours of operation will be limited for HGV movements in order to avoid coinciding with commuting during the morning and evening peak hours, in particular during local school start and finish times. Therefore, the proposed works would permit heavy vehicle movements access for approximately 10 hours per day during the construction period. It is anticipated that a succession of trucks with capacities of 8 m^3 and 20 tonnes for aggregate deliveries, and 7 m^3 for concrete will transport the material at a peak frequency of 4 to 8 trucks/hour.

The vast majority of construction deliveries for the wind farm site, including all specialist delivery vehicles will be via the R516. The scale of the grid connection route will require deliveries to access various locations where the grid connection is to be constructed along the public roads. It is envisaged that deliveries will use the R516, L8012, L8011, L1412, R512, L1170, L1171 and N24 to access the sections of the grid connection route. (See **Figure 4-2**).

The Traffic Management Plan (EIAR **Volume III, Appendix 16A**) outlines the required traffic management procedures to be implemented on the public roads during the construction of the proposed development and delivery of the wind turbine components**.** In the event that planning approval is granted for the proposed development, the final TMP will address the requirements of any relevant planning conditions, including any additional mitigation measures which are conditioned by the planning authority. The parameters set out in the TMP subject to the approval of the planning authority are there to ensure controls are in place for all deliveries to the project site. The appointed contractor will be responsible for the TMP which is a live document and will reference to the planning application TMP.

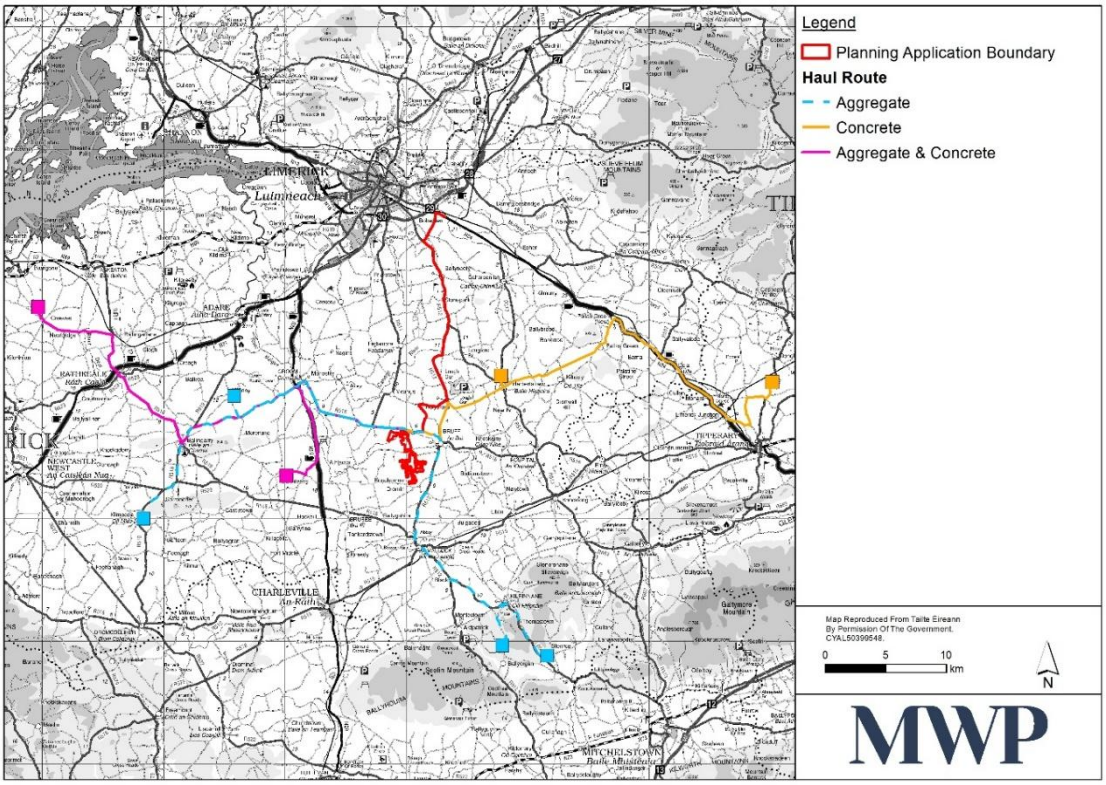

Figure 4-2: Potential Aggregate and Concrete haul routes

4.2.7 Borrow Pits

There are two (2) No. proposed on-site borrow pits which have been located to provide aggregate for internal access tracks, passing bays, hardstands, foundations, and temporary compounds. It is estimated that this will provide 61% of the aggregate required for the development. The location of the proposed borrow pits are shown in Figure 4-3. It is estimated that approximately 99,852 m³ of aggregate will be won from the borrow pits. The extraction of rock from the borrow pits is proposed to be undertaken by a combination of rock breaking and ripping. There is also the potential that rock blasting is required. The proposed locations for the borrow pits are shown on planning drawings 22635-MWP-00-00-DR-C-5008 and 22635-MWP-00-00-DR-C-5017 and section details provided on planning drawings 22635-MWP-00-00-DR-C-5073 and 22635-MWP-00-00-DR-C-5074.

The proposed installation works for a borrow pit will comprise the following:

1. Prior to commencing borrow pit works at each location, a survey will be conducted with a total station GPS, and the designated extent will be clearly pegged out.
2. Pre agreed settlement monitoring points at adjacent structures will be installed and baseline recording completed with a total station GPS.
3. Upon establishing the borrow pit boundary, a temporary fence and noise barrier will be installed along with appropriate warning signage. Fencing and signage will be inspected regularly and repaired or replaced as necessary.

4. Perimeter swales will be installed or upgraded to divert surface water run-off from entering the borrow pit and to ensure the protection of the surrounding environment and will be implemented as outlined in Section 4.2.4.9.
5. Once the borrow pit location is surveyed and pegged out, consultation with the relevant ecological and archaeological authorities will be undertaken. Upon receiving their approval where required under planning conditions, borrow pit preparation may commence.
6. Topsoil will be carefully cut and set aside in the designated temporary deposition areas for reinstatement after borrow pit operations are completed.
7. The removal of superficial soil materials ("overburden") will typically be carried out using crawler tractor dozers and backtrackers. The overburden will be loaded onto articulated dump trucks for transportation to designated deposition areas. Different overburden materials will be stored separately and managed to prevent erosion, with consideration given to slope gradients and proximity to watercourses or sensitive receptors.
8. Standing water in borrow pit excavations is likely to contain an increased concentration of suspended solids. Dewatering of borrow pit excavations can result in significant flow rates to the surface water swales and sediment settlement ponds if high-capacity pumps are used, temporary storage will be provided within the excavations in the form of a sump and dewatering carried out at a flow rate that is within the capacity of the sediment settlement ponds.
9. Efforts will be made to minimise soil disturbance by restricting traffic on undisturbed areas and limiting the working footprint to prevent unnecessary excavation and ground disturbance.
10. Borrow pits will be opened only when rock extraction is required, and they will be restored promptly upon completion of extraction activities. Borrow pits will be established progressively, in line with active construction areas.
11. If rock extraction is temporarily halted, borrow pits will be securely fenced off during periods of inactivity.
12. Borrow pits will be reinstated as soon as practicable following completion of production.
13. Upon exposure of the rock head, excavation will proceed using digging and/or ripping a combination thereof, depending on rock characteristics.
14. Ripping will be carried out using large tractor dozers fitted with towed rippers, followed by excavation with a 360° excavator for loading into dump trucks. If gradients are too steep, a 360° excavator will be deployed at the base of the face for rock extraction.
15. Benches will be worked to a maximum height in line with standard construction practice.
16. A mobile crushing and screening plant will be established within each borrow pit. All material processing, grading, and stockpiling will take place within the borrow pit boundary.
17. Aggregate excavation will be performed using a suitable excavator, with dump trucks transporting material to the processing plant.
18. Stockpiled material will be transported to its intended location, with borrow pit distribution minimising haul distances.
19. Borrow pit reinstatement will follow contractor-provided plans.
20. On completion of backfilling with appropriate materials, surface profile restoration will be carried out using the stockpiled overburden, which will be dozed back into place.

21. The contractor will provide records detailing reinstatement activities, including original and final levels and materials used.
22. All borrow pits will be reinstated promptly upon completion of use. Reinstated borrow pits will be periodically inspected for settlement, erosion, or vegetation degradation.

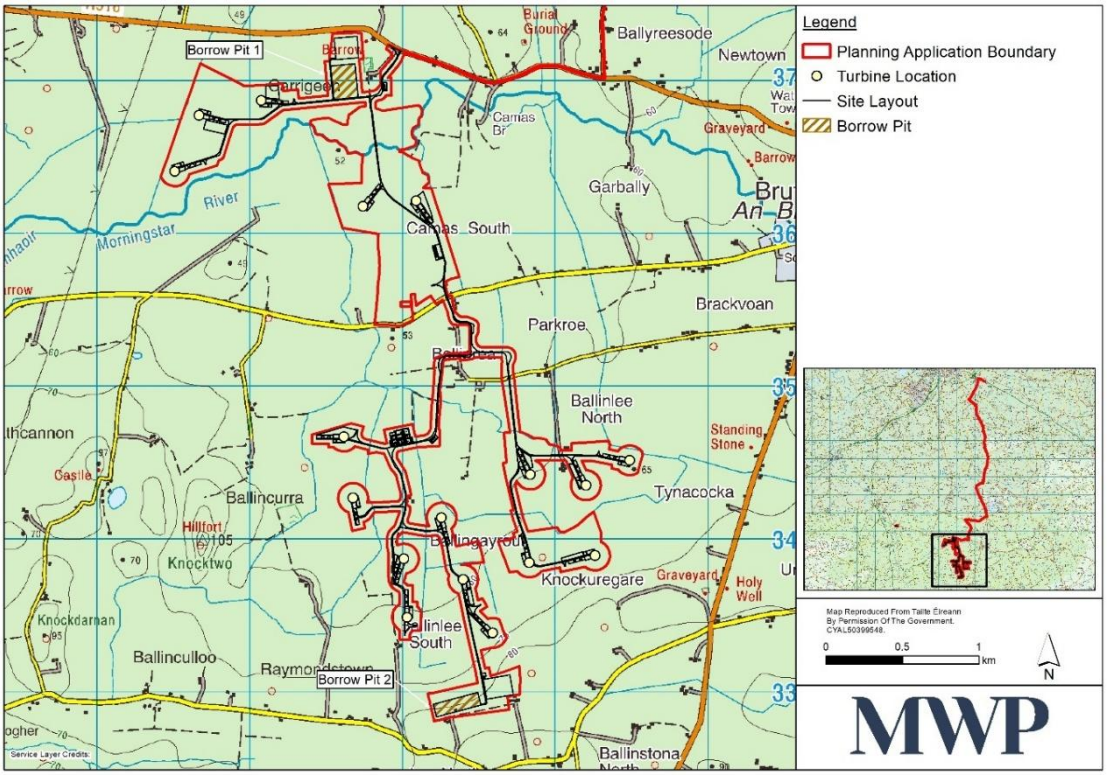

Figure 4-3: Proposed Borrow Pit locations

4.2.8 Deposition Areas

Excavated material will be reused for the backfilling, landscaping, and restoration around the proposed wind farm infrastructure such as turbines and hardstands. During the construction period, and post-excavation, the deposition areas will act as material storage areas for the management of excess material generated on the site. Ballinlee Wind Farm has nine (9) No. Permanent deposition areas and two (2) No. Temporary deposition areas.

The proposed locations for the permanent and temporary deposition areas are shown on planning drawing 22635-MWP-00-00-DR-C-5006 to 22635-MWP-00-00-DR-C-5020 and details are shown on planning drawing 22635-MWP-00-00-DR-C-5418.

The proposed installation works for a deposition area will comprise the following:

1. Deposition area locations have been selected based on consultation with landowners, to minimise environmental impacts, provide adequate separation from watercourses and in close proximity to excavation areas (turbine foundations).
2. Excavated material will be transported to designated deposition areas and placed in layers in accordance with best-practice methods to ensure stability and environmental compliance.

3. Excess cohesive material will be placed around the perimeter of the deposition pit to act as a retaining structure for the stored material. This cohesive material will be laid at a shallow batter angle not exceeding 20 degrees and to a maximum height of 2 metres.
4. The deposition area will be enclosed with silt fencing to prevent sediment runoff. Water buildup within the deposition area will not be permitted.
5. Deposition areas will be inspected and monitored daily during construction.
6. When heavy rainfall is forecast, additional erosion control and siltation prevention measures will be taken where deemed necessary based on the daily inspections (e.g. additional rows of silt fencing, placement of erosion protection layers, etc.).
7. Upon completion of construction, deposition areas will be graded to match the surrounding land profile, capped with soil, and reseeded to promote natural regeneration.
8. The surface of the deposited material will be profiled to a gradient not exceeding 5%.
9. Where feasible, excess material will be utilised to form a thin layer (≤1m) over recently felled areas, allowing for natural vegetation growth and enhancing local habitats and biodiversity.
10. Following completion, the deposition area will be replanted to aid in habitat restoration and landscape integration.
11. Works within deposition areas will be monitored weekly during the construction phase and monthly for six months post-construction by a qualified geotechnical engineer to ensure stability and compliance with environmental standards.

4.2.9 Turbine Hardstands

The layout of the crane hardstand is designed to accommodate the delivery of the turbine components prior to their erection and to support the cranes during erection. Plate 4-9 is an example of a turbine hardstand. Hardstands are also used for maintenance during the operation of the turbine. The hardstands will be rectangular in shape with additional minor hardstand fingers to lay the turbine blades across once delivered. The area of a single hardstand is approximately 2,305m^2. Refer to planning drawing 22635-MWP-00-00-DR-C-5404 for further details.

The proposed works will be restricted to the turbine locations and will comprise the following:

1. Each crane hardstand will be formed on competent subgrade of the underlying subsoil / rock which will comprise of site won aggregate, obtained from the on-site borrow pits, laid on a geotextile filter membrane.
2. The aggregate will be compacted in 250mm layers and will vary from approximately 600mm to 900mm deep depending on the depth and gradient of the underlying subgrade.
3. Temporary set down areas will be formed to facilitate the storage of the turbine components at each crane hardstand (e.g. the rotor hub assembly, the turbine blades, the turbine towers and nacelle). Each temporary set down area will be constructed using compacted aggregate which will be fully removed and reinstated after all turbines have been erected.
4. Plate bearing test results will be undertaken on the finished hardstand surface to check if ground bearing strengths are to the wind supplier's specifications. Once complete the main assembly crane will be set up on the hardstand and erection of the wind turbine will take place.

Plate 4-9: Typical finished hardstand on a wind farm

4.2.10 Turbine Foundation

It is proposed the seventeen (17) No. wind turbines will have a reinforced concrete base pad foundation with a central pedestal above the base, that will in turn support the wind turbine tower. Each turbine base will bear onto rock or other such suitable bearing stratum and will be constructed utilising a spread foundation, which is wide and shallow. The foundation will be approximately 27m in diameter and will generally be installed to a depth of approximately 3.5m below ground level. Approximately 19,100m^3 of concrete and 2,865 tonnes of steel will be used in the construction of the turbine bases. Plate 4-10 shows a turbine foundation under construction. Refer to planning drawing 22635-MWP-00-00-DR-C-5403 for further details.

The proposed works will be restricted to the turbine locations, and a raft foundation will comprise the following:

1. The extent of the excavation will be marked out and will include an allowance for trimming the sides of the excavation to provide a safe working area and slope batter.
2. Any existing topsoil and subsoil found within the footprint of the turbine base will be excavated out during formation works at the adjacent crane hardstand area. The excavation works will be carried out using hydraulic excavators, if rock is encountered this will be undertaken by a combination of rock breaking and ripping and if necessary, blasting.
3. Surplus material will be transported to the on-site deposition areas via articulated dumper trucks or tractor and trailer for subsequent reuse in the permanent reinstatement of the borrow pits.
4. Standing water in turbine base excavations is likely to contain an increased concentration of suspended solids. Dewatering of turbine base excavations can result in significant flow rates to the surface water swales and sediment settlement ponds if high-capacity pumps are used. To avoid the need for pumping, it is proposed to provide cut off swales from the excavations to prevent a build-up of water. Where this is not feasible, temporary storage will be provided within the excavations and dewatering carried out at a flow rate that is within the capacity of the sediment settlement ponds.

5. The excavated surface will be levelled, and adequate surface water controls will be put in place along with suitable set back areas to facilitate placing of aggregate and ultimately the erection of shuttering for the turbine base.
6. Suitable aggregate will be used to form a solid level working foundation surface. The aggregate will be rolled and compacted to a suitable formation level.
7. Shutters and steel reinforcement will then be put in place, and the foundation of the turbine will be prepared for pouring of concrete.
8. A layer of concrete blinding approximately 100mm thick will be laid directly on top of the newly exposed formation, tamped and finished with a screed board to leave a flat level surface. The concrete will be protected from rainfall during curing and all surface water runoff from the curing concrete will be directed to a swale and sediment settlement pond.
9. High tensile steel reinforcement will be fixed in accordance with the design drawings and schedules. The foundation anchorage system will be installed, levelled and secured to the blinding using steel box section stools.
10. Ductwork will be installed as required, and formwork erected around the steel cage and propped from the backside as required.
11. The foundation anchorage system will be checked both for level and line prior to the concrete being installed in the base. These checks will be passed to the turbine supplier for their approval.
12. Ready-mix concrete will be delivered to each turbine base by a fleet of ready-mix concrete trucks via the internal access tracks. Concrete will be placed into each base by means of a concrete pump where vibrating pokers will be used to ensure that full and proper compaction of the concrete around the reinforcement in the turbine base has been made. Upon completion of the concreting works the foundation base will be covered and allowed to cure.
13. Steel shutters will be used to pour the circular chimney section.
14. Following curing, the shuttering around the turbine base will be struck and removed.
15. Earth wires will be placed around the base.
16. The foundation will be backfilled with a cohesive material, where possible using the material arising during the excavation and landscaped using the vegetated soil set aside during the excavation. A gravel footpath will be formed from the access track to the turbine door and around the turbine for maintenance.

Plate 4-10: Typical construction of a wind turbine base

If poor ground conditions are encountered during excavation and a significant depth to sub-formation is required, a piled foundation may be considered. A piled foundation requires the use of a piling machine equipped with an auger drill to rotary bore a number of holes around the area of the turbine base to the sub-formation depth determined at construction stage. Once all the holes have been bored, reinforcement steel is inserted into each with concrete poured afterwards. Piling if required, will be limited and localised. Refer to planning drawing 22635-MWP-00-00-DR-C-5403 for further details.

The proposed works will be restricted to the turbine locations, and a pile foundation will comprise the following:

1. The extent of the turbine foundation area will be marked out. Temporary works, such as access routes, crane hardstands, and safe working areas, will be prepared.
2. Topsoil and subsoil within the footprint of the turbine base will be stripped and stored separately for later reinstatement.
3. Excavation will be carried out using hydraulic excavators to formation level suitable for piling operations.
4. Piling will be carried out in accordance with best practice methodologies set out in TII Series 1600 documents for piling and guidelines from the Federation of Piling Specialist.
5. Piles will be installed to the design depth and diameter, with casing or slurry support used where ground conditions require it. Only water-based, biodegradable, and non-hazardous compounds will be used, under controlled conditions.
6. Reinforcement cages will be lowered into each borehole, followed by the placement of concrete using tremie methods to ensure quality.
7. Pile integrity and/or load testing will be undertaken in accordance with the design requirements prior to proceeding with pile cap construction.
8. Once pile installation is complete, the pile cap area will be excavated to design depth.
9. Pile heads will be exposed, trimmed to cut-off level, and reinforcement cleaned for connection with the pile cap.

10. Blinding concrete (approx. 100 mm thick) will be placed to provide a clean working surface. The concrete will be protected from rainfall during curing and all surface water runoff from the curing concrete will be directed to a swale and sediment settlement pond.
11. High tensile steel reinforcement will be fixed in accordance with the design drawings and schedules. The foundation anchorage system will be installed, levelled and secured to the blinding using steel box section stools.
12. Ductwork will be installed as required, and formwork erected around the steel cage and propped from the backside as required.
13. The foundation anchorage system will be checked both for level and line prior to the concrete being installed in the base. These checks will be passed to the turbine supplier for their approval.
14. Ready-mix concrete will be delivered to each turbine base by a fleet of ready-mix concrete trucks via the internal access tracks. Concrete will be placed into each base by means of a concrete pump where vibrating pokers will be used to ensure that full and proper compaction of the concrete around the reinforcement in the turbine base has been made. Upon completion of the concreting works the foundation base will be covered and allowed to cure.
15. Steel shutters will be used to pour the circular chimney section.
16. Following curing, the shuttering around the turbine base will be struck and removed.
17. Earth wires will be placed around the base.
18. The foundation will be backfilled with a cohesive material, where possible using the material arising during the excavation and landscaped using the vegetated soil set aside during the excavation. A gravel footpath will be formed from the access track to the turbine door and around the turbine for maintenance.

4.2.11 Internal Collector Circuit

A network of underground cabling serving each turbine with electrical power and signal transmission will be installed within the site. The distribution system will electrically connect the wind turbines to the onsite substation. Cable jointing bays will be required to allow cables to be jointed from the turbines to the onsite substation. Refer to planning drawings 22635-MWP-00-00-DR-C-5006 to 22635-MWP-00-00-DR-C-5020 for further information on the internal collector circuit and planning drawings 22635-MWP-00-00-DR-C-5408 for trench details.

The proposed works will be restricted to the internal site cables and will comprise the following:

1. The appointed contractor will install an underground cabling network to supply each turbine with electrical power and signal transmission.
2. The cable distribution system will electrically connect the wind turbines to the onsite substation.
3. Cable jointing bays will be established at strategic locations to enable secure and reliable joints between the turbine cables and the substation network.
4. The installation will utilise either single or twin cable trenches for open ground sections, as well as trenches constructed within internal access tracks when encountered.
5. A cable marker post will be installed atop each trench to both protect and clearly identify the underlying cable duct.

6. The typical build-up for the internal site cable trenches will involve placing selected excavated backfill over a prepared bedding material.
7. The minimum cover depth over the ducts will be maintained at 750 mm, measured from the top of the cable duct to the existing ground level.
8. Where cable ducts are located within internal access tracks, the cable trench will be backfilled with lean-mix concrete to safeguard the ducting from potential damage by heavy axle loads.
9. Excavated material from the trenching operations will be reused as backfill where possible; alternatively, it will be deposited in the designated on-site borrow pit as part of the reinstatement measures.
10. If a surface water drain or watercourse is encountered during installation, the cable trench will cross via new or existing access track crossing points within the carriageway, thus minimising the need for in-stream works.
11. After backfilling, non-corrodible marker tapes in bright red and yellow will be placed within the trench for identification and safety purposes, in accordance with ESB Networks guidelines.
12. An earth berm may be constructed over the cable trench, with a marker post installed in a secure and robust manner to prevent damage from animals or adverse ground conditions.
13. Cable marker posts, constructed from concrete, recycled plastic, or timber, will be provided with appropriately worded warning signage to alert personnel to the presence of high-voltage electricity cables below.

4.2.12 External Grid Connection

Grid Connection Route Assessment (EIAR **Volume III, Appendix 2D**) provides a description of the route, assesses the constraints along the route, details the site investigations completed, illustrates the process and rationale for the initial and preliminary design.

The exact location of the underground HV ducting may be subject to minor modification following confirmatory site investigations, to be undertaken prior to construction and following consultation with Limerick City and County Council and all other relevant stakeholders, having regard to all environmental protection measures outlined in the planning application and accompanying technical reports. Any such minor modification will be within the planning boundary.

The proposed grid connection route from the proposed Ballinlee Wind Farm 110kV grid connection to the existing 220/110kV Killonan substation is shown on planning drawings **22635-MWP-00-00-DR-C-5021** to **22635-MWP-00-00-DR-C-5050** and also in **Figure 4-4**.

The grid connection route construction techniques and methodologies which will be implemented during construction of the proposed Ballinlee Wind Farm 110kV grid connection to the existing 220/110kV Killonan substation are detailed below in **Sections 4.2.12.1, 4.2.12.2, 4.2.12.3** and **4.2.12.4**

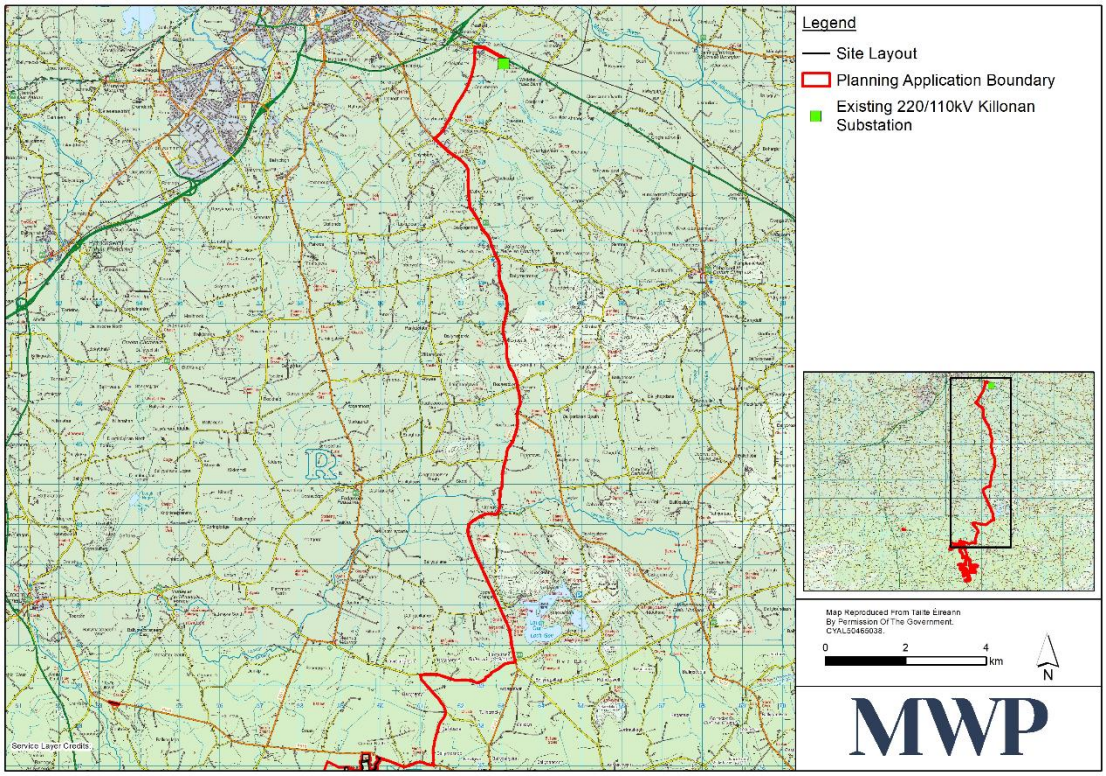

Figure 4-4: Proposed Grid Connection Route

4.2.12.1 Trench

1. The cable distribution system will electrically connect the onsite substation to the offsite existing Killoran 110/220kV substation.
2. Prior to works commencing, the area where excavations are planned will be surveyed and all existing services will be confirmed. All relevant bodies i.e., ESB Networks, EirGrid, Gas Networks Ireland, Eir, County Council etc. will be contacted and drawings for all existing services sought. A road opening licence will be obtained from the council for the relevant road sections. All plant operators and general operatives will be inducted and informed as to the location of any services.
3. Prior to works commencing a dilapidation survey will be carried out photographing and noting any existing damage or defects to structures or road surfaces. A copy of this survey will be submitted to the council prior to works commencing.
4. Prior to works commencing, the route will be inspected and marked out on the ground. Standard good practice preparatory measures are then put in place along the extent of the route. This will include any required warning notices, temporary barriers, etc.
5. Prior to works commencing the Traffic Management Plan (EIAR, Appendix 16A, Volume III) will be updated by the appointed contractor and agreed with the Council.
6. During construction works, the trench within the road will be excavated using a wheeled or rubber tracked excavator and hydro vac for crossings services. In some instances, some soil or unsuitable material may be encountered in the trench, and this will be removed from site and brought to an appropriate licensed facility.

7. The trench is then prepared to receive concrete bedding and surround for the ducts.
8. Once the concrete is suitably set, appropriate imported aggregate material is placed over the concrete surround and filled back up to the top of the trench. This is to safeguard the ducting from potential damage by heavy axle loads.
9. Prior to backfilling, non-corrodible marker tapes in bright red and yellow will be placed within the trench at appropriate locations for identification and safety purposes, in accordance with EirGrid specifications.
10. Cable marker posts in accordance with EirGrid specification CDS-HFS-01-001 (which can be constructed from concrete, recycled plastic, or timber) will be provided with appropriately worded warning signage to alert personnel to the presence of high-voltage electricity cables below.
11. Once the trench is filled, the trenching and ducting process will move along the road in planned phases.
12. The trench surface receives an immediate temporary reinstatement in accordance with *Department of Transport Guidelines for Managing Openings in Public Roads*. Final permanent reinstatement is completed at appropriate intervals in accordance with the Road Opening Licence conditions to the specification of the roads authority, TII or Council.
13. The as-built location of the ducting will be surveyed using a total station / GPS.
14. A condition survey will be carried out on the roads affected by the grid connection route, both pre and post construction. This will include a video survey of the road extent with any significant dilapidations further recorded by photography and local surveying as required.

4.2.12.2 Joint Bay

1. The joint bays will connect each length of cable to the next length of cable from the onsite substation to the offsite Killonan 220/110kV substation.
2. The joint bays and communication chambers will be either precast or cast in situ, depending on contractor preference. In order to place the boxes, the area of excavation will first be marked out on the ground and any necessary preparatory protection measures put in place to avoid any runoff or loss of soil materials.
3. Prior to works commencing, the area where excavations are planned will be surveyed and all existing services will be confirmed. All relevant bodies i.e., ESB Networks, EirGrid, Gas Networks Ireland, Eir, Council etc. will be contacted and drawings for all existing services sought. A road opening licence will be obtained from the council for the relevant road sections. All plant operators and general operatives will be inducted and informed as to the location of any services.
4. Prior to works commencing a dilapidation survey will be carried out photographing and noting any existing damage or defects to structures or road surfaces. A copy of this survey will be submitted to the council prior to works commencing.
5. Prior to works commencing, the route will be inspected and marked out on the ground. Standard good practice preparatory measures are then put in place along the extent of the route. This will include any required warning notices, temporary barriers, etc.
6. Prior to works commencing the Traffic Management Plan (EIAR, Appendix 16A, Volume III) will be updated by the appointed contractor and agreed with the Council.
7. During construction works, the joint bay excavation within the road will be excavated using a wheeled or rubber tracked excavator and hydro vac for crossings services. As aggregate fill is removed it is

temporarily stockpiled adjacent to the trench for re-use in backfilling. In some instances, some soil or unsuitable material may be encountered in the trench, and this will be removed from site and brought to an appropriate licensed facility.

8. A typical joint bay is 2 metres deep, 2.5 metres wide and 6 metres long, with a slightly larger footprint required for construction. Beside the joint bay is a link box and a C2 box.

   Link box – The link box is used to test and provide a point for condition assessment and maintenance of the cables for performance and reliability. The link box looks like a small chamber with an access cover.

   C2 Chamber – This is a small chamber where communication cores are connected. These cores transmit signals to and from substations to ensure that the cable is protected and working as designed. Prior to the chamber being installed into a compacted layer of suitable aggregate or lean mix concrete, appropriate material will be placed in the excavation to a level surface. The boxes are then positioned in situ and backfilled around them with imported crushed aggregate material.

9. The joint bays precast concrete cover slab is then put in place at a suitable level to allow for a new road surface and maintenance access / manhole cover to be installed onto the precast concrete cover slab.

10. Once the joint bays have been constructed, they will be temporarily backfilled until they are re-excavated later to allow for the pulling and jointing of cables at each joint bay.

4.2.12.3 Cable Pulling

1. The cables are delivered to a section of the site on cable drums. Two working areas are set up, one at each end of the trenched section. At one end, the cable feed is placed, and at the other, the equipment to pull the cable through.

2. Cables are pulled through in sections and connected as one circuit in a process called jointing. This process is carried out in an environmentally controlled enclosure which fits directly over the underground joint bay which is exposed for access. Once installed, the road surface is returned to its original appearance, and the joint bays are completely hidden from view.

3. The trench surface receives a temporary dressing of macadam or spray and chip. Once the overall scheme is completed, the grid connection route and associated road areas will receive a new permanent macadam finish as agreed with the Council.

4. A condition survey will be carried out on the grid connection route, both pre and post construction. This will include a video survey of the road with any significant dilapidations further recorded by photography and local surveying as required.

4.2.12.4 Horizontal Directional Drilling

1. Prior to works commencing, the area where excavations are planned will be surveyed and all existing services will be confirmed. All relevant bodies i.e., ESB Networks, EirGrid, Gas Networks Ireland, Eir, County Council etc. will be contacted and drawings for all existing services sought. A road opening licence will be obtained from the council for the relevant road sections. All plant operators and general operatives will be inducted and informed as to the location of any services.

2. Prior to works commencing a dilapidation survey will be carried out photographing and noting any existing damage or defects to structures or road surfaces. A copy of this survey will be submitted to the council prior to works commencing.

3. Prior to works commencing, the route will be inspected and marked out on the ground. Standard good practice preparatory measures will be put in place along the extent of the route. This will include any required warning notices, temporary barriers, etc.
4. Prior to works commencing the Traffic Management Plan (EIAR, Appendix 16A, Volume III) will be updated by the appointed contractor and agreed with the Council.
5. The directional drilling machine will set up at a launch and reception pit (an enlarged portion of on-road trench, i.e., a service trench on either side of the crossing point at an appropriate distance back from the watercourse). The drill will then bore in an arc under the watercourse feature.
6. The drilling head of the boring tool has a series of nozzles that feed a liquid bentonite mix along the bore direction, which provides both lubrication and seals the cut face of the bore.
7. Once the bore reaches the reception pit, the duct is then attached to the drill head, and the duct is pulled back along the route of the bore to the original drilling point/launch pit.
8. Any bentonite mix is deposited within the bore shaft and spillage is collected at either end of the bore with a dedicated sump; all excavated material and excess bentonite will be removed from site and brought to an authorised waste facility.
9. Once the duct is in place under the watercourse, the normal process of road trenching can continue from either side of the watercourse structure.
10. The launch and reception pits will be backfilled in accordance with normal specification for backfilling excavated trenches and to the satisfaction of the Council.

4.2.13 Substation Compound and Buildings

The development is proposed to include a substation compound within the proposed development lands. The substation compound will contain two buildings, connection points and associated equipment, incoming and outgoing circuit breakers, earth fault, over-current and other protection devices, metering equipment and other items of switchgear for exporting power from the wind farm via a grid connection to the Killonan 220/110kV substation. Plate 4-11 shows a typical substation compound, refer to planning drawings 22635-MWP-00-00-DR-C-5419 to 22635-MWP-00-00-DR-C-5429 for further details.

The substation compound will be constructed as follows:

1. Prior to construction/tree felling, cut off swales will be installed upslope of the proposed substation compound to intercept any existing overland flows (clean water) and convey it downslope in order to limit the extent of surface water coming into contact with the works. The clean water conveyed will be discharged via a level spreader downslope of the works over existing vegetation.
2. The area of the substation compound will be marked out using ranging rods or wooden posts and the forested area will be cleared. The trees will be felled, and the stumps will be removed using hydraulic excavators either by stump grinding or excavating the stump.
3. After the area is cleared the soil will be stripped and removed to a temporary storage area for later use in landscaping. All remaining excavated material will be brought to the on-site borrow pits for final deposition. The area will be surveyed, and all existing services will be identified. All plant operators and general operatives will be inducted and informed as to the location of any services.

4. Perimeter swales will be installed or upgraded to collect surface water run-off from the substation compound which will include the installation of check dams, silt traps and level spreaders to cater for surface run-off.
5. All soils on the substation site will be removed and replaced with site won compacted crushed rock or granular fill.
6. Formation of the substation compound will be achieved where the compound will be constructed with compacted layers of suitable hardcore.
7. The foundations for both substation buildings will be excavated down to the level indicated by the designer and appropriately shuttered. Reinforced concrete will be laid over it.
8. The blockwork walls for each building will be built up from the footings to DPC level and the floor slab constructed, having first located any ducts or trenches required by the follow on mechanical and electrical contractors.
9. The blockwork will then be raised to wall plate level and the gables & internal partition walls formed. Scaffold will be erected around the outside of the two buildings for this operation.
10. The concrete roof slabs will be lifted into position using an adequately sized mobile crane.
11. The construction and components of the substation buildings will be to EirGrid and ESB Networks specifications.
12. The timber roof trusses at each building will then be lifted into position using a telescopic loader or mobile crane depending on site conditions. The roof trusses will then be felted, battened, tiled and sealed against the weather.
13. A domestic wastewater holding tank will be installed to hold effluent from the toilets within the substation and control buildings.
14. A proprietary treatment device will be installed to collect and treat hydrocarbons and oil spills within the substation compound.
15. A rainwater harvesting tank will be installed to collect rainwater from the roofs of the substation buildings for toilet flushing and hand washing.
16. Commencement of civil works associated with the construction of the transformer bund, equipment plinths etc. within the substation compound.
17. Commencement of civil works associated with construction of underground cable ducts and trenches within the substation compound.
18. Installation of electrical equipment within the substation compound and buildings including transformers, busbars, circuit breakers, cable supports, switchgear, panels etc. and all associated cabling.
19. Installation of palisade fencing and associated gates to perimeter of the substation compound.

Plate 4-11: Typical Substation Compound

4.2.14 Permanent Meteorological Mast

The layout of the permanent meteorological mast hardstand is designed to accommodate the delivery and erection of the mast in its individual components. A permanent meteorological mast is proposed within the wind farm site to monitor the local wind regime while the wind farm is in operation, Plate 4-12 is an example constructed on a wind farm. The mast will be located near T12, adjacent to the access track leading to the southern borrow pit. Refer to planning drawing 22635-MWP-00-00-DR-C-5405 for further details.

The proposed installation works for a permanent meteorological mast will comprise the following:

1. The mast will be situated approximately 300m south of T12, adjacent to the access track leading to the southern borrow pit, in an area with a low surface gradient.
2. Upon delivery, the mast sections and all associated equipment will be lifted from the truck with the appropriate lifting equipment. A 4×4 vehicle or a tractor and trailer will transport the equipment from the delivery point to the mast location.
3. The lifting of the mast sections will be accomplished using a crane. The crane will be located on a 21m x 26m crane hardstand adjacent to the meteorological mast hardstand.
4. A reinforced concrete foundation, with dimensions of 10m x 10m, will be constructed to support the lattice structure.
5. The mast will have a height of 92m, representing the hub height of the turbines.
6. Anemometers and wind vanes will be installed at regular intervals above ground level on the meteorological mast.
7. Once the mast is lifted into position and securely fixed, all materials and machinery will be removed from site.
8. Delivery, erection, and decommissioning works will avoid periods of high rainfall, with the activities ideally undertaken during the drier summer and autumn months in accordance with standard good practice.

9. It is anticipated that the erection of the met mast will take approximately five workdays. The mast will remain in situ for the duration of the proposed development and will be removed using the same machinery as was used during installation.

Plate 4-12: Typical meteorological mast on a wind farm

4.2.15 Turbine Delivery

The components for the seventeen (17) No. turbines will be delivered by cargo ships to Foynes Port in County Limerick. The components for each turbine will be delivered in separate loads, some of which are abnormal in terms of their width and length. The components will be transported from Foynes Port along the motorway, national and regional roads.

Pre and post-construction surveys will be carried out to ensure the structural integrity of the selected haulage route. Repairs will be carried out on the public road network, as necessary, during the construction phase, to ensure that the condition does not deteriorate below a standard that could affect the use of the road, as required. Following the completion of construction, the condition of the public road network will be of at least the same standard as it was prior to commencement of construction.

One section, near Tullovin Bridge, of the turbine delivery route requires a temporary access track as the swept path analysis highlighted vehicle manoeuvre difficulties at the bridge and the bends either side of the bridge. The construction of the access track will follow the same construction methods in Section 4.2.3.

A permit from moving abnormal loads to the wind farm site will be sought from An Garda Síochána and the applicable local authorities on the selected haulage route with a transportation plan for the time of deliveries established at construction stage.

Refer to the Turbine Delivery Route Assessment (EIAR **Volume III, Appendix 2C**) for a detailed description of the proposed turbine delivery route.

The proposed route to deliver wind turbine components from the port at Foynes County Limerick to the proposed Ballinlee wind farm site entrance is shown on planning drawing **22635-MWP-00-00-DR-C-5071** and also in **Figure 4-5**

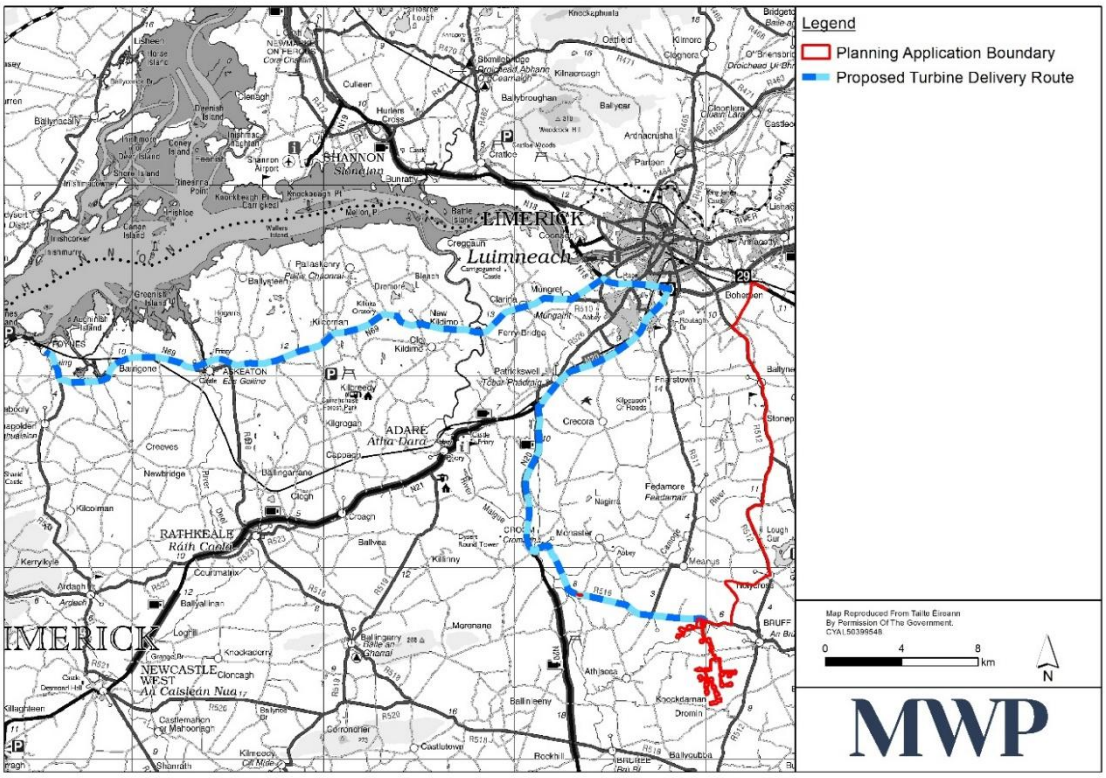

Figure 4-5: Proposed Turbine Delivery Route

4.2.16 Turbine Erection

It is proposed that the erection of wind turbines will occur during the final months of the construction phase, with the process following a carefully coordinated schedule and using specialist lifting equipment, with an average rate of one turbine being erected per week. The turbine erection process is a precision operation that relies on specialist plant and favourable weather conditions to ensure safe and accurate installation.

The proposed works will be restricted to the turbine base locations and will comprise the following:

1. The appointed contractor will mobilise specialist large-scale cranes, which are required for the erection of the turbine components. These cranes will be built up on site at each turbine hardstand location.
2. Prior to each turbine erection, turbine components may be placed on designated hardstands to streamline the assembly process.
3. The erection process will commence with the construction of the turbine tower using the large cranes, which will be supported by smaller assist cranes as necessary.
4. Following the erection of the tower, the nacelle will be installed and securely fixed in position.

5. The hub will then be assembled on the ground and subsequently fitted to the nacelle.
6. Once the hub and the nacelle is fully assembled, it will be lifted into place on the tower using the appropriate crane equipment.
7. Following this the first blade will be lifted into place using the appropriate crane equipment and fitted to the hub. This process is repeated until all blades are attached.
8. After each turbine is in place, electrical commissioning and final energisation will be conducted to integrate the turbine into the operational network.
9. The Project Manager will notify Limerick City and County Council and the Irish Aviation Authority (IAA) at least 30 days prior to the erection of the crane and wind turbines.
10. Once the turbines have been installed, the Project Manager will provide confirmation of the as-constructed coordinates and the highest point of each turbine (up to the top of blade spin) to the IAA.

4.2.17 Wind Farm Commissioning

The final stage of the project construction includes commissioning of the wind farm. It will include testing of the turbines for compliance with standards and for compliance with the National Electricity Grid Code. Once the tests results are satisfactory, the wind farm will be authorised by ESB Networks/EirGrid to export electricity onto the national grid.

5. Construction & Environmental Management – Organisational Structure, Duties & Responsibilities.

5.1 On-Site Organisational Structure and Responsibility

An example of an Organisational Structure for the Appointed Contractor(s)'s Project Team is included in **Figure 5-1**. This structure will be defined by the Appointed Contractor(s) and will include the names of the assigned personnel with the appropriate responsibility and reporting structure reflected.

The Appointed Contractor(s) will be *required to finalise the Organisational Structure* for the project to oversee this CEMP and to outline the specific responsibilities for the roles required.

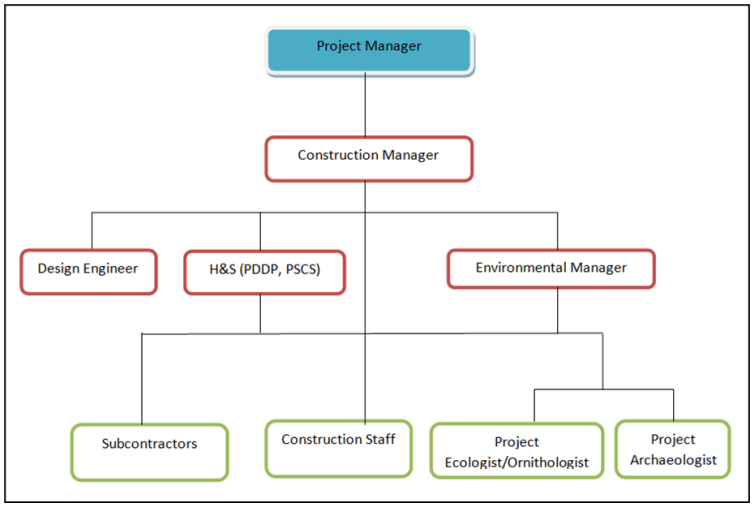

Figure 5-1: Organisational Structure

5.2 Duties and Responsibilities

The general role of key people on site implementing the CEMP will be.

- The Project Manager - liaises with the Project Team in assigning duties and responsibilities in relation to the CEMP to individual members of the main contractor(s)'s project team.
- The Construction Manager - liaises with the Environmental Manager when preparing site works where there is a risk of environmental damage and manages the construction personnel and general works.
- The Design Engineer - undertakes and certifies the Design and supervises the standard of works, including geotechnical aspects (Geotechnical engineer may need to be consulted).
- The Environmental Manager - ensures that the CEMP is developed, implemented and maintained.

Other roles will be outlined as follows.

- Health and Safety (PSDP and PSCS)
- Project Archaeologist (report to the Environmental Manager)
- Project Ecologist / Ornithologist (report to the Environmental Manager)
- Resource Manager to implement & update the Resource & Waste Management Plan (RWMP)
- Geotechnical Engineer (as required by Design Engineer)

The roles and responsibilities outlined below are indicative and will be updated on the appointment of the main contractor(s). Details of the personnel and their responsibilities must be added to the CEMP. *An outline of potential roles is provided below but will require revision.*

5.2.1 Project Manager - To be updated upon appointment of Contractor (s)/finalisation of CEMP

Name: _____

A Project Manager will be appointed on behalf of the main Contractor(s) to manage and oversee the entire project. The Project Manager is responsible for:

- Implementing the Construction and Environmental Management Plan (CEMP)
- Implementing the Health and Safety Plan
- Management of the construction project
- Liaison with the client/developer
- Liaison with the Project Team
- Assigning duties and responsibilities in relation to the CEMP
- Production of construction schedule
- Materials procurement
- Maintaining a site project diary
- Review of the performance of the CEMP and ensuring it is update as required.

5.2.2 Construction Manager – Updated upon appointment of Contractor (s)/finalisation of CEMP

Name: _____

The Construction Manager manages all the works to construct the project, on behalf of the main contractor(s). The Construction Manager reports to the Project Manager. In relation to the CEMP, the Construction Manager is responsible for:

5.2.2.1 Site Specific Method Statements

- Liaising with the Environmental Manager in preparing site-specific method statements for all works activities where there is a risk of environmental damage, by incorporating relevant Environmental Control Measures and referring to relevant Environmental Control Measure Sheets.
- Liaising with the Environmental Manager in reviewing and updating site-specific method statements for all works activities where Environmental Control Measures and Environmental Control Measure Sheets have been altered, and

- Liaising with the Environmental Manager where third party agreement is required in relation to site-specific method statements, Environmental Control Measures and/or Environmental Control Measure Sheets.

5.2.2.2 General

- Being aware of all Environmental Commitments and Requirements.
- Ensuring that all relevant information on project programming, timing, construction methodology, etc., is communicated from the Project Manager to the Environmental Manager in a timely and efficient manner in order to allow pre-emptive actions relating to the environment to be taken where required.
- Programming and planning of excavation works and communicating this schedule to the Environmental Manager.
- Ensuring that adequate resources are provided to design and install any environmental interventions.
- Liaising with the Design Engineer and providing information on environmental management to the Design Engineer during the course of the construction phase.
- Liaising with the Project Team in assigning duties and responsibilities in relation to the CEMP to individual members of the main contractor(s)'s project staff.
- Ensuring that the Environmental Manager performs regular and frequent environmental site inspections.
- Review and update of the CEMP documents, and
- Review of the on-site monitoring program.

5.2.3 Design Engineer – Updated upon appointment of Contractor(s)/finalisation of CEMP

Name: _____

The Design Engineer is appointed by the Contractor(s) for the works.

The Design Engineer reports to the Project Manager and is responsible for:

- Design of the Works.
- Review and approval of relevant elements of the method statements – assist the Construction Manager with the overall review.
- Participating in Third Party Consultations; and
- Liaising with Third Parties through the Environmental Manager.

5.2.4 Environmental Manager - Updated upon appointment of Contractor (s)/finalisation of CEMP

Name: _____

The Environmental Manager is appointed by the Contractor(s) and reports to the Project Manager.

The Environmental Manager is responsible for:

5.2.4.1 General

- Being familiar with the project environmental commitments and requirements.
- Being familiar with baseline data gathered for the various environmental assessments and during pre-construction surveys.
- Assisting the Construction Manager in liaising with the Design Engineer and the provision of the information on environmental management to the Design Engineer during the course of the construction phase.
- Liaising with the Project Team in assigning duties and responsibilities in relation to the CEMP to individual members of the main contractor(s)'s project staff.
- Implementing the environmental procedures of the CEMP.
- Liaising with the Construction Manager to ensure that the control measures set out in the Schedule of Environmental Mitigation are implemented.
- Liaising with the client/developer in relation to environmental issues.
- Auditing the construction works from an environmental viewpoint.
- Ensuring the implementation of all mitigation measures set out in the EIAR.
- Ensuring that all monitoring requirements set out in the EIAR are conducted on site, records are maintained of all measurements taken by the contractor.
- Conducting audits and inspections of all environmental measures undertaken on the site and maintaining records of inspections, resultant report actions and mitigations.

5.2.4.2 Site-Specific Method Statements

- Liaising with the Construction Manager in preparing site-specific method statements for all works activities where there is a risk of environmental damage. These site-specific method statements will incorporate relevant Environmental Control Measures and take account of relevant Environmental Control Measure Sheets.
- Liaising with the Construction Manager in reviewing and updating site-specific method statements for all works activities where Environmental Control Measures and Environmental Control Measure Sheets have been altered.
- Liaising with the Construction Manager where third party agreement is required in relation to site specific method statements, Environmental Control Measures and/or Environmental Control Measure Sheets.

5.2.4.3 Third Party Consultations

- Overseeing, ensuring coordination and playing a lead role in third party consultations required statutorily, contractually and in order to fulfil best practice requirements.
- Ensuring that the minutes of meetings, action lists, formal communications, etc., are well documented and that the consultation certificates are issued to the Design Engineer as required.
- Liaising with all prescribed bodies during site visits, inspections and consultations.
- Where new Environmental Control Measures are agreed as a result of third party consultation, ensuring that the CEMP is amended accordingly.
- Where new Environmental Control Measures are agreed as a result of third party consultation, the Environmental Manager will liaise with the Construction Manager in updating relevant site-specific method statements.
- Where required, liaising with the Construction Manager in agreeing site-specific method statements with third parties.

5.2.4.4 Licensing

- Ensuring that all relevant works have (and are being carried out in accordance with) the required permits, licences, certificates, planning permissions, etc.
- Liaising with the designated licence holders with respect to licences granted pursuant to the Wildlife Act, 1976, as amended (if required).
- Bringing to the attention of the Project, Design and Construction Team any timing and legal constraints that may be imposed on the carrying out of certain tasks.

5.2.4.5 Waste Management Documentation

- Holding copies of all permits and licences provided by waste contractors.
- Ensuring that any operations or activities that require certificates of registration, waste collection permits, waste permits, waste licences, etc., have appropriate authorisation.
- Gathering and holding documentation with respect to waste removal.

5.2.4.6 Legislation

- Keeping up to date with changes in environmental legislation that may affect environmental management during the construction phase.
- Advising the Construction Manager of these changes.
- Reviewing and amending the CEMP in light of these changes and bringing the changes to the attention of the main contractor(s)'s senior management and subcontractors.

5.2.4.7 Specialist environmental contractors

- Identifying requirements for specialist environmental contractors (including ecologists, waste contractors and spill clean-up specialists) before commencement of the project.
- Procuring the services of specialist environmental contractors and liaising with them with respect to site access and report production.
- Ensuring that the specialist environmental contractors are competent and have sufficient expertise to co-ordinate and manage environmental issues.
- Co-ordinating the activities of all specialist environmental contractors on environmental matters arising out of the contract.

5.2.4.8 Environmental Induction Training and Environmental Toolbox Talks

- Ensuring that Environmental Induction Training is carried out for all of the main contractor(s)'s site personnel. The induction training may be carried out in conjunction with Safety Induction Training.
- Providing toolbox talks on Environmental Control Measures associated with site-specific method statements to those who will undertake the work.

5.2.4.9 Environmental Incidents/Spillages

- Prepare and be in readiness to implement at all times an Emergency Response Plan.
- Notifying the relevant statutory authority of environmental incidents.
- Carrying out an investigation and producing a report regarding environmental incidents. The report of the incident and details of remedial actions taken will be made available to the relevant authority, the Design Engineer and the Construction Manager.

5.2.4.10 Site environmental inspections

- Carrying out regular documented inspections of the site to ensure that work is being carried out in accordance with the Environmental Control Measures and relevant site-specific method statements.
- Carrying out a daily inspection of the bunded areas and site surface water systems and controls.
- Appending copies of the inspection reports to the CEMP.
- Liaising with the Construction Manager to organise any repairs or maintenance required following the daily inspection of the site.

5.2.5 Other Roles

5.2.5.1 Health and Safety Personnel –
To be updated upon appointment of Contractor (s)/finalisation of CEMP

The Health and Safety personnel for the construction project are appointed by the Contractor(s) in line with the Construction Regulations:

- Carrying out duty of Project Supervisor Construction Stage.
- Responsible for safety induction of all staff and personnel on site.
- Implementing the Health and Safety Plan.
- Auditing and updating the Health & Safety Plan.
- All other required legal duties.

5.2.5.2 Project Archaeologist –
To be updated upon appointment of Contractor (s)/finalisation of CEMP

The Archaeologist may be appointed by the Developer or the Contractor(s) and is responsible for

- Ensuring implementation of archaeological mitigation measures.
- Monitoring of groundworks associated with the development.
- Liaison with the Environmental Manager/Construction Manager.
- Liaison with the Project Manager/client/developer.

5.2.5.3 Project Ecologist -
To be updated upon appointment of Contractor (s)/finalisation of CEMP

The Ecologist may be appointed by the Developer or the Contractor(s) and is responsible for:

- Undertaking any required pre-construction surveys.
- Ensuring implementation of ecological mitigation measures.
- Advising on re-vegetation onsite.
- Monitoring of success of re-vegetation.

5.2.5.4 Project Ornithologist -
To be updated upon appointment of Contractor (s)/finalisation of CEMP

The Ornithologist may be appointed by the Developer or the Contractor(s) and is responsible for:

- Ensuring all pre-construction and construction phase avian monitoring is conducted at the site.
- Advice on any mitigation required.
- Consultations with National Parks and Wildlife Service (NPWS).

5.2.5.5 Geotechnical Engineer -
To be updated upon appointment of Contractor (s)/finalisation of CEMP

The Geotechnical Engineer may be appointed by the Developer or the Contractor(s) and is responsible for:

- Assisting the Design Engineer as required.
- Providing advice on geotechnical aspects of the works.
- Requirement for specific geotechnical engineer by the Contractor(s).

5.2.5.6 All Site Personnel -
To be updated upon appointment of Contractor (s)/finalisation of CEMP

The site personnel appointed by the Contractor(s) are responsible for:

- Adhering to the relevant Environmental Control Measures and relevant site-specific method statements.
- Adhering to the Health and Safety Plan.
- Reporting immediately to the Environmental Manager and Construction Manager any incidents where there has been a breach of agreed procedures including:
    - a spillage of a potentially environmentally harmful substance.
    - an unauthorised discharge to ground, water or air, damage to a protected habitat, etc.

5.3 Contacts

5.3.1 Main Contractor Contacts

Position Title:	Name:	Phone:	Email:
Main Contractor(s)			
Project Manager			
Construction Manager*			
Environmental Manager*			
Safety (PSCS)*			
Safety Officers*			
Site Emergency Number*			
Project Ecologist/Ornithologist			
Project Archaeologist			
Overall Project PSDP			

*24 hour contact details required

5.3.2 Employer Contacts

Organisation:	Position:	Name:	Phone:	Email:
Employers Ecologist	Project Ecologist			
Employers Archaeologist	Project Archaeologist			
Safety (PSDP)	Overall Project PSDP			
Employers Public Liaison Officer	Project Liaison Officer			

5.3.3 Third Party Contacts

Organisation:	Position:	Name:	Phone:	Email Address:
Inland Fisheries Ireland				
National Parks and Wildlife Service				
Environmental Protection Agency				
Limerick City & County Council				
Department of the Environment, Heritage, and Local Government				
Health and Safety Authority				
Emergency Services				
Other, as appropriate.				

6. Environmental Commitments

6.1 Environmental Management Plans (EMP)

A number of environmental management plans (EMP) have been prepared for managing the impacts of Construction Activities associated with the wind farm development project. See Table 6-1 and refer to Appendix A. These plans will be implemented by the Appointed Project Manager and/or Project Contractor(s) as relevant.

Once appointed, it is the Contractor's responsibility, to update and add (where required) project specific control measures relevant to the environmental management plans and procedures. The Appointed Contractor(s) will ensure that plans/procedures are communicated to all site staff, including sub-contractors, through induction, training and at relevant meetings.

Table 6-1: Plans for Managing Impacts of Construction Activities

Ref:	Procedure:
EMP-1	Management of Excavations
EMP-2	Surface Water Management and Run-off Control
EMP-3	Fuels and Oils Management
EMP-4	Management of Concrete
EMP-5	Construction Noise & Vibration Management
EMP-6	Construction Waste Management Plan
EMP-7	Construction Traffic Management Plan
EMP-8	Construction Dust, Emissions and Air Quality Management
EMP-9	Ecological Management Plan Protection of Habitats and Fauna
EMP-10	Management of Invasive Species
EMP-11	Archaeological and Heritage Protection
EMP-12	Emergency Response
EMP-13	Site Environmental Training and Awareness
EMP-14	Monitoring and Auditing
EMP-15	Environmental Accidents, Incidents and Corrective Actions
EMP-16	Environmental Complaints

7. Auditing, Monitoring and Response

The Monitoring Schedule for construction will also provide for the checking of equipment, materials storage and transfer areas and specific environmental controls.

A *Preliminary Monitoring Schedule* is provided in **Table 7-1** and will be finalised pending appointment of the Contractor.

Table 7-1: Preliminary Monitoring Schedule

Aspect	Monitoring Required	Frequency	Note	Responsibility
Water	Sediment & Erosion Controls (Performance of Surface Water Systems and Controls)	Daily during the construction phase as well as during and after significant rainfall events	-	Environmental Manager
Water	Fuel & Oil Storage Inspection	Daily	-	Environmental Manager
Ecology	Material and Waste Storage	Daily	-	Environmental Manager
Water	Water quality monitoring	Monthly	Minimum parameters: pH, Suspended Solids, metals, nitrates, phosphates	Environmental Manager
Water	Concrete Pours	As Required	To be scheduled with pours	Environmental Manager
Archaeology	Archaeological Monitoring	As Required	Monitor ground works & excavations	Archaeologist

The Contractor will assign an on-site Environmental Manager to monitor the construction activities on a day-to-day basis. The duties will include completing the required checklists and coordinating with the relevant personnel (e.g. Project Ecologist, Project Archaeologist and the Design Engineer as required) ensuring all environmental monitoring is carried out.

These records and results will be maintained by the Site Manager and will be stored on site during the construction phase.

The Contractor developed daily site checklists will have the following information shown in **Table 7-2** included at a minimum:

Table 7-2: Site Checklist

Area of Inspection	Environmental Hazards
Sediment settlement ponds	• Leaks • Cracks/broken plastic piling • Build-up of sediment
Silt filters	• Missing filters • Blocked filters – build-up of sediment
Cut off swales and conveyance swales	• Damage • Silt build-up • Blockages in the pipes conveying the runoff to the settlement pond drains
Cross drains – located under drain crossings	• Damage • Silt build-up • Blockages in the pipes
Post and wire boundary fence	• Signs of movement (i.e. not in a straight line) • Damaged or fallen sections of fence
The land adjacent to the development	• Presence of waste • Presence of construction equipment • Presence of invasive species identified during the preconstruction survey
Site tracks	• Unacceptable level of sediment/silt on the track surface • Presence of waste
Site compound – storage area	• Damage • Untidiness
Site compound – waste collection area	• Damage • Untidiness • Full skips
Site compound – oil storage area	• Damage to containers or ancillary equipment • Leakages • Unlocked storage container
Dry wheel wash	• Build-up of sediment
Waste water facilities	• Holding tank requiring emptying
Concrete chute washout area	• Damages • Leakages • Unacceptable level of concrete washings
Site Entrance	• Unacceptable level of sediment/silt on the track surface • Presence of waste

7.1 Environmental Performance Indicators

The appointed Project Contractor will outline the key performance indicators for the site in gauging successful site management in the prevention of pollution and the protection of the environment.

Environmental performance indicators will at a minimum include:

- Number of environmental accidents/incidents logged.
- Breach of procedure and corrective actions.
- Number of environmental complaints received.
- Results of monthly water quality monitoring.
- Results of noise and vibration monitoring; and
- Results of site audits.

The performance indicators will be finalised by the Appointed Contractor and communicated to all relevant personnel and sub-contractors. The review periods for analysing site performance indicators will also be specified.

7.2 Response Procedure / Corrective Action

In the event of an environmental incident, or breach of procedure, or where a complaint is received, the contributing factors will be investigated and remedial action taken as necessary. The Main Contractor(s) will ensure that the following response actions will take place:

1. The Project Manager must be informed of any incident, breach or procedure and/or complaint received as soon as possible, and details must be recorded in the incident/complaint register.
2. The Project Manager is to conduct/co-ordinate an investigation to determine the events that could have led to the non-compliance.
3. The Project Manager is to notify and liaise with the appropriate site personnel where required, e.g. Site Environmental Manager, Project Ecologist, Project Archaeologist.
4. If necessary, the Project Manager will inform the appropriate regulatory authority and will notify them of the scope of the event, corrective action taken, etc.. The appropriate regulatory authority will depend on the nature of the incident.
5. The details of the incident will be recorded on an Incident / Complaints Form which is to record information such as the cause, extent, actions and remedial measures used following the incident/complaint. The form will also include any recommendations made to avoid reoccurrence of the incident.
6. The Project Manager 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(s) as appropriate.
7. The Site Project Manager is to ensure that the relevant environmental management plans/procedures are revised and updated as necessary.

8. Summary

This CEMP provides the information which will be contained in the final Contractor(s) developed Plan at the construction stage of the project. The document will be updated to comply with conditions attached to planning permission granted for the project. The Contractor will be required to update the CEMP to provide for planning conditions and the project detailed design and to update the roles and responsibilities of those appointed on the site for the construction of the project.

9. References

COFORD, 2004, Forest Road Manual, Guidelines for the design, construction and management of forest tracks

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Transport Infrastructure Ireland, 2017, DN-GEO-03060: Geometric Design of Junctions (priority junctions, direct accesses, roundabouts, grade separated, and compact grade separated junctions)

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EIRGRID, 2020, Engagement process for development and update of technical standards and policies

ESB, 2021, General Specification for Contestably Built Underground Networks

ESB, 2021, General Specification for Contestably Built HV Substations

Guide to application of the Machinery Directtive Edition 2.2 October 2019.

Appendix 1

Environmental Management Plans

EMP-1 Management of Excavations

EMP-2 Surface Water Management and Run-off Control

EMP-3 Fuels and Oils Management

EMP-4 Management of Concrete

EMP-5 Construction Noise & Vibration Management

EMP-6 Construction Waste Management Plan

EMP-7 Construction Traffic Management Plan

EMP-8 Construction Dust, Emissions and Air Quality Management

EMP-9 Ecological Management Plan Protection of Habitats and Fauna

EMP-10 Management of Invasive Species

EMP-11 Archaeological and heritage Protection

EMP-12 Emergency Response

EMP-13 Site Environmental Training and Awareness

EMP-14 Monitoring and Auditing

EMP-15 Environmental Accidents, Incidents and Corrective Actions

EMP-16 Environmental Complaints

EMP 1: MANAGEMENT OF EXCAVATIONS

Purpose

To describe measures for the management of all excavations and excavated rock on the site.

Rock

- To minimise the requirement for stockpiling rock and to reduce the volume of crushed aggregate imported onto site, excavated rock can be reused in the construction of the turbine hardstands were found and is suitable.
- A rock rippability assessment will be carried out following completion of detailed ground investigation. This will inform the choice of excavation methodology for rock.
- A detailed, site-specific method statement for excavation of rock will be required from the Contractor(s) prior to commencement of works.

Responsibility

- The Environmental Manager will monitor the excavation areas and associated drainage.
- The Construction Manager will manage vehicle movements throughout the construction phase.
- The Project Manager will oversee the phasing of the excavation and machinery movement across the site.
- Construction personnel will be informed of the measures to prevent pollution of water courses, particularly at stream crossings.
- The Design Engineer, Geotechnical Engineer and Sub-contractors will have responsibilities as appropriate.
- All responsibilities will be finalised by the Appointed Contractor(s).

EMP 2: SURFACE WATER MANAGEMENT AND RUN-OFF CONTROL

Purpose

To describe measures for the management of all surface water and run-off on the site, for the protection of watercourses and in particular, sediment and erosion control. See the Surface Water Management Plan (EIAR Volume III, Appendix 2E).

The plan will:

- Implement erosion control to prevent runoff flowing across exposed ground and become polluted by sediments.
- Intercept and divert clean water runoff away from construction site runoff to avoid cross-contamination of clean water with soiled water.
- Implement sediment control to slow down runoff allowing suspended sediments to settle in situ particularly on tracks.
- Implement the erosion and sediment controls before starting site clearance works.
- Minimise area of exposed ground by maintaining existing vegetation that would otherwise be subject to erosion in the vicinity of the wind farm infrastructure and keeping excavated areas to a minimum.
- Delay clearing of soil until before construction begins rather than stripping the entire site months in advance particularly during access track construction.
- Avoid working near drains during or after prolonged rainfall or an intense rainfall event and cease work entirely near drains when it is evident that pollution is occurring.
- Install a series of silt fences or other appropriate silt retention measure where there is a risk of erosion runoff to watercourses from construction related activity particularly if working during prolonged wet weather periods or if working during an intense rainfall event.
- Implement sediment control measures that includes for the prevention of runoff from adjacent intact ground that is for the separation of clean and 'dirty' water.
- Install appropriate silt control measures such as silt-traps, check dams and sedimentation ponds.
- Provide recommendations for public road cleaning where needed particularly in the vicinity of drains.
- Controls need to be regularly inspected and maintained otherwise a failure may result, such as a build-up of silt or tear in a fence, which will lead to water pollution so controls must work well until the vegetation has re-established; inspection and maintenance is critical after prolonged or intense rainfall.

Monitoring

- The Environmental Manager will monitor the general level of suspended solids at designated sampling points in the rivers/streams downslope of the active construction areas using a turbidity meter at the agreed frequency.
- The Environmental Manager will walk the site each day and check the cross-drain pipes, dirty water drains and outlets, sediment settlement ponds, interceptor drains and silt fences for any damage or blockages. Any damage or blockages will be repaired or cleared promptly.
- As detailed above, weather forecasts will be monitored during the construction phase. The 24 hours advance meteorological forecasting service from Met Éireann will be used.

- Water quality monitoring will take place prior to and during the construction phase and for the first 6 months of the operational phase. The location of sampling points and the programme of monitoring of water quality will be agreed with the Planning Authority prior to the commencement of construction. This monitoring, together with visual monitoring, will help to ensure that the mitigation measures that are in place to protect water quality are effective.
- A Water Monitoring Programme will include monitoring of streams and from the end points of the Sediment and Erosion Control system and visual monitoring of Sediment and Erosion Control measures including silt fences, sediment ponds and check dams.

Responsibility

- The Construction Manager is responsible for ensuring the designed surface water management measures are implemented during the construction process.
- The Environmental Manager is responsible for ensuring that appropriate water pollution prevention measures are put in place and that water sampling is carried out. Where standards are breached and appropriate remedial action is taken, an investigation will be carried out in conjunction with the Construction Manager, and further samples will be taken to verify that the situation has returned to normal.
- The Environmental Manager is responsible for ensuring spill kits are readily available in vulnerable locations and that booms for watercourses are long enough and have adequate anchorage.
- The Construction Manager (or a designate) is responsible for ensuring the spill kits are adequately stocked and should inform the Environmental Manager when items have been used.

EMP 3: FUEL AND OILS MANAGEMENT

Purpose

To describe measures for the management of all fuel and oils on site for the protection of watercourses from any spills.

Procedure

Construction machinery and vehicles

- The potential for hydrocarbons getting into the existing drains and local watercourses will be mitigated by only refuelling construction machinery and vehicles in designated refuelling areas using a prescribed refuelling procedure.
- Refuelling will be carried out using 110% capacity double bunded mobile bowsers. The refuelling bowser will be operated by trained personnel. The bowser will have spill containment equipment which the operators will be fully trained in using.
- Plant nappies or absorbent mats will be placed under refuelling points during all refuelling to absorb drips. Plant nappies will be provided beneath small mobile plant (e.g. small generators, pumps etc).
- Mobile bowsers, tanks and drums will be stored in a secure, impermeable storage area, away from drains and open water.
- To reduce the potential for oil leaks, only vehicles and machinery will be allowed onto the site that are mechanically sound. An up-to-date service record will be required from the main contractor(s).
- Potential leaks from delivery vehicles will be reduced by visually inspecting all delivery vehicles for major leaks. Contractors supplying concrete and crushed aggregate to the site will be contractually required to supply their products using roadworthy vehicles.
- Potential leaks from the cranes used for turbine erection will be mitigated by contractually requiring the crane suppler to supply cranes to site that are in good working order, up to date in servicing and free of leaks.
- Should there be an oil leak or spill, the leak or spill will be contained immediately using oil spill kits; the nearby dirty water drain outlet will be blocked with an oil absorbent boom until the fuel/oil spill has been cleaned up and all oil and any contaminated material removed from the area. This contaminated material will be properly disposed of in a licensed facility.
- The Environmental Manager will be immediately informed of the oil leak/spill and will assess the cause and the management of the clean-up of the leak or spill. They will inspect nearby drains for the presence of oil and initiate the clean-up if necessary.
- Immediate action will be facilitated by easy access to oil spill kits. An oil spill kit that includes absorbing pads and socks will be kept at the site compound and also in site vehicles and machinery.
- Correct action in the event of a leak or spill will be facilitated by training all vehicle/machinery operators in the use of the spill kits and the correct containment and cleaning up of oil spills or leaks. This training will be provided by the Environmental Manager at site induction.
- In the event of a major oil spill, a company who provide a rapid response emergency service for major fuel spills will be immediately called for assistance, their contact details will be kept in the site office and in the spill kits kept in site vehicles and machinery. Contaminated material will be removed off site for removal by a licensed contractor.

Oil storage during the construction phase

- The scale of potential impacts on downstream water quality will be reduced by only storing the required volume of oils for the works taking place at the time.
- Fuel containers will be stored within a secondary containment system e.g. bund for static tanks or a drip tray for mobile stores.
- Access to oil stores will be controlled by the storage of oils within a locked steel container within the site compound. The site compound will be surrounded by a palisade fence and locked when there are no site personnel present.
- Collision with oil stores will be prevented by locating oils within a steel container in a designated area of the site compound away from vehicle movements.
- Leakages of oil from oil stores will be prevented by storing these oils in bunded tanks which have a capacity of 110% of the total volume of the stored oil. Ancillary equipment such as hoses and pipes will be contained within the bunded storage container. Taps, nozzles or valves will be fitted with a lock system.
- The volume of leakages will be prevented through monitoring oil storage tanks/drums for leaks and signs of damage. This will be carried out daily by the Environmental Manager.
- Long term storage of waste oils will not be allowed on site. These waste oils will be collected in leak-proof containers and removed from the site or re-cycling by an approved service provider.

Responsibilities

The Construction Manager and Environmental Manager are responsible for ensuring Fuel and Oils are managed in line with this procedure. The Appointed Contractor(s), in updating the CEMP, must designate personnel to the tasks relating to Fuels and Oil, as outlined below.

_____ is the designated person for _____ area responsible for being present during tanker refilling operations of oil storage tanks.

_____ is the designated person responsible for checking bunds weekly.

_____ is the designated person authorised to pump from the bund only when accumulated rainwater is clear.

Reference

Best Practice Guidelines BPGCS005 – Oil Storage Guidelines (Enterprise Ireland).

EMP 4: MANAGEMENT OF CONCRETE

Purpose

To describe measures for the management of concrete on site for the protection of watercourses from any spillages.

Procedure

Supervision of concrete pours

- To reduce the potential for cementitious material entering watercourses, concrete pours will be supervised by the Construction Manager, a suitably qualified Engineer and the Environmental Manager.
- The Construction Manager will ensure that the area of the pour is completely drained of water before a pour commences.
- Pours will not take place during forecasted heavy rainfall.
- Incidental rainfall from light showers during the period of a pour is typically absorbed into the concrete matrix but heavier showers can result in some run off from the top surface of the concrete pour. If run-off is encountered the Environmental Manager will block the outflow from the drains to retain or treat the run-off until the pH is neutral before discharge to the surface water network.
- In the event of a spillage on site, the Environmental Manager will temporarily block the dirty water drains in the immediate area and monitor the pH levels of the water in the associated sediment settlement ponds and if necessary, will adjust the pH levels using CO_2 entrainment. Any spillage will be cleared immediately and deposited in the designated area within the site compound.

Concrete Water

- Pours will not take place during heavy rainfall.
- To reduce the volume of cementitious water, washout of concrete trucks will not take place on site. Concrete trucks will be washed out off site at the source quarry.
- To reduce the volume of cementitious water, only concrete truck chutes will be washed down on site. The concrete trucks will wash down their chutes at a designated chute wash down area in the site compound. The wash down area will consist of a polythene lined bunded area with a capacity of approximately $20m^3$. This capacity will be sufficient to accommodate the chute wash down for two turbine base pours.
- The Environmental Manager will monitor the pH of the water in the chute wash down bund and can dose with CO_2 or acidic water from the drains until the wash out water achieves neutrality before discharge.

Responsibilities

- All concrete pours will be supervised by the Construction Manager, a suitably qualified Engineer and the Environmental Manager.
- The Environmental Manager is responsible for ensuring that appropriate water pollution prevention measures are put in place and that water sampling is carried out. Where standards are breached, he/she will carry out an investigation and in conjunction with the Construction Manager, he/she will ensure remedial action is taken and further samples taken to verify that the situation has returned to normal.
- The Environmental Manager is responsible for ensuring spill kits are readily available in vulnerable locations and that booms for watercourses are long enough and have adequate anchorage.

EMP 5: Construction Noise & Vibration Management

Purpose

To describe measures for the management of impacts from construction noise.

Procedure

Control of Noise at Source

- Only sound plant/equipment will be permitted on site.
- No unnecessary revving of machinery on site.
- Plant will be properly used and regularly maintained.
- Compressors, if needed, will be 'sound related' models fitted with properly lined and sealed acoustic covers which will be kept closed whenever machines are in use.
- All vehicles and mechanical plant will be fitted with effective exhaust silencers.
- A site hoarding will be erected at the boundary of the Borrow Pits and can be applied at any construction site/activity where necessary.
- The hours of construction activity will be limited to avoid unsociable hours where possible. Construction operations shall be restricted to between 07:00hrs and 19:00hrs Monday to Saturday inclusive. On public roads working hours will be between 07:00hrs and 19:00hrs on Monday to Friday and 09.00hrs to 14.00hrs on Saturdays. Any such out of hours working will be agreed in advance with the local Planning Authority.

Control of Vibration – Borrow Pits

- Suitable vibration monitoring will be conducted at the closest noise sensitive locations to ensure that the vibration criteria is satisfied.
- The condition of the properties will also be regularly inspected to ensure no cosmetic or structural damage occurs.

Control of Vibration – Blasting Events

- Trial blasts will be undertaken to obtain scaled distance analysis.
- Ensuring appropriate burden to avoid over or under confinement of the charge.
- Accurate setting out and drilling.
- Appropriate charging.
- Appropriate stemming with appropriate material such as sized gravel or stone chipping.
- Delay detonation to ensure small maximum instantaneous charges.
- Decked charges and in-hole delays.
- Blast monitoring to enable adjustment of subsequent charges.
- Good blast design to maximise efficiency and reduce vibration.
- Avoid using exposed detonation cord on the surface.

Responsibility

- The Construction Manager will be familiar with the noise sensitive receptors and alert the Environmental Manager in good time prior to work commencing in the areas closest to any noise sensitive receptors.
- The Environmental Manager will review any relevant planning conditions in updating this plan.

References

BS5228 –1&2:2009, Code of Practice for the Control of Noise and Vibration on Construction and Open Sites

EMP 6: CONSTRUCTION WASTE MANAGEMENT PLAN

Purpose

To describe measures for the management of all wastes associated with the construction of the wind farm.

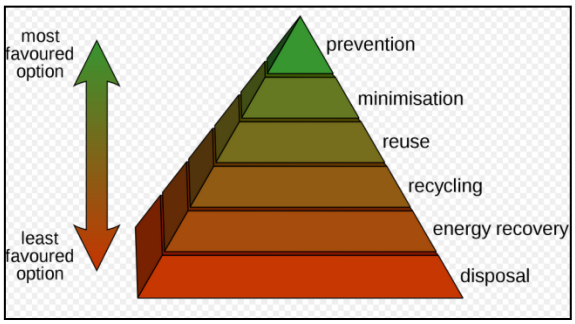
Procedure

Waste Management Plan

The Waste Management Hierarchy (illustrated below) will be assessed and applied in the preparation and maintenance of the Construction Phase Waste Management Plan.

The Construction Phase Waste Management Plan will address the following aspects of the Project:

- Analysis of the waste arising/material surpluses.
- Specific waste management objectives for the project.
- Methods proposed for prevention, reuse and recycling of wastes, and
- Material handling procedures.



Construction Methodology and Raw Materials

The construction phase of the wind farm will require a variety of construction methodologies. The anticipated phasing of the construction phase will be as follows.

Activity
Prepare site, Pre-construction activities, Site entrance
Access track construction + Surface water management plan implementation
Crane hardstand construction
Turbine foundation construction
Substation construction
Internal trenching and ducting

Activity
External grid connection
Turbine delivery
Turbine erection
Permanent meteorological mast erection
Reinstatement/Landscaping
Wind farm commissioning
Project closeout

Construction

Contractors working on site during the works will be responsible for the collection, control and removal of all waste generated by the works. Construction phase waste may consist of hardcore, aggregate, concrete, steel reinforcement, shuttering timber, food waste from the canteen and unused oil, diesel and building materials. This waste will be collected at the end of the construction phase and taken off site to be reused, recycled and disposed of in accordance with best practice procedures at an approved facility. Domestic wastewater from the on-site holding tank will be collected on a regular basis by approved contractors and disposed of in an authorised facility in accordance with best practice. Plastic waste will be taken for recycling by an approved contractor(s) and disposed or recycled at an approved facility.

General Waste Management on Site

To manage waste effectively, focus will be on the following:

- Ordering the correct number of materials to be delivered when needed.
- Ensuring materials are not delivered to site damaged and unusable.
- Reducing the amount of packaging used by suppliers.
- Where possible, establish a 'take back' system with suppliers.
- Ensuring wastes are handled and stored correctly.
- Limiting the amount of waste going to landfill by reusing and recycling where possible.

Construction Compound(s)

Construction compound(s)/waste storage area(s) will be created for storage of waste materials, plant, and equipment and for site offices, and welfare facilities.

Wastes Generation

Best practice procedures in general will minimise waste generated on-site. Measures including good site management will be taken to limit the quantity of waste generated during the construction phase. Waste such as excavated material on-site will be recycled where possible.

Surplus materials will include materials generated by the excavation/extraction works during construction of tracks, construction compounds and turbine foundations, mainly comprising excavated sub-soils.

Waste streams will include wastes generated by plant, machinery and construction workers over the period of the works, for example waste oils, sewage, refuse (paper, carton, plastic etc), wooden pallets, waste batteries, fluorescent tubes etc.

Minimisation, Reuse, Recycling, and Management of Construction Waste

The primary aim of this Waste Management Plan is to ensure that wastes generated during the course of the project are managed in a systematic manner in accordance with Waste Management Legislation and the principles of the waste Hierarchy, i.e. Prevention, Minimisation, Reuse, Recovery, and Recycling.

Wastes generated during the construction phase will be identified and segregated according to their category as described by the European Waste Catalogue (EWC). Designated waste storage areas will be created at the site construction compound(s), other suitable locations, for storage and segregation of wastes prior to transport for recovery/removal at suitably licensed/permitted facilities. Suitably sized containers for each waste stream will be provided and will be supervised by the Resource Manager (RM). The RM will be responsible for the management of wastes during the entire project. The numbers and sizing of the containers will be agreed with the Waste Contractors/Hauliers in advance of the commencement of the works. Source segregation of the wastes generated will result in cost savings, in addition to providing an environmentally sound route for the management of all the Construction and Demolition Waste.

Under Waste Management (Collection Permit) Regulations 2007 a waste collection permit, for appropriate waste codes and destinations is required by the waste haulier, to transport the waste from one site to another. The contractor(s) will ensure the movement of all wastes are carried out in compliance with relevant waste regulations.

Wastes will only be treated or disposed of at waste facilities to carry out a specific activity (i.e. chemical treatment, landfill, incineration etc.) for the specific waste types. Records of all waste movements and associated documentation will be held on site. It is planned that all waste activities at the site will comprise of:

- Source,
- Segregation,
- Storage, and
- Collection.

In order to prevent/minimise the generation of wastes, the contractor(s) will ensure that raw materials are ordered so that the timing of the delivery/quantity delivered, and the storage is not conducive to the creation of unnecessary waste.

The Contractor(s) will continuously seek to improve the waste management process on the site during all stages of the construction phase and maximise opportunities for reuse/recycling wherever they exist. For example, in relation to waste packaging, the contractor(s) will seek to negotiate take back of as much packaging waste as possible at source, to ensure maximum recycling. The Construction Waste Management Plan will be included in the construction team weekly meetings. In addition, the plan will be communicated to the whole construction team regularly on site, including any updates from earlier revisions of the plan.

An overview of the methods to manage the primary waste streams is presented in the following sections.

Soils and Material

Any materials excavated on site in the course of the construction works (i.e. soil stripping for track construction, turbine foundations/hardstanding areas) will be stored on site and re-used on site. As such, off-site disposal of this material is not expected. Soil excavated from the grid route will be taken off-site for disposal.

Excavated materials from construction activities at the wind farm will be temporarily stockpiled at hardstand locations during construction and subsequently reused on site for backfill/re-grading or re-vegetation.

It is anticipated that the majority of the excavated material within the wind farm will be reused on site.

Concrete

Concrete waste may potentially occur. There shall be no washout of trucks at site. Excess concrete will be returned to the supplier for reuse. Concrete trucks will be washed out off site at the source quarry. To reduce the volume of cementitious water, only concrete truck chutes will be washed down on site. The concrete trucks will wash down their chutes at a designated chute wash down area in the site compound. The wash down area will consist of a polythene lined bunded area with a capacity of about 20m³. This capacity will be sufficient to accommodate the chute wash down for two turbine base pours.

The Environmental Manager will monitor the pH of the water in the chute wash down bund(s) and can dose with CO_2 or acidic water from the drains until the wash out water achieves neutrality before discharge.

Waste-Water Treatment / Effluent disposal

During the construction time period, the maximum wastewater production is estimated to be the same as the maximum water consumption (3,000 litres per day). The project will include an enclosed wastewater management system at the temporary compound capable of handling the demand during the construction phase when as many as 80 people will be working on site. A holding tank is proposed for wastewater management.

During the construction phase, staff facilities will be provided at the site compound/other suitable locations. A cabin comprising a canteen, washroom and toilets will be provided. The wastewater tank will be emptied as required by a vacuum tanker and removed from site to a licensed facility. These staff facilities will be removed at the end of the construction phase.

Hazardous and Other Waste

Table 9-1 lists some of the waste types that may be generated during the construction works. Although some waste types may be generated in locations other than the construction compounds for example if absorbent filters are required at foundation/track locations etc., such waste materials will be stored within the construction compounds only. Waste materials generated outside of the construction compounds will be taken to the compounds on a daily basis.

Table 9-1: List of the waste types that may be generated during the construction works

Typical Construction Wastes					
Concrete	Wood	Cables	Ducting	Metallic packaging/tins	Cardboard Packaging
Paper packaging	Plastic packaging	Wooden packaging	Office paper	Non-hazardous detergent	Plastic containers
Plastic bottles	Mixed waste	Septic tank sludge	Ferrous metal	Non-hazardous waste electrical(s)	
Hazardous Waste, as categorised by the European Waste Catalogue					
13 02 08* Waste engine, gear and lubricating oils - Other engine, gear and lubricating oils					
13 05 08* Oil/Water separator contents - Mixtures of wastes from grit chambers and oil/water separators					
15 02 02* Absorbents, filter materials, wiping cloths and protective clothing -Absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by dangerous substances					
17 03 01* Bituminous mixtures, coal tar and tarred products - Bituminous mixtures containing coal tar					
17 05 03* Soil (including excavated soil from contaminated sites), aggregates and dredging spoil - Soil and aggregates containing dangerous substances					

If hazardous waste is encountered, then appropriate handling, storage, transportation, and removal will be carried out. Prior to being removed from the site, the waste will undergo a comprehensive waste assessment and classification by suitably trained/qualified person(s), in accordance with the European Waste Catalogue hazardous waste list. If non-hazardous waste becomes contaminated with hazardous waste, the entire load will be considered hazardous. At the site every effort will be made to segregate waste, and properly segregate hazardous waste from non-hazardous and inert waste arising. Hazard wastes will be identified, removed and kept separate from other wastes in order to avoid cross contamination. Specific method statements detailing the necessary mitigation measures during the excavation/handling, transportation, and removal of hazardous materials encountered at the site will be prepared as required.

Oils, paints, adhesives and chemicals will be kept in a separate contained secured storage area. Lids will be kept on containers to avoid spillage/evaporation. Waste oils, adhesives etc will be handled, and disposed of appropriately. Every effort will be made at the site for no long-term storage of hazardous materials/fuels/oils/chemicals, etc. There shall be no long-term storage of waste oils etc. at the site.

Gravel/Aggregate/Asphalt/ Bituminous Materials

There will be no requirement for the storage of Asphalt/bitumen materials on site. Road surface materials will be delivered to site as required, with excess returned to supplier.

Metals

Metals used during the construction phase will be segregated for reuse and recycling. One of the primary sources of metal on sites is rebar. Waste of rebar will be reduced by ordering 'made to measure' from the source, and detailed scheduling of all reinforced concrete structural elements. Any waste metals will be recycled where possible.

Timber

Timber waste will be stored separately. Any pallets will be returned to the supplier for reuse.

Packaging/Plastic

Double handling will be avoided by segregating packaging wastes immediately after un-wrapping. Waste packaging will be segregated and in separate containers, at the storage area for collection by the waste contractor for removal to licensed facility.

Mixed Waste

- This waste stream will arise from waste packaging of electrical and engineering components.
- A 40 cubic metre open skip will be put in place to collect mixed waste within a designated waste area at the temporary site construction compounds.
- This skip will accept plastic packaging, plastic piping, cardboard and timber waste.
- Special care will be taken to ensure that no green waste or food waste will be disposed of in this skip. The purpose of this arrangement is to stop birds scattering food items across the site and therefore prevent vermin infestation.
- This material will be collected by contracted and licensed non-hazardous waste collectors.

Mixed Waste/Canteen Waste

Staff canteens have the potential to generate food waste and packaging waste. Designated receptacles will be provided at the canteen(s) to allow for segregation, and storage of individual waste streams. These will include receptacles for food waste, dry recyclables, and residual bin. All offices and canteens will be equipped with black plastic refuse bags and wheelie bins for the purpose of collecting and delivering this waste stream to the compactor. This material will be collected by the contracted waste management company/transported to licensed facility.

Dry recyclable collection from welfare facilities

- All offices and canteens will be equipped with clear plastic bags and wheelie bins for the purpose of collecting dry recyclables. This will be strictly managed to prevent any food waste entering the dry recyclable stream.
- Recycling wheelie bins will be located at all welfare facilities and offices associated with the project.
- This material will be collected by the contracted and licensed non-hazardous waste collectors.

Other waste

Other wastes which may be generated may include residual non-recyclable waste such as paper, cloth, some cardboards, or plastics. Others may include fibreglass and geotextiles, and polystyrene. These types of materials will be stored in a dedicated container at the site compound. All residual wastes will be dispatched to suitably licensed facility. Other construction and demolition waste will be collected and disposed of appropriately.

Management of General Waste

- Access to materials will be controlled. A dedicated storage area will be provided in the site construction compounds for building materials such as cables, plastic piling for the sediment settlement ponds, geotextile matting, blocks, tools and equipment, fence posts and wire, booms, pipes etc.
- Access to stored materials will be restricted; the site compound will be securely fenced from the outset and will be locked when there are no site personnel present.
- To contain and manage construction phase waste, multiple skips will be provided at the temporary site construction compounds; one for recyclable waste and others for various construction waste. These skips will be emptied when required by a licensed waste management company. Waste oil and waste oil drums will be collected and stored in containers and on a bunded tray within the storage container.
- At the end of each phase, the completed works areas will be tidied of any unused material or waste; this material will be brought to the site compound for storage and reuse or placed in the appropriate skip for removal.

Assignment of Responsibilities

A Resource Manager (RM) will be assigned at the wind farm site, to have an overall responsibility for the management of waste that may be generated at the site. As part of the record keeping procedures, the RM will keep records of all waste being removed from site. This information will be recorded in a standard format. The effectiveness and accuracy of the documentation will be monitored on a regular basis. The Resource and Waste Management Plan will be updated on a regular basis where required and made available as required (i.e. sub-contractors). The RM will be appropriately trained/suitably qualified in all aspects of materials wastes management, and the site personnel will be in a position to;

- Distinguish reusable materials from materials suitable for recycling.
- Ensure maximum segregation at source.
- Cooperate with Site Management, on locations for stockpiling reusable materials.
- Separate materials for recovery.
- Identify and liaise with operators for recovery outlets.

The RM will be responsible for educating site personnel, sub-contractors, and suppliers, about the best alternatives to conventional waste disposal/Waste Management Regime. Training will also be given to site personnel in materials management on site. The RM will continually identify waste minimisation actions on site, and these will be updated in the plan.

Training

Copies of the Waste Management Plan will be available to all site personnel. All site personnel and sub-contractors will be instructed about the objectives of the Waste Management Plan for the site and informed of the responsibilities which fall upon them as a consequence of its provisions. This will be carried out during the site induction process for all site personnel. Where source segregation and materials reuse techniques apply, each member of the construction team will be given instructions on how to comply with the Waste Management Plan

for the site. Site notices will be designed to reinforce the key messages of the waste management plan and will be displayed prominently for the benefit for all on site personnel.

Waste Records

All details of wastes (arising/generated/movement, etc) will be recorded during the project. Each consignment of waste removed from the site will be documented in the form of a waste management movement record form which will ensure full traceability of the material to its final destination. All records will be retained at a designated location at the site office/construction compound and made available for auditing of the waste management plan.

Ballinlee Wind Farm Waste Management Plan Summary

Wastes will inevitably be generated during the construction phase of the project. A certain amount of surplus soils/materials will be generated. These materials will be reused as backfill/landscaping around turbine bases and hardstands and permanently stored at the on-site deposition areas.

Other than materials from excavations, waste arising during the construction phase will be minimised by site management, by timing the ordering of materials required at the site, in a manner which reduces the likelihood of over ordering or damaging during storage. Furthermore, several of the traditional waste streams arising will be re-used at the site where appropriate. Waste will be segregated and stored on site at designated locations/in containers prior to transport to appropriate licensed facilities.

A Resource Manager will be appointed to ensure the Waste Management Plan is followed. Training will be given to all site personnel, so that they are aware of the Waste Management Regime at the site and know their responsibilities.

Records will be kept tracing the inputs and outputs of the construction works at the site. These records will be made available to relevant authorities, should it be required.

The design and implementation of the Resource Waste Management Plan will provide for the optimum planning/management and handling of wastes generated during the construction phase of the proposed development.

References

Best Practice Guidelines on the Preparation of Resource & Waste Management Plans for Construction and Demolition Projects (EPA, 2021).

Ballinlee Wind Farm: Resource Waste Management Plan, EIAR ***Volume III - Appendix 2B*** *(MWP, 2025).*

EU Construction and Demolition Waste Management Protocol (August 2024)

EMP 7: CONSTRUCTION TRAFFIC MANAGEMENT

Purpose:

To describe measures for the management of all traffic, including construction traffic and oversized loads, for the minimization of disturbance to the local community.

Scope:

All site construction areas, approach roads to the site and internal access track traffic.

Procedure:

General

A detailed Traffic Management Plan (EIAR **Volume III, Appendix 16A**) has been prepared as part of the planning application and should be reviewed and updated as necessary by the Appointed Contractor(s) prior to the works commencing. This Plan will be finalised in agreement with An Garda Síochána and Limerick City & County Council.

The plan will include provision for:

- Communicating with the community, An Garda Síochána and Limerick City & County Council.
- Details of site access and any site traffic rules, including security, parking, loading and unloading, required speed or other relevant details.
- Details of the turbine component delivery and any road closures.
- Programme of maintenance and upkeep of public roads.
- Site operating hours (including delivery) to be outlined.

Public Roads

- In order to mitigate from a significant impact during peak traffic hours, the majority of staff will either arrive on-site before or after the peak morning traffic and finish work before or after the evening peak traffic hours.
- The condition of the public roads will be monitored on an on-going basis and a road sweeper provided to clean the public roads if required.

Site Entrance

- There will be no parking of any vehicles on the public road near the wind farm site entrance.
- Adequate parking will be provided on site for both employees and visitors.
- The condition of the site entrances will be monitored on an on-going basis and a road sweeper provided to clean the public road if required.

Responsibility

Project Manager

Construction Manager

Construction personnel

Sub-contractors as appropriate

Delivery personnel

References

Preliminary Traffic Management Plan (Appendix 16A)

EMP 8: CONSTRUCTION DUST, EMISSIONS and AIR QUALITY MANAGEMENT

Purpose

To describe the measures for the management of impacts on air quality from construction generated dust.

Procedure

A dust minimisation plan will be formulated for the construction phase of the project by the Appointed Contractor, as construction activities are likely to generate some dust emissions. The potential for dust to be emitted depends on the type of construction activity being carried out in conjunction with environmental factors including levels of rainfall, wind speeds and wind direction. The potential for impact from dust depends on the distance to potentially sensitive locations and whether the wind can carry the dust to these locations. The majority of any dust produced will be deposited close to the potential source and any impacts from dust deposition will typically be within several hundred metres of the construction area.

In order to ensure that no dust disturbance occurs, a series of measures will be implemented:

- Site access tracks will be regularly cleaned and maintained as appropriate.
- Hard surface roads/tracks will be swept to remove mud and aggregate materials from their surface.
- Furthermore, any road/track that has the potential to give rise to fugitive dust will be regularly watered, as appropriate, during dry and/or windy conditions.
- Speeds will be restricted on hard surfaced roads/tracks as site management dictates.
- Public roads in the vicinity of the site will be regularly inspected for cleanliness and cleaned as necessary.
- A temporary vehicle wheel wash facility will be installed in proximity to the site entrance.

The dust minimisation plan will be reviewed at regular intervals during the construction phase to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust through the use of best practice and procedures.

Responsibility

- The Environmental Manager is responsible for reviewing the site Dust Minimisation Plan.
- The Construction Manager is responsible for organising dust suppression through use of bowsers and cleaners.

References

Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes (Consultation Draft, National Roads Authority, October 2006).

Control of Dust from Construction and Demolition Activities (BRE, 2003).

EMP 9: ECOLOGICAL MANAGEMENT PLAN FOR THE PROTECTION OF HABITATS AND FAUNA

Purpose

To describe measures for the management and protection of flora and fauna on the site.

Procedure

- Ensuring implementation of ecological protection measures outlined below
- Advising on re-vegetation onsite
- Monitoring of success of re-vegetation
- A detailed Habitat and Species Management Plan (HSMP) (EIAR Volume III Appendix 6I) has been prepared to enhance and restore habitats important for biodiversity within the Planning Application Boundary to compensate habitat loss under the footprint of the Development.
- A detailed Whooper Swan Management Plan (WSMP) (EIAR Volume III, Appendix 7D) has been prepared for the protection of the Whooper Swan population in the area.

Ecological Protection Measures

General Habitats

- Habitat degradation will be limited by controlling the movement of construction vehicles and machinery. Construction vehicles and machinery will not encroach onto habitats beyond the proposed development footprint and will be required to travel via the constructed tracks when moving between works areas. To emphasise this requirement, the boundaries of the footprint of the development will be fenced off with post and wire. The Environmental Manager will also monitor vehicle movements.

Monitoring

The following pre-construction surveys will be undertaken:

- Preconstruction bird surveys breeding season.
- Preconstruction terrestrial mammal survey, particularly, for badgers.
- Bird surveys will be carried out prior to, during the construction phase and post construction in accordance with the approved Bird Monitoring Programme.
- Water quality monitoring will take place prior to, during the construction phase and post construction in accordance with the approved Water Quality Monitoring Programme.
- Routine inspections and maintenance of sediment and erosion control measures will take place regularly during the construction phase and during the operational life of the project. Silt traps and sediment settlement ponds will be cleaned on a regular basis to ensure their effectiveness.
- To reduce the level of disturbance to fauna, construction activities will be restricted to between 7.00am and 7.00pm, Monday to Saturday. Construction hours for public roads will be from 07.00hrs to 19.00hrs Monday to Friday and from 09.00hrs to 14.00hrs on Saturdays. Construction work will not take place outside of these hours unless in exceptional circumstances and agreed with the local authority.

- In the unlikely event that protected faunal species are found actively using the site for breeding/roosting during the construction phase, works will cease immediately, and the area will be cordoned off until advice is sought from a suitable qualified expert/NPWS/environmental manager or project ecologist. Works would be restricted within an appropriate buffer zone of the protected species.

Responsibility

Environmental Manager

Construction Manager

Project Ecologist

EMP 10: MANAGEMENT OF INVASIVE SPECIES

Purpose

To describe measures for the management of invasive species on site.

Procedure

Areas where invasive species are present will be identified and demarcated prior to commencement of construction:

Invasive Species Control

The following principles will be applied during the management of Invasive Species at the Development site:

- Prevention/Bio-security: Preventing invasive species from arriving on site/preventing spread of invasive species.
- Response: Regular monitoring combined with a rapid response to treat/ eradicate invasive species that are identified encroaching on the site, to ensure that they do not become established.
- Eradication: Aiming to eradicate invasive species on site will prevent the problem increasing.
- Containment: It may not be realistic to completely eradicate invasive species from a particular site. This could be due to the level of infestation, or the species involved, and resourcing limitations.

Informing

- Invasive Species 'Toolbox Talks'/Site Inductions including visual training will be delivered to ensure all site personnel are of aware of/what invasive species looks like that are potentially at the location/greater area, i.e. Japanese Knotweed/Zebra Mussel, and issues associated with the same. To reduce the likelihood of invasive species spreading, the construction personnel involved in works will be trained in basic relevant invasive species prevention and management ('Toolbox talk').
- Prior to the commencement of construction, the development footprint will be surveyed for the presence of invasive species. If invasive species are present, the Project Manager/Environmental Manager will manage their control. The control methods will be specific to the local site conditions as well as the invasive species being managed. Control methods can include physical and/or chemical control methods and monitoring.
- Where any non-native species are present, a management plan will be put in place, to manage the risks, the risks and implications of the species, along with legal requirements.
- A distribution map of the invasive alien plant species at the development site has been developed and included in **Volume II Chapter 06** Biodiversity under **Section 6.3.3** Terrestrial Surveys and will be incorporated into the final CEMP.
- Where a non-native species is identified as a risk of being introduced, spread within, or moved off site, mitigation measures will be in place to prevent spread of the species.
- If required, the project will be phased, to allow time to deal with the presence and/or risk of spread of non-native species.

- Where a species requires long-term management (e.g. Japanese knotweed), a site management plan will be developed that addresses all issues associated with it.
- Locations of invasive species within the overall site will be highlighted and excluded from the works.
- To reduce the likelihood of invasive species being introduced to the site from quarries, the aggregate will be crushed aggregate which will be biologically inert and would not be expected to have a seed bank.
- No machinery will be permitted to park within demarcated/exclusion areas.
- If excavations are required/movement of invasive species such as Japanese Knotweed, relevant licenses will be obtained and any excavations/movement of the same will be in line with current best practice.

Bio-security

- To reduce the likelihood of invasive species being introduced to the site from construction works on other sites, it will be required that vehicles and tools will arrive on site clean. Work boots will be dipped in or scrubbed with a disinfectant solution and thoroughly dried afterwards before being used on the site for the first time (also requirement during water quality sampling between different catchments). All PPE will be visually inspected and any attached vegetation or debris removed. PPE and tools will remain on site for the duration of construction. Any machinery or equipment returning from a different construction site will be cleaned, power washed/steam washed and visually inspected again before re-entering the site.

Equipment/Machine

To maintain good site hygiene when dealing with any non-native species:

- A fence/signage that can be clearly seen will mark out any area of issue. Signs should be erected to warn people working there that the area is infested/contaminated. No entry signage will be put in place.
- Where contaminated soil, or water are located, signage should be erected to indicate them.
- Personnel working on or between sites will ensure their clothing and footwear are cleaned were appropriate to prevent spread.
- Tracked vehicles should not be used within the area of infestation.
- All vehicles leaving the infested area and / or transporting infested soil/materials must be thoroughly pressure-washed in a designated wash-down area before being used for other work.
- Where cross-contamination is possible (i.e. from one site to another), vehicles or machinery will be designated to specific sites where possible to prevent spread.
- Material / water left after vehicles have been pressure-washed must be contained, collected and disposed of appropriately.
- All chemicals used for the control of non-native species should be stored and used in an appropriate manner carried out by specialist/suitability trained personnel.

Methodologies

- Invasive species management methodologies and plans outlining Best Available Techniques (BAT) will be sourced from the National Invasive Species Database, from previously published documents/current best practice, and from the Invasive Species Ireland and Inland Fisheries Ireland websites.

A Site Specific Invasive Species Management Plan will be developed and will be incorporated into the Appointed Contractor(s) CEMP.

Responsibility

Project Manager

Environmental Manager

Construction Manager

Project Ecologist

References

Information on invasive species is provided in the National Road Authority (NRA) (now Transport Infrastructure Ireland (TII))1, and Invasive Species Ireland (ISI)2 documents provided in Annexes I and II, in relation to identification, control and eradication of Japanese Knotweed.

EMP 11: ARCHAEOLOGICAL AND HERITAGE PROTECTION

Purpose

To describe measures for the management and protection of archaeological and cultural heritage on the site.

Procedure

- During the course of development, all excavations will be monitored by a suitably qualified archaeologist, under licence to the National Monuments Service at the Department of Culture, Heritage and the Gaeltacht.
- Prior to construction, a program of archaeological test excavation trenching, under licence from NMS, will be undertaken to establish the veracity of anomalies recorded in the geophysical survey.
- Furthermore, archaeological test excavations should also be undertaken on the footprints of the core wind farm components within the planning boundary. The scope of the test excavations will be agreed following consultation / liaison with the Limerick City & County Council Archaeologist.
- If during the proposed archaeological testing and monitoring, previously unrecorded sites/features are discovered, then preservation 'in situ' or preservation by record will be proposed.
- In the event of archaeological material being uncovered consultation will take place with the National Monuments Service and the National Museum of Ireland to decide on an appropriate course of action.

Responsibility

Project Manager

Environmental Manager

Construction Manager

Project Archaeologist

EMP 12: EMERGENCY RESPONSE PLAN

Purpose

To describe measures for the prevention of an environmental accident or incident and the response required to minimise the impact of such an event.

Procedure

In the event of an environmental emergency, all personnel will react quickly and adhere to this procedure.

All site personnel will be inducted in the provisions of the Emergency Response Plan.

The following outlines some of the information, on the types of emergencies, which must be communicated to site staff;

- Release of hazardous substance – Fuel and oil spill.
- Concrete spill or release of concrete or silt.
- Discharge of sediment.
- Flood event – extreme rainfall event.
- Environmental buffers and exclusion zones breach.
- Housekeeping of materials and waste storage areas breach.
- Stop works order due to environmental issue or concern (threat to archaeological or ecological feature).
- Fire on site (cross-reference site Safety Emergency Plan as appropriate).

If any of the above situations occur; the Emergency Response Plan is activated. The Environmental Manager will most likely be responsible for overseeing the Emergency Response Plan (to be confirmed by the Appointed Contractor(s)) and will be prepared and ready to implement the plan at all times. The Environmental Manager will be immediately informed and report to the scene. He/she must be aware of the;

- Nature of the situation – brief description of what has happened.
- Location of the incident.
- Whether any spill has been released.
- Whether the situation is under control.
- Remedial actions taken and ongoing requirements.

Oil Spillages

The following list outlines issues likely to be appropriate for inclusion the plan:

- Site staff will report the spillage immediately to the Environmental Manager or Construction Manager.
- Where relevant, the Environmental Manager will report the spillage to Inland Fisheries Ireland and Limerick City & County Council.
- Where possible, the source of pollution will be identified.
- Switch off all sources of ignition.

- Stop the spillage spreading.
- Use absorbent materials from the spill kit to mop up the spill (sand or absorbent materials should be used rather than detergents).
- Place boom across watercourse or in nearby downstream existing drains as a precaution.
- Do not wash spillage into surface water system. Washing will only make the situation worse and extend the pollution to other water bodies/surface water systems.
- If the spill has already reached drains, block the inlet of the dirty water cross pipes in the nearby surface water outflow points on the trackside drains with oil absorbent booms, which will prevent oils flowing into the existing drains.
- Shovel contaminated sand/earth/absorbent granules into sacks or skips.
- A specialist oil removal company should remove pooled oil to a licenced facility.

Concrete Spillages

The following list outlines issues likely to be appropriate for inclusion in such a plan:

- Site staff will report the concrete spillage immediately to the Environmental Manager or Construction Manager.
- Where relevant, the Environmental Manager will report the spillage to Inland Fisheries Ireland and Limerick City & County Council.
- If there is a risk of concrete spreading into the surface water system, the inlet of the dirty water cross pipes in the nearby surface water outflow points on the trackside drains will be blocked using the absorbent booms, which will prevent concrete flowing into the existing drains.
- Do not wash spillage into surface water system. Washing will only make the situation worse and extend the pollution to other water bodies/surface water systems.
- If the spill has already reached drains, acid may be added to the drains by the Environmental Manager to neutralise the alkalinity of the concrete.
- Shovel contaminated concrete granules into sacks or skips for removal off site by a licensed contractor.

Contacts

As an Environmental Control Measure, the Environmental Manager will append the relevant contact details to the Emergency Response Plan document. Examples of such contact details include:

- Environmental Manager.
- Specialist oil removal Company.
- Limerick City & County Council.
- Inland Fisheries Ireland.
- National Parks and Wildlife Service.

Location of Emergency Spill Kits

- A map indicating the location of all emergency spill kits will be attached to the Emergency Response Plan document.
- Emergency oil spill kits will also be carried in all site vehicles and machinery and in the site office.

Responsibility

- The Environmental Manager will prepare and finalise an Emergency Response Plan to be ready to respond to any incident.
- All site personnel will report any spillages of oil or chemicals to the Environmental Manager and Construction Manager immediately.

As appropriate, the Environmental Manager will report the spillage to the Regional Fisheries Board, Limerick City & County Council and any other relevant authority.

EMP 13: SITE ENVIRONMENTAL TRAINING AND AWARENESS

Purpose

To describe measures for the training of all site personnel in the protection of the environment and the relevant controls.

Scope

All site personnel and construction teams which may influence environmental impacts.

Procedure

An initial site environmental induction and ongoing training will be provided to communicate the main provisions of the CEMP including this EMP to all site personnel. Two-way communication will be encouraged to promote a culture of environmental protection.

The following outlines some of the information which will be communicated to site staff;

- Environmental procedures of the CEMP.
- Environmental buffers and exclusion zones.
- Housekeeping of materials and waste storage areas.
- Environmental Emergency Response Plan.

Housekeeping and Storage of hazardous materials

- Hazardous materials marked with the following symbols will only be stored in the secure storage container in the temporary site construction compounds.

- Subcontractors will provide a copy of the Material Safety Data Sheets for all hazardous substances brought on site.

All finalised CEMP policies will be adhered to, in the management of fuels and oils, concrete, and installation of sediment and erosion controls and surface water systems. All finalised details will be communicated with site personnel. Environmental Training including spill kit training, installation of silt fence training is to be provided by the Appointed Contractor(s). Environmental training records will be retained in the site office.

Responsibility

Construction Manager

Environmental Manager

All site personnel

Details of Induction and Training to be finalised by Appointed Contractor(s)

EMP 14: MONITORING AND AUDITING

Purpose

To describe a plan for environmental monitoring during the construction works and a program for the audit of control measures for environmental protection.

Procedure

All mitigation measures, planning conditions and relevant construction methods will be monitored on site. The Appointed Contractor(s) will nominate an Environmental Manager for the works. The Environmental Manager will provide Audit Checklists to ensure regular checks of the site's control measures for the ongoing protection of the environment.

Monitoring will be carried to ensure adherence with the following;

EMP-2	Surface Water Management and Run-off Control
EMP-3	Fuels and Oils Management
EMP-4	Management of Concrete
EMP-5	Construction Noise & Vibration Management
EMP-6	Construction Waste Management Plan
EMP-7	Construction Traffic Management
EMP-8	Construction Dust, Emissions and Air Quality Management
EMP-9	Ecological Management Plan Protection of Habitats and Fauna
EMP-10	Archaeological & Heritage Protection

Checklists for daily, weekly or monthly site audits will be finalised by the Environmental Manager and the relevant personnel informed of their duties. Checklists will include (but are not limited to) confirmation that fuel is stored appropriately, waste management rules are adhered to, all environmental buffers are maintained, surface water and run-off control measures are in place and functioning, and concrete chute wash-out procedure is being followed. Checklists will be finalised with the Final Contractor(s)'s EOP.

All environmental records, including completed checklists, audits, monitoring and sampling data will be retained at the site office.

Responsibility

Project Manager

Environmental Manager

Construction Manager

Project Ecologist

Project Archaeologist

Details of Monitoring Procedure and Checklists to be finalised by Appointed Contractor(s)'s Environmental Manage

EMP 15: ENVIRONMENTAL ACCIDENTS, INCIDENTS AND CORRECTIVE ACTIONS

Purpose

To describe measures for the recording, investigating and close-out of any environmental accidents or incidents on the site.

Procedure

- The Environmental Manager or Construction Manager will be contacted as soon as possible where there is any incident that carries the possibility of adverse environmental consequences (e.g. minor oil leakage or blockage of surface waterpipe).
- The Emergency Response Plan and standard emergency procedures will be applied to get the incident under control and prevent injury or loss of life in the first instance.
- Work in the area will be halted, and the Environmental Manager will be called to the scene to assess the situation and to decide on initial responses and remedial measures.
- Once the situation is under control, the environmental accident or incident will be recorded and the cause investigated.
- Any remedial action required will be taken to mitigate any damage and prevent a reoccurrence.
- Corrective actions will be communicated to personnel and sub-contractors where relevant – particularly where it results to a change in procedure.

Example list of environmental accidents & incidents

- Accidents involving a large spill of fuel or concrete from a delivery truck, sediment release (emergency response required)
- Spills of fuel and oil (minor)
- Waste or rubbish left around the site (not in dedicated waste areas)
- Breach of any buffers (archaeological, ecological, watercourse)
- Failure of any control measures (silt fences collapsed in a storm)
- Concrete chute wash out in a non-dedicated area
- Unplanned vehicle movement off the access tracks
- Unplanned vehicle movement within a buffer zone

Responsibility

- Site staff will contact the Environmental Manager or Construction Manager as soon as possible where there is any incident that carries the possibility of adverse environmental consequences.
- The Environmental Manager is responsible for alerting the relevant authorities.
- Environmental Manager will ensure that all personnel on site are trained and briefed on the environmental management plans.

Details of Environmental Accidents, Incidents and Corrective Actions Procedure, including a chain of responsibility, to be finalised by Appointed Contractor(s) and communicated to all personnel and sub-contractors

EMP 16: ENVIRONMENTAL COMPLAINTS

Purpose

To describe measures for the recording and resolving complaints by third parties, including local residents or members of the public.

Procedure

Any environmental complaints received, whether internal or external, will be recorded and investigated. It is recommended that immediate action is taken as relevant to resolve environmental complaints to avoid any disturbance to the local community or any environmental damage.

This procedure includes;

- Recording of any complaints to a site log
- Follow up by the relevant site representative – Environmental Manager
- Remedial measures where required
- Ongoing communication with complainant to confirm resolution
- Any required training or communication with site personnel and sub-contractors as a result

Responsibility

Project Manager

Environmental Manager

Construction Manager

Details of Environmental Complaints Procedure to be finalised by the Appointed Contractor(s)