## Document history

| | | |
|---|---|---|
| **Author** | Lesley Cartwright | 04/04/202 |
| **Checked** | Jim Ravey | 09/04/2024 |

| Client Details | |
|---|---|
| Contact | Simon Lejeune |
| Client Name | Vattenfall Wind Power Ltd |

| Issue | Date | Revision Details |
|---|---|---|
| A | 09/04/2024 | Initial Draft |
| B | 25/06/2024 | Update |
| C | 17/09/2024 | Final |

# Chapter 3.

## Project Description

## Contents

## Glossary

| Term | Definition |
|---|---|
| Environmental Impact Assessment | Environmental Impact Assessment (EIA) is a means of carrying out, in a systematic way, an assessment of the likely significant environmental effects from a development. |
| Environmental Impact Assessment Regulations | The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (EIA Regulations). |
| Environmental Impact Assessment Report | A document reporting the findings of the EIA and produced in accordance with the EIA Regulations. |
| The Proposed Development | The South Kyle II Wind Farm Project. |
| The Proposed Development Area | The area within the “Site boundary” as illustrated on Figure 1.1 within which the Proposed Development will be located |
| Developer | In the event of the Proposed Development being granted Section 36 Consent, this is the Company developing the Project. |

## List of Abbreviations

| Abbreviation | Description |
|---|---|
| ACoW | Archaeological Clerk of Works |
| AOD | Above Ordnance Datum |
| BESS | Battery Energy Storage System |
| CAA | Civil Aviation Authority |
| CDM | Construction Design Management |
| CEMP | Construction Environmental Management Plan |
| CMS | Construction Method Statement |
| COSHH | Control of Substances Hazardous to Health |
| ECoW | Environmental Clerk of Works |
| EIA | Environmental Impact Assessment |
| EIAR | Environmental Impact Assessment Report |
| PMO | Planning Monitoring Officer |
| SCADA | Supervisory Control and Data Acquisition |
| SEPA | Scottish Environment Protection Agency |

## 3.1. Introduction

This chapter of the EIAR outlines the details of the Proposed Development as specified in the application, including specifications of turbines, battery energy storage system (BESS), access tracks and electrical infrastructure. It also describes the general construction methodology, projected construction timescales and typical construction equipment likely to be used. Operational and decommissioning phases are also described within this chapter.

3.1.1. The construction methods detailed below build on best practice methodologies developed at other wind farms to comply with Health and Safety requirements for construction operations and follow relevant guidelines including but not limited to Construction (Design and Management) Regulations 2015, SEPA's Pollution Prevention Guidelines, and the joint publication of Good Practice during Wind Farm Construction.

## 3.2. Site Location and Description

Volume 2a Figure 1.1 illustrates the site layout of the Proposed Development. It is located south-east of the B741, south-east of Dalmellington and south-west of New Cumnock, in East Ayrshire. It covers an area of approximately 2,262 hectares. The maximum Above Ordnance Datum of the site is 516 m. Volume 2a Figure 1.2 shows the regional context of the Proposed Development.

The Proposed Development is for:

- Up to 11 wind turbines
  - Turbine foundations
  - External transformer housing
  - Crane pads
- Substation, control building and compound
- Battery/energy storage infrastructure
- Upgraded and new access tracks
- Underground cables
- Signage
- Temporary use of existing borrow pits
- Temporary batching plant area(s)
- Temporary construction and storage compounds, laydown areas and ancillary infrastructure
- Drainage and drainage attenuation measures (as required).

3.2.1. Any public road to the site entrance may be utilised, subject to upgrades where necessary. Habitat management will be undertaken in the Proposed Development Area.

3.2.2. The land upon which the turbines will be erected is currently forested. As such forest felling and replanting will be undertaken to facilitate the Proposed Development. It is highlighted that the areas of existing planting already on the site of the Proposed Development or areas of forestry planting consented comprise commercial forestry plantations.

3.2.3. The Proposed Development is expected to operate for 40 years following which decommissioning of the turbines and other infrastructure would be undertaken as required.

3.2.4. After detailed design iterations it was considered that the Proposed Development provides a reasonable and proportionate balance between optimising efficient wind capture to ensure economic viability and a meaningful contribution towards renewable energy targets (in the context of "net zero"[1]) whilst for the most part safeguarding against potential significant adverse environmental effects. Volume 2a Chapter 2 provides further details of the process that resulted in the final project design and layout.

### Site Layout

3.2.5. The Proposed Development's layout is presented in Volume 2a Figure 1.1. Micrositing allows the exact turbine location and infrastructure to be modified post-consent within specified parameters, following detailed ground investigation and ground clearance. Through industry experience a micrositing allowance of 100 m is considered appropriate for turbines and associated infrastructure, subject to certain conditions, such as ensuring buffers from watercourses are maintained. The assessments within this EIAR account for the potential micrositing of the turbines and associated infrastructure. Table 3.1 gives the centre point location and proposed maximum tip height for each of the proposed turbines.

Table 3.1: Turbine Locations

| Turbine ID | Easting | Northing | Tip Height (m) |
|---|---|---|---|
| 1 | 251586 | 606353 | 200 |
| 2 | 251796 | 606892 | 200 |
| 3 | 252126 | 606495 | 200 |
| 4 | 252210 | 605653 | 200 |
| 5 | 252292 | 607281 | 200 |
| 6 | 252614 | 606862 | 200 |
| 7 | 253406 | 606364 | 200 |
| 8 | 253283 | 605872 | 200 |
| 9 | 253962 | 606846 | 200 |
| 10 | 254043 | 605697 | 200 |
| 11 | 252533 | 606114 | 200 |

*Source: Natural Power*

3.2.6. Indicative drawings for currently available technologies that suit site conditions are presented in Figures 3.1 – 3.10 of this EIAR. For the purpose of assessment a maximum turbine height of up to 200 m to tip has been used. Where necessary for assessment purposes a maximum rotor blade diameter of up to 170 m has been used although the rotor length may be less depending on blade availability at the time of construction.

### Public Road Access

3.2.7. The Proposed Development will be accessed at the existing northern entrance via the existing North Kyle Wind Farm and its site entrance from A713. This site entrance was designed to facilitate the construction and operational requirements of the North Kyle Wind Farm and has therefore been upgraded to accommodate deliveries of large turbine components. It is proposed that all Abnormal Indivisible Loads (AIL) associated with the construction of the Proposed Development will use this access. A detailed Abnormal Load Route Survey Report supports the application and will identify the necessary works that will be required to enable loads to access the site.

3.2.8. Construction traffic to the Proposed Development Area will be from the B741 road. An assessment of the public road access is provided in Volume 1 Chapter 11: Traffic & Transport.

[1] About Net Zero | Net Zero Nation [Accesed 4/4/24]

### Private Road Access

3.2.9. Upon leaving A713 , access to the Proposed Development is through existing wind farm tracks and forestry tracks. As a result of the larger components intended to be utilised in the Proposed Development, upgrades to existing tracks may be required to facilitate component deliveries. Assessment of utilising this route is provided in Volume 1 Chapter 11: Traffic & Transport and the potential environmental and forestry effects are also assessed in Volume 1 Chapters 6: Ecology and Biodiversity, 8: Hydrology, Geology and Hydrogeology and 12: Forestry.

### Felling

3.2.10. As noted earlier, the land where the wind turbines will be developed is a commercial forest. As a result, felling of elements of the commercial forestry will be required. It is anticipated that some of the felling required to accommodate the Proposed Development is likely to take place in advance of prior planned felling dates. An updated forestry design plan including assessment of the felling and proposed arrangements are provided in Volume 1 Chapter 12: Forestry.

## 3.3. Construction

### Construction Method Statement (CMS)

3.3.1. Prior to the commencement of construction, a Construction and Environmental Management Plan (CEMP)/CMS will be produced setting out in detail the individual items of works associated with the construction of the Proposed Development. The individual items of works associated with the construction contained within the CEMP/CMS are considered as embedded mitigation (see Volume 1 Chapter 8: Hydrology, Geology and Hydrogeology of the EIAR for more details of a draft CEMP). The CEMP/CMS will be secured by planning condition and ensure that construction activities are carried out safely, in accordance with best practice and the relevant guidelines[2], and to minimise environmental impact, in accordance with SEPA's pollution prevention guidance. The CEMP/CMS will likely cover, but not be limited to, the following topics:

- Site Health and Safety Plan
- Method Statements and Risk Assessments to include for environmental considerations e.g. sympathetic construction methodology with regard to weather and ground conditions.
- Location and Description of Project
- Consent and Regulation Approvals e.g. discharge of planning conditions
- Pre-construction Survey Work Undertaken
- Turbine Description/Specification
- Construction Schedule
- Public Highway Works
- Site Tracks
- Temporary Construction Compound
- Crane Pads
- Cable Trenches
- Foundation Works
- On-site Substation and Control Building
- Borrow Pits
- Monitoring - Ecological, Hydrological and Geotechnical and Archaeology
- Emergency Procedures

3.3.2. A Site Waste Management Plan will also be drawn up as part of the CMS/CEMP prior to the commencement of construction.

3.3.3. Previous experience of agreeing the construction methodology during the post-consent/pre-construction stage has proved effective in securing accurate and realistic method statements. At this stage in the project, additional data will be available in the form of detailed site investigations. Furthermore, the civil engineering contractor and the turbine supply contractor would have been chosen, enabling more detailed preparation of individual method statements. During the preparation of the CMS/CEMP consultation with NatureScot, SEPA, the planning authority/authorities and other relevant consultees would be undertaken to review the working methods proposed and if necessary, incorporate changes. This iterative process of preparing the CMS/CEMP ensures that when construction commences there is a robust process for ensuring that the construction effects associated with the Proposed Development are effectively managed and mitigated against where reasonably practicable. As a consequence of this process the monitoring of the construction activities, either by the appointed site representative or by the various bodies associated with the preparation of the document is more effective.

3.3.4. Each section of the CMS/CEMP will provide a detailed description of the tasks to be completed along with risk assessments, where necessary, covering items such as waste management, pollution prevention, control of waters, nuisance and material use.

3.3.5. A section of the CMS/CEMP will include a Peat Management Plan (PMP). The PMP will focus on the handling and storage of peat would be prepared in accordance with recommendations from a suitably qualified geotechnical designer, ecologist and hydrologist following a detailed site investigation. Peat slide risk assessment works have been carried out to provide input to the layout design and the results show that, through geotechnical risk management, strict construction management and implementation of relevant control measures, the risk of peat failure across the site shall be reduced to negligible levels. Should the Proposed Development be approved , additional detailed ground investigation, focussing upon the authorised layout, would be conducted prior to construction.

3.3.6. In respect of matters regarding construction methodology and peat stability at the site, the following general recommendations would be adhered to and would form part of the overall CMS/CEMP documentation:

3.3.7. Environmental awareness training will be provided to all staff entering on to the site; this will include a basic environmental site induction covering the following measures:

- Avoid placing excavated material and local concentrated loads on peat slopes.
- Avoid uncontrolled concentrated water discharge onto peat slopes identified as being unsuitable for such discharge.
- Avoid unstable excavations. All excavations would be suitably supported to prevent collapse and development of tension cracks.
- Avoid placing fill and excavations in the vicinity of steeper slopes.
- During construction install and regularly monitor geotechnical instrumentation as appropriate, in areas of possible poor ground such as deeper peat deposits.
- Implement site reporting procedures to ensure that working practices are suitable for the encountered ground conditions. Ground conditions are to be assessed by a suitably experienced geotechnical engineer.

[2] Good Practice during Wind Farm Construction. (Version 4, 2019) Scottish Renewables, SNH, SEPA, FCS and HES. Available online from: Good practice during Wind Farm construction | NatureScot (last accessed 18/04/2024)

- Form a contingency plan to detail the level of response to observed poor ground conditions.
- Routinely inspect the wind farm site by maintenance personnel including an assessment of ground stability conditions.
- Carry out an annual inspection of the site following completion of works by suitably experienced and qualified geotechnical personnel.
- Maintain stored peat in a suitable condition to minimise the peat drying out.
- Minimise the need to handle stored peat so as to reduce any drying or changes to the peat.
- Re-use of peat (both acrotelmic and catotelmic) as close to extracted area as possible
- Maintain all surplus peat (both acrotelmic and catotelmic) on site

3.3.8. NatureScot's online carbon/peatland map indicates the Proposed Development Area consists of primarily Class 5 soils - no peatland habitat recorded[3].

Phase 1 and 2 peat surveys have been completed in the Proposed Development Area which indicate an average peat depth of 0.78 m. Further details are provided in Volume 1 Chapter 8: Hydrology, Geology and Hydrogeology. The layout of the site infrastructure has taken the findings of the Phase 1 and Phase 2 surveys into account and avoided areas of deep peat where possible. Construction procedures will follow best practice guidelines in order to ensure that areas of peatland habitat identified in the Phase 1 and Phase 2 surveys are protected.

3.3.9. Other sections relating to site-specific items including landslide hazard and the geotechnical risk register, identified during the pre-construction phase, will form part of the CMS/CEMP.

3.3.10. It is intended that the CMS/CEMP will be an evolving document. The evolving nature of the CMS/CEMP would allow a staged completion of the mitigation measures to be undertaken in line with the progression of construction.

3.3.11. Updating of the CMS/CEMP to reflect changes in the construction activity methods to be used would also be carried out, where necessary.

## Wind Farm Construction and Reinstatement Techniques

3.3.12. Construction of the Proposed Development would begin within a defined time period following consent granted by the Scottish Government. The Applicant seeks a 5-year period within which to commence development under the consent. This is necessary to allow time for the discharge of conditions and procure the turbine equipment and associated infrastructure delivery.

3.3.13. This chapter summarises the construction phase and the general order of on-site activities is presented in Table 3.2. These items generally follow chronologically but some items will run concurrently.

**Table 3.2: Construction Elements**

| Construction Elements |
| --- |
| Forestry felling |
| Mobilisation of civil and electrical contractor |
| Site Investigation |
| Construction and upgrades to access and site tracks |
| Excavation and construction of turbine foundations |
| On-site cabling |
| Construction of the substation control building and BESS |
| Preparation of crane pads |
| Installation of turbine transformers |
| Mobilisation of turbine supply contractor |
| Turbine delivery |
| Turbine erection |
| Reinstatement around turbines |
| Turbine fit-out |
| Connection to substation and grid connection |
| Commissioning of wind farm |
| Reliability testing |
| Demobilisation |

3 Available online: https://map.environment.gov.scot/Soil_maps/?layer=10 (last accessed 05/03/2024)

3.3.14. Table 3.2 represents a simplified process of the different construction elements. It should be noted that there will be a degree of overlap between individual elements. It should also be noted that these elements relate to permanent infrastructure. Some temporary works are also required during the construction phase, such as borrow pits, batching plant areas, temporary hardstanding areas for crane components, pads for supporting the rotors during construction in addition to the permanent crane pads or drainage measures in turbine excavations.

3.3.15. Volume 3 Technical Appendix 11.2: Outline Traffic Management Plan provides indicative details for associated construction traffic and abnormal indivisible loads. An indicative construction timetable is also provided based on an 18-month construction programme.

## Environmental Clerk of Works (ECoW)

3.3.16. A suitably qualified independent ECoW would be appointed to undertake pre-construction surveys, monitor the construction activities and report to both the Developer and Local Planning Authority/Authorities (LPA) of any incidences that were not a component of the construction working practices agreed through the CEMP/CMS. The ECoW would liaise closely with the Developer, providing expert advice to help rectify any potential environmental matters that arise during the construction phase.

## Planning Monitoring Officer (PMO)

3.3.17. A PMO would be appointed to undertake site surveys, monitor the construction activities, monitor compliance of development with the planning requirements of its consent during construction and report to both the Developer and LPA of any incidences that were not a component of the construction working practices agreed through the CEMP/CMS. The PMO would liaise closely with the Developer, providing expertise to help rectify any potential planning issues that arise.

## Archaeological Clerk of Works (ACoW)

3.3.18. An independent qualified ACoW would be appointed to undertake pre-construction archaeological surveys, monitor the construction activities in relation to any sites of Cultural Heritage significance and report to both the Developer and LPA of any findings or incidences that were not a component of the construction working practices agreed through the CEMP/CMS. The ACoW would liaise closely with the Developer, providing expert advice to help mitigate any potential harm to Cultural Heritage sites that could arise during the construction phase.

## 3.4. Infrastructure

3.4.1. As explained above, a CMS will detail the final construction methods for infrastructure. Below is a high-level overview including reference to relevant diagrams submitted with the Application. For the purposes of carrying out the assessments on construction activities in the EIAR, the reasonable worst-case scenario has been adopted.

### Wind Turbines

The eventual turbines procured for construction and operation would be of a modern design with three blades mounted on a horizontal axis, attached to a nacelle. The nacelle would be mounted on a tubular tower which allows access to the nacelle. It is expected that the turbine cut in wind speed will be around 3 m/s and will rotate clockwise. The specific turbine model has not yet been selected but to inform modelling and EIA assessment a turbine with maximum 200 m tip height, a maximum 170 m rotor diameter and a maximum 115 m hub height was assumed. An indicative drawing of the proposed turbine is presented in Volume 2a Figure 3.1. The capacity of the turbines that will be deployed is not fixed and will be subject to final wind turbine availability and procurement, but the maximum stated dimensions above would currently allow for candidate turbines with a capacity of around 8.4MW.

3.4.2. Volume 1 Chapter 13: Aviation and Other Effects provides details of a lighting scheme proposed for the turbines which has been consulted with the CAA.

### Construction including External Transformers and Foundations

3.4.3. This section describes the construction of the wind turbines including external transformers, foundations and crane pads.

3.4.4. Wind turbine towers will likely be pre-fabricated off site in three sections and made from steel and the blades from. Details of these would be agreed as part of the CMS.

3.4.5. Whilst the transformer is likely to be internal to the turbine structure an indicative design for a typical external transformer housing is included in Volume 2a Figure 3.1 to represent a “worst case” scenario. External transformer housing(s) will be situated adjacent to each of the turbine towers. The requirement for such structures, along with their dimensions, will vary based on the final turbine choice (some turbine types require two stacked transformer housings).

3.4.6. Reinforced concrete foundations will form a stable base upon which the turbine towers will be bolted. An indicative drawing of a turbine foundation is presented in Volume 2a Figure 3.2. Depending on the height of the water table at the foundation location, a drainage system may be installed around the foundation to prevent the build-up of water pressure under the foundation. Alternatively, in locations that are particularly sensitive to hydrological disturbance, a submerged foundation design could be employed which would not require a drainage system around the foundation.

3.4.7. Cement entering a watercourse can have a detrimental effect by drawing oxygen from the water and increasing its alkalinity. If an on-site batching plant is required it will be situated away from water courses, either within a borrow pit or at another secure location which will be agreed in advance with SEPA, Scottish Water and landowners prior to construction. Please refer to proposed layout for proposed location(s) (an indicative diagram of a typical batching plant is shown in Volume 2a Figure 3.10). Particular care will be taken pouring concrete at turbine foundations in the vicinity of watercourses and in areas of deeper peat (see also Volume 1 Chapter 8: Hydrology, Geology and Hydrogeology). SEPA’s Pollution Prevention Guidelines would be adhered to and in addition SEPA would be consulted during the preparation of the CMS to ensure that the appropriate measures are put in place. This may include construction of a settlement pit within the construction compound or elsewhere for treating rinse water from concrete lorries and measures to prevent water from entering excavations in the vicinity of watercourses.

### Erection of Turbines including Crane Pads and Hardstandings

3.4.8. It is expected that two types of cranes are required for the erection of the turbines; 800/1000-tonne capacity cranes and 400/500-tonne capacity tailing cranes. The cranes would use the crane hard standing area as indicated in Figure 3.3. There will be permanent crane pads to facilitate the construction and subsequent maintenance of the individual turbines. Additional temporary hardstandings may be required at various stages during turbine construction and erection. This may include temporary hardstanding to facilitate the erection of crane components, lattice boom or turbine components e.g. rotor assembly. The locations of both permanent and temporary hardstandings will be finalised following further site investigation, but will maximise use of the access tracks, where possible, to minimise the carbon footprint and ground disturbance of the Proposed Development.

The construction of the hardstanding areas would see topsoil/ peat removed and stored adjacent to the sites and remaining strata removed down to a suitable bearing stratum. Geotextile material would be laid down where necessary with crushed stone on top, to a depth of around 500 mm. The crushed stone would be sourced from the borrow pit identified in Volume 2a Figure 1.1.

3.4.9. Where reasonably practicable, the delivery of the turbine components would be scheduled, weather dependent, to allow for direct lift off the transport trailers. Otherwise, turbine components would be stored on, or adjacent to, the crane pad areas, or components may be delivered to the construction compound for internal distribution by a separate tractor unit. The tower sections would be erected, followed by the nacelle and hub. Following erection of the tower sections and the nacelle, the blades would either be lifted and attached individually to the hub in position, or the hub and blades would be raised together, as a unit, and attached to the nacelle. The cranes would then move to the next turbine location.

### Operation

3.4.10. Once installed and fully commissioned, the wind turbines would operate automatically and can be controlled remotely or from the on-site Control Building. Regular visits will be made by technicians to infrastructure and turbines in four-wheel drive vehicles or similar. In addition, longer servicing visits would be required, typically every six months, along with reasonable unscheduled maintenance, as may be necessary. Occasional use of larger vehicles, such as cranes or lorries similar to those used during construction may be necessary, should there be a requirement for replacement of major turbine components.

3.4.11. Wind farm performance would be remotely monitored using a Supervisory Control and Data Acquisition system (SCADA) that would monitor the individual turbines and the grid connection.

3.4.12. All turbine transformers would be sited on bunded foundations that are capable to retaining 110% of the oil contained within the transformer. Any leaks from equipment within the nacelle would be contained within the turbine.

### Borrow Pit

3.4.13. An existing on-site borrow pit will be used to provide most or all of the stone for use in the Proposed Development Area, subject to sufficient quality and quantity of stone being available at this location. Should further stone be required, material may be imported onto site from local quarry sources.

## Access Tracks

3.4.14. Approximately 7.3 km of new on-site tracks would link the proposed turbines and infrastructure to the existing private access tracks. The existing private access tracks, primarily used for commercial forestry, will be used and upgraded where required. Existing South Kyle Wind Farm tracks will also be used for AIL access and upgraded where required. (see Volume 2a Figure 1.1).

3.4.15. The design philosophy behind the track layout has taken into account a number of factors including topography, ecological/ environmental/ archaeological constraints, hydrology, watercourse crossing, ground conditions and construction parameters and has been based on best practice methodology developed at other wind farm sites. Embedded mitigation in the CMS primarily requires that existing tracks are used where possible in order to reduce the need for construction of new tracks, thus reducing the degree of disturbance to the local environment and promoting sustainable development. Where new tracks are required the layout has been designed following an onsite review and minimised the number of water crossings necessary and used as far as reasonably possible the existing infrastructure in place to minimise impacts on the environment.

3.4.16. The initial stripping of topsoil/ peat for the new tracks and placement of stone material for construction of new tracks has the potential to release sediment into watercourses. Therefore, using methods consistent with industry best practice, sediment measures would be put in place ahead of the track construction activities. Sediment would be transported the furthest by existing surface water channels and manmade drainage systems, therefore proactive mitigation measures would require these to be identified prior to the track construction. Within the channels and drains and any necessary settlement ponds, silt traps would be constructed prior to track construction. The silt traps would likely be constructed using straw/hay bales or specialized siltation fencing, pinned into place, allowing water to either percolate through the bale or flow over. Where machinery is required for any of these up-front activities, they would have low pressure bearing tracks. Sediment transport mitigation drainage systems would be subject to regular maintenance during the lifetime of the Proposed Development. Volume 1 Chapter 8: Hydrology, Geology and Hydrogeology of the EIAR provides an assessment of the potential effects on hydrology.

3.4.17. For construction of new sections of track, alternative methods would be utilised for different areas of the Proposed Development Area, depending on site specific conditions. For each method, the track running width (excluding drainage channels and cable trenches) would generally be approximately 5 m wide, with the exact width depending on the local ground conditions. A wider track width of approximately 7m is also proposed as a main spine road to minimise interface issues throughout the construction and operational period of the windfarm. The spine road reduces collision risks and also has significant environmental benefits by preventing the continual braking and accelerating (and standing) of plant and vehicles associated with passing places. Track widths may also be wider for short sections such as lengths with passing places and at sharp bends and track junctions. It is expected that all new tracks will be excavated whereby overlying soil or peat material would be removed with a foundation formed on the underlying glacial till or the weathered rock horizon, as shown in Volume 2a Figure 3.5. Where peat depths are greater than 1m deep, it is generally more efficient to “float” the track over peat i.e. leave the peat in place. In this instance, geogrid(s) and rock from the borrow pits (at approximately 1m thick), are used to form the construction of the floating track.

3.4.18. In addition, there would be a requirement for drainage channels along one or both sides of each section of track depending on the ground conditions along each track segment (see Volume 2a Figure 3.5) to prevent the track itself acting as a watercourse. Tracks would be designed with a crossfall, towards the drainage ditches, to prevent build-up of water on the running surface. It is important that the water flowing along the drainage ditch is not able to build up enough volume and velocity to act as a major sediment transport route. To prevent this happening, cross drainage pipes would be placed under the road at regular intervals. This also helps minimise the effect the road construction would have on the hydrology in the adjacent area and prevent concentration of water flow higher in the catchments’ area than would necessarily occur. The drainage ditch would also be blocked just above the cross-drainage inlet, thus preventing water from simply flowing past the inlet. Using stone available onsite, a head wall would be constructed to prevent erosion around the inlet. A silt trap would also be constructed at the inlet to the cross drainage, to minimise sediment entering the pipes. The outlet of the cross drainage would allow the water to filter through the adjacent vegetation.

3.4.19. For safety reasons, marker posts may be placed in the ground by the edge of the track in order to guide on-site vehicles during times of poor visibility.

## On-site cabling

3.4.20. The wind turbines envisaged for use on the Proposed Development will initially generate electricity at 690-1000 Volts. This needs to be converted to 33,000 Volts (33 kiloVolts (kV)) via a transformer located within the turbine or immediately adjacent to the tower of each turbine. Typical specifications for possible external transformer housings are given in Volume 2a Figure 3.1. Any external transformer would be linked to the turbines through cable ducts in the turbine foundations. Underground cable routes between turbines and the substation compound would generally follow track routes. These would be placed approximately 2 m from the track verge and drainage ditches.

3.4.21. The transformers would be linked to the on-site electrical substation and metering/control building (Volume 2a Figure 3.4) via 33 kV underground cables placed in trenches. The route within the site would generally run adjacent to the route of on-site tracks where possible. The route would be marked above ground with clearly identified posts, spaced at suitable intervals along the length. This would be agreed as part of the CMS/ CEMP.

3.4.22. Cables would be laid from a drum attached to a suitable vehicle. Each 33 kV cable would arrive as three insulated cores. These would be gathered in the trench and bound together along the entire length of the trench in a trefoil arrangement. Communication cables and earth tapes would also be laid in the same trench. The cables would be protected from mechanical damage by a sand bed and surround. Two layers of marker tape and/or tiles would be buried above the cables to prevent accidental excavation, and concrete marker posts would be placed at regular intervals to enable the cables to be located in the future.

3.4.23. Silt, scour and run-off will need to be managed as the cable trench can act as a preferential drainage channel. Backfilling of the trench should be carried out as soon as is reasonably practicable and the road drainage installed should be set up with suitable silt traps as the construction proceeds. In steep sections, impermeable plugs could be used in the cable trench to prevent the channel becoming a preferential drainage run, using locally won clay material if available.

3.4.24. In areas where the surrounding soils are very coarse gravel or peat, the cable trench footprint shall have a geo-textile wrap placed within it to prohibit fines migrating from the backfill into the surrounding sub-soils. These areas shall be identified on site during the commencement of the works. Where surplus mineral soil material is present, this shall be transported back to the borrow pit for use in the reinstatement and final profiling.

3.4.25. On-site cable trenches would be located to minimise the area of disturbance, up to 5 m beyond the edge of the site track in case of multiple circuits. Trench excavation, cable laying and backfill would be carried out in a continuous operation (minimising the length of trench open at any one time) and may occur subsequent to the construction of on-site tracks or after the erection of turbines. Prior to excavation, the topsoil/turfs would be stripped and placed to the side in a temporary stockpile. A trench would then be dug with a small excavator or backhoe to approximately 1 – 1.5 m in depth and 1.5 – 3 m in width. Volume 2a Figure 3.7 gives an indicative outline of the cable trench. The final cable positions would be surveyed and supplied in 'as built' drawings for the Operations and Maintenance team.

3.4.26. Cable ploughing may be adopted if ground conditions permit. The final choice of method will depend on the appointed contractor and the results of further site investigation.

3.4.27. In all cases, the cables would be buried to a depth of approximately 1 m. Reinstatement would be carried out to relay the previously stripped top layer of peat turfs containing the seed bank, over the top of the cable trench. This reinstatement would be conducted following the backfilling of each cable trench section

3.4.28. At track crossings and within concrete foundations, the cables would be laid within plastic ducts.

3.4.29. Existing watercourses should be monitored during the works, both to prevent water entering the excavation, and also for runoff and silt escaping and entering the watercourses. These may need temporary diversions/piping until the track is complete and the watercourses can be reinstated.

3.4.30. On decommissioning of the Proposed Development, on-site cabling will be left in-situ, unless ducted. Most modern cables are aluminium with a protective plastic coating and are relatively benign and inert; over time these will break down to clay. These can be electrically isolated and left in-situ, as is common practice.

### Substation, Control Building, Energy Storage & Compound

3.4.31. The onsite substation and control building compound will accommodate metering equipment, switchgear, transformers, the central computer system, electrical control panels and the containers for battery storage. A spare parts store room and domestic facilities will also be located in the control building. Volume 2a Figure 3.4 shows a typical compound and layout within the footprint area (18,000 m$^2$) assessed. Although it may not be permanently staffed, the building would be visited periodically by maintenance personnel.

3.4.32. The underground 33 kV cables routed from the proposed turbines would be brought together via underground cables to an onsite substation, (an indicative diagram of underground cabling is shown in Volume 2a Figure 3.6). The electricity will be stepped up from 33 kV to 132 kV at the substation before being transformed to 400 kV as part of National Grid asset works and connected to the grid.

### Grid Connection

3.4.33. The Applicant has a grid connection contract which proposes a short overhead line connection to link the Proposed Development with the National Grid at New Cumnock substation. Electricity generated by the Proposed Development will be exported from the onsite substation. The method and exact route will be subject to a separate assessment undertaken by the network operator. It is anticipated that the connection will be subject to a separate application, prepared by the network operator, for consent under Section 37 of the Electricity Act 1989.

### Temporary Construction Compound and Facilities

### Description

3.4.34. During the construction phase of the Proposed Development, a temporary construction compound area will be required. The construction compound will be built by carefully removing topsoil or peat turfs down to a firm substrate, laying down geotextile material and then constructing a working surface of stone extracted from the borrow pit. The topsoil/peat would be stored adjacent to the site for reinstatement or used elsewhere on the site. The temporary construction compound will be reinstated with topsoil, at the batching plant, such that it can be re-used if needed during the operation phase for major maintenance or emergency works.

### Construction

3.4.35. The area of the compound is 15,000m$^2$ maximum and would be surrounded by a fence. Due to the requirement under health and safety legislation, the Construction Design Management (CDM) Regulations for welfare facilities on site, and the exposed nature of the site, a number of cabins would be needed in the construction compound. These would have offices, canteens, drying-rooms, toilets and washing facilities. Smaller mobile, self-contained units are likely to be required as work progresses throughout the Proposed Development Area. These would be placed at suitable locations to tie in with the work interfaces as required. A typical layout of the compound area is presented in Figure 3.9.

3.4.36. The compound would be used, where necessary, for temporary storage of the various components and materials which are required for construction.

3.4.37. A settling pit/concrete washout bay and wheel wash may be included near the construction compound. When concrete lorries have deposited their loads, there is a requirement to wash out the inside of the concrete drum. This requires water that would then be washed out from the drum into a settlement pit. The size of this pit would depend upon the flow of concrete lorries up to the site (or within the site if an on-site batching plant is employed) but would be lined with an impermeable sheet and granular fill to assist in the settling process. The construction compound will be reinstated at the end of the wind farm construction period. The stored subsoil and the stored topsoil would be laid over the geomembrane separating it from the underlying stone surface and then regenerate naturally (or reseeded using a seed mix selected if required) or where possible, turfs would be reinstated. This process is regarded as more environmentally friendly whilst still meeting planning requirements.

### Environmental Considerations

3.4.38. Fuel would be required for the vehicles, generators and other equipment on site. The storage facilities would typically be comprised of a bunded concrete area containing a lockable, bunded fuel tank and a lockable housing for the storage of construction chemicals. In addition, there would typically be a wheeled, double-skinned bowser for transport of fuel to tracked vehicles. All construction equipment would be inspected daily to check for spillages. Drip trays would be used when refuelling vehicles on the site. Emergency spill kits would be kept on site adjacent to the fuel storage area and with the mobile bowser. Site operatives would be briefed on the emergency procedures to be undertaken in the event of a large spillage. The principal contractor would have a 24-hour emergency response company on standby in the event of a spillage incident. Vehicles would be refuelled at their working location to prevent loss of time and use of fuel returning to any designated refuelling areas. All previous stated measures would be used when refuelling vehicles and the bowser operator would be suitably trained to deal with any spillage.

3.4.39. Turfs would be regularly monitored to prevent excessive desiccation. The subsoil would be removed and stored separately from the topsoil (or peat turfs). Geotextile and stone would be laid down to an approximate depth of 300-500 mm.

3.4.40. The storage facilities would be self-contained and no discharge of drainage would be made to the surrounding land unless otherwise agreed with SEPA and the relevant local authority.

3.4.41. The settlement pit would be located away from watercourses with details included as part of the CMS following consultation with SEPA. Any drainage from these facilities would be collected and treated prior to discharge via the Sustainable Drainage System (SuDS). The washout bay would be maintained as necessary by replacing the granular fill with clean stone. At close of construction, all material within the washout bay would be removed from site and the area reinstated.

3.4.42. Diesel fuel would be stored on site for all construction vehicles. The storage tank would be placed within the construction compound and measures would be taken to mitigate the risk of leakage using either a double skinned tank, or the tank placed within a bund capable of containing 110% of the maximum stored volume as required by the SEPA guidelines.

3.4.43. In line with SEPA guidance, appropriately competent operatives would be used for handling, storing and arranging for the disposal of potentially polluting substances. Licensed waste disposal companies would be used to dispose of potentially polluting wastes.

### Signage

3.4.44. There will be a requirement for the need for signage at the Proposed Development to provide safe day-to-day navigation, for emergency vehicles to navigate to emergencies, should they arise as well as aid the development of comprehensive risk assessment for those visiting and using the site. Signage would consist of non-illuminated post and panel sign locations and non-illuminated turbine identification signs with a maximum of 3 signs per post facing at the Proposed Development. Signs would also be placed on the turbines to help identify them as indicated in Figure 3.8.

3.4.45. The signage on site would comprise of two elements; directional signs and roundels displaying the site speed limit. Indicatively, the directional and speed roundel sign measure 300 mm x 400 mm x 3 mm and 300 mm x 300 mm x 3 mm respectively, which will likely be mounted on a 2500 mm x 76 mm grey aluminium pole as shown on Figure 3.8. The poles will be set within a 460 mm deep concrete foundation as indicated in Figure 3.8. This will ensure the stability of the signs, in line with current guidance for such installations.

3.4.46. The sign fixtures allow back-to-back mounting and are used on sign locations where more than two signs are specified. The signs will be hard wearing using tamperproof fixtures, securing the signs in place. A high-quality typeface would be used to maximise readability. The signage would be uncluttered and designed to be legible from vehicle or from foot.

3.4.47. The exact number of signs required at any of the post locations will be decided post consent, following a full review of the health and safety requirements and will be confirmed in the CMS, that will be approved by the planning authority prior to the commencement of development.

## 3.5. EMPLOYMENT DURING CONSTRUCTION

3.5.1. It is envisaged that the Proposed Development would be constructed employing a number of main contractors; probably one for the civil infrastructure works, one for the electrical works, and one for the supply, erection and commissioning of the wind turbines - all of whom would be coordinated and overseen by a project manager. In order to monitor the progression, site representatives would be employed full time to ensure the quality and health and safety aspects of the construction, and to ensure the development is carried out in accordance with the CMS methodologies. The site representatives would be individuals with previous experience of wind farm construction and would, as required, be supported on site by a suitably qualified ECoW. The site representatives would carry out daily checks on the site to monitor on-going activities, particularly when subcontractors are being used on site. In addition to this, and in conjunction with the appointed ecologist and hydrologist, environmental audits of the site operations would be undertaken on a regular basis accompanied by representatives of the relevant contractors. Where necessary, additional specialists may attend the site including geotechnical and archaeological representatives.

3.5.2. In line with guidance, appropriately competent operatives would be employed for handling, storing and arranging for the disposal of potentially polluting substances. Licensed waste disposal companies would be used to dispose of potentially polluting wastes.

3.5.3. During the construction period there will be construction operatives carrying out the works on site which have been detailed above. There would be indirect local benefits arising from the construction phase, including use of hotels, Bed & Breakfasts and other accommodation, hire of local equipment and plant, temporary employment of local work force and potential contracting of local subcontractors (see Volume 1 Chapter 14 of the EIAR: Socioeconomics for more details). The construction mobilisation would likely be spread over an 18-month period for which such effects are assessed in Volume 1 Chapter 11 of the EIAR: Traffic & Transport.

## 3.6. SITE REINSTATEMENT

### Access Tracks

3.6.1. During track excavation works, where possible the vegetated top layer of material, which holds the seedbank, will be stripped and carefully set to the side of the worked area for re-use in the re-profiling and track verge reinstatement works. Where practical, if storage is required, the layers will be correctly stored in their respective soil/peat horizons, i.e. in the layers that they were stripped in, so when reinstated they can be put back in the correct order. If temporary storage of excavated materials is required, then such material will be stored safely and the method of storage will not lead to any areas of additional disturbance.

### Cable Trenches

3.6.2. The reinstatement and storage of any excavated materials for the cable trenches will involve replacement of previously stripped soils, vegetated layers or turves. Timing of trench reinstatement works will also take into account adjacent construction activities which may disturb any reinstatement works already carried out. The amount of time between the excavation of the trench and subsequent reinstatement following cable laying will be minimised as much as practically possible. The reason for this is that the longer the stripped turves are stored for the more they will degrade and become unsuitable for successful reinstatement. The optimum scenario for the cable trench works will be to ensure that no cable trenches are excavated until the electrical contractor has their cables ready for installation on site.

### Turbine Foundations

3.6.3. Reinstatement methods associated with turbine foundations will include where practical the storage of turves and topsoil around the perimeter of the foundation excavation. A plan showing where the material is to be stored will be created prior to the works commencing. In areas where storage of the turves or excavated material adjacent to the works is not possible, then the material will be taken to the nearest agreed storage areas as soon as possible.

### Crane Hardstandings

3.6.4. Due to the requirement for crane hardstandings to remain in place for the duration of the site operations, reinstatement of the crane pad will not take place. There will however be reinstatement of the edges around the crane pad and any exposed batters using the stripping, storage and reinstatement methods described above.

### Construction Compound

3.6.5. All temporary construction areas will be reinstated as quickly as possible following conclusion of the construction operations. Initially removal of temporary site accommodation, storage, equipment and materials will be carried out to allow all temporary construction compound areas to then be reinstated. Suitable materials i.e. topsoil will be replaced over the area in appropriate horizons i.e. in the correct order. The material used for the temporary compound reinstatement works (often that the displaced materials which were excavated to form the temporary construction area), will be stored and managed adjacent to the temporary construction areas but away from watercourses and other sensitive receptors. It is highly probable that the temporary construction areas, such as the site compound will be required for the duration of the construction period and may be required at times during the operation and decommissioning phases. Therefore it is unlikely that any stripped turves would be suitable for reinstatement, as the vegetation would have decomposed if stored for any length of time. Vegetation will therefore be allowed to regenerate naturally from the local seed bank.

### Forestry Replanting

3.6.6. As noted, the land where the wind turbines will be developed is forested with further planting anticipated. Details of the proposed forestry arrangements are presented in Volume 1 Chapter 12: Forestry of the EIAR.

## 3.7. OPERATIONAL PHASE

### Operation of the Proposed Wind Farm

3.7.1. The majority of the operational requirements of the Proposed Development will be automated. Each individual turbine would operate independently of the other turbines. Turbine operation would be managed by control and monitoring systems. These systems control the rotational speed of each individual turbine and ensure its continued safe operation. Should any malfunction in operation occur or should wind speeds exceed safe limits, then the braking system of the wind turbine would automatically be applied and each turbine would shut down to a safe condition.

3.7.2. If the cause of the shutdown is due to high wind speeds, then the turbine would automatically begin operation again once average wind speeds reduce to below 25 m/s. Under other causes of shutdown e.g. through malfunction, the turbine would remain shut down in a safe condition (e.g. with the rotor blades orientated 90 degrees to the wind direction) until manually restarted by a member of the Operations and Maintenance team, following satisfactory inspection and/or repair.

3.7.3. The lifetime of the project is envisaged to be up to 30 years from completion of commissioning to commencement of decommissioning. To ensure that turbines continue to operate with acceptable reliability (i.e. with each turbine capable of operating on average, between 95% and 98% of the time), regular pre-planned maintenance and servicing programmes are performed on each turbine. A typical maintenance programme is outlined below. Additionally, there may be a need to conduct irregular, ad hoc maintenance in the event of mechanical breakdowns.

3.7.4. Tracks giving access to turbines will be required during the operational period of the wind farm to allow for routine maintenance operations and occasional replacement of larger components.

### Maintenance Programme

3.7.5. Maintenance regimes commonly begin shortly after commissioning with a 'post-construction' check on the torque levels of all bolts within the structure. This is normally performed 10 days after commissioning and again, 3 months after commissioning.

3.7.6. After this, servicing is performed annually throughout the lifetime of the turbine.

3.7.7. Routine oil sampling and testing of lubricant maintains awareness of the integrity and condition of these lubricants. This allows cost-effective oil changes to be performed as the oil quality degrades. Routine oil sampling and testing of transformer oils is also performed in order to maintain awareness of the integrity of the electrical properties of these oils.

3.7.8. Maintenance of the high-voltage switchgear will also be conducted routinely and annual checks will be performed.

3.7.9. In the case of major component maintenance being required, such as generator or blade replacement, large vehicles similar to those used during construction may need to return to site. These would be subject to similar conditions of planning as agreed for the initial construction period. From time to time, when such maintenance is being undertaken, it may be necessary to restrict access to areas close to the replacement turbine components in order to maintain the health and safety of visitors. In such cases, the areas affected would be clearly marked and fenced and alternative routes would be provided for any visitors seeking passage through the wind farm, where necessary.

3.7.10. All maintenance of any equipment item would be performed according to the Original Equipment Manufacturer's stated schedules, health and safety and Construction, Design and Management (CDM) procedures.

3.7.11. All maintenance would also be undertaken according to the environmental procedures aforementioned in this chapter.

### Storage and Use of Polluting Substances

3.7.12. Storage of polluting substances at the site during the operational period of the proposed wind farm would only take place where agreed with the relevant authorities in accordance with Control of Substances Hazardous to Health (COSHH) regulations. Generally, substances of this nature are transported in minimum quantities on an 'as required' basis.

### Employment during the Operational Phase

3.7.13. It is envisaged that the turbines at the Proposed Development would be included within a wider portfolio of Vattenfall operational wind turbines and that persons and/or technicians would be on site as required. For the first few years of operation the turbines would be under warranty and maintenance would be performed by the turbine manufacturer. During annual servicing thereafter, the number of technicians on site would increase. The site would also support a site manager to be based in the local area. Other contract personnel would attend the site as required to maintain the civil and electrical infrastructure as well as carrying out duties in relation to ecological monitoring and reporting. Site personnel would make use of the onsite control building, which has been designed to include office space and welfare facilities. Volume 1 Chapter 14 of the EIAR assesses the socio-economic effects of the Proposed Development.

## 3.8. DECOMMISSIONING

3.8.1. At the expiry of the consent or the end of the Proposed Development's useful life, it is proposed that the turbines and transformers would be removed. The upper sections of the turbine foundations, to a depth of at least 1 m, would be removed and backfilled with appropriate material. Peat or topsoil would be replaced and the area reseeded. Tracks will be left and allowed to grass over, or would be covered with soil and reseeded. Cabling would be left in-situ, unless ducted. At least six months prior to the decommissioning of the site, a Decommissioning Method Statement would be prepared, for agreement with the local authorities and relevant consultees.

## 3.9. WASTE MANAGEMENT

3.9.1. The Proposed Development will produce small amounts of general, municipal and hazardous waste during its construction, operation and decommissioning. Where waste is generated, the waste hierarchy will be applied:

*Source: DEFRA Guidance on applying the Waste Hierarchy, 2011*

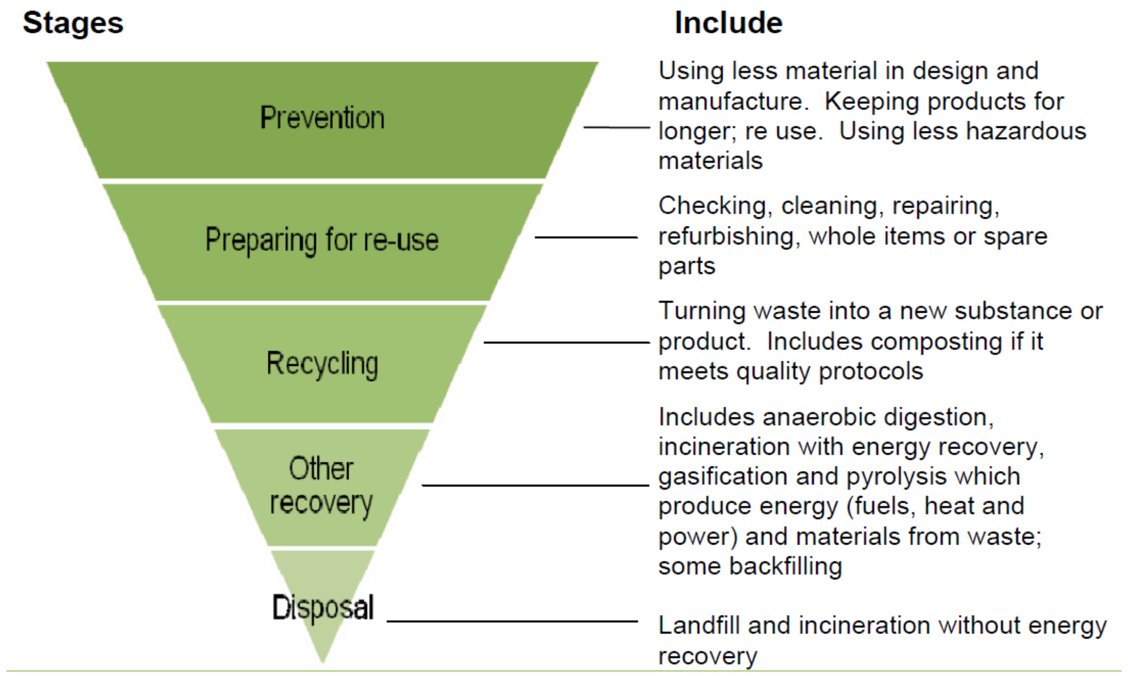


**Table 3.3 Waste hierarchy**

3.9.2. Waste materials generated during the construction phase include excavation waste such as vegetation, forestry residues, soil, stone, rock and similar materials. Excavated materials can be reused on site or elsewhere if it is deemed suitable for reuse. Excavated peat associated with development on peatland is not classed as waste if it is deemed suitable for a required and predetermined end use as part of construction works and reinstatement on a site. Other construction waste streams include municipal waste from welfare facilities, including food waste, paper, plastics, glass, cardboard, paper, and other typically domestic refuse. Industrial waste chemicals, fuel, oil and polluted water from plant, vehicle and wheel washes may also be generated as a result of the Proposed Development.

3.9.3. The operational phase of the Proposed Development is unlikely to generate significant amounts of waste except for minor quantities of material collected during routine maintenance inspections. Waste streams during this phase include municipal waste, waste chemicals, fuel and oil, sewage and polluted water from vehicle and wheel washes.

3.9.4. During the decommissioning phase of the Proposed Development wastes include demolition waste, turbine components, electrical cabling as well as municipal waste, waste chemicals, fuel and oil, sewage and polluted water. Wind turbines and electrical cables can be re-used subject to potential ready markets for the material.

3.9.5. Measures will be put in place to ensure waste generated from the Proposed Development is kept to a minimum and does not have a significant cumulative effect on local waste management infrastructure. Such measures will be detailed fully within the CMS, that will be subject to approval from the local authority.

3.9.6. Embedded mitigation to reduce the quantity of waste from the Proposed Development will include the design of the Proposed Development in such a way that new turbines can be accessed by existing access tracks wherever possible, minimising the need to construct additional access tracks and reducing the potential for waste. All construction and decommissioning activities will be planned effectively to ensure that any materials associated with these activities are predicted well in advance, reducing the chance of over-ordering of materials which would result in waste.

3.9.7. Materials will be reused on site or elsewhere and where reuse cannot be achieved materials will be sent for recycling where recycling facilities are available. Other measures to ensure that waste materials sent to local waste management facilities sent to landfill are kept to a minimum include the nomination of an approved person(s) to be responsible for waste management on site; this will include the coordination of waste collection to suitable disposal and/or recycling facilities. In addition, a system to record and monitor waste will be implemented, keeping a record of re-use, recycling and disposal. It may also be possible to schedule certain activities that generate large volumes of waste to avoid overloading local infrastructure if other construction projects in the area are also producing large volumes.

3.9.8. Pollution prevention measures will also be put in place and these will be detailed fully within individual chapters of the EIAR and within the CMS. Pollution prevention measures include:

- Storage of waste materials within the construction compound only. If waste materials are generated outside the construction compound they will be taken to the compound on a daily basis.
- All waste products will be removed from site by registered waste carriers and taken to a waste management facility permitted to receive each specific waste type.
- Bonfires and the burning of waste products will be prohibited on site.
- Labelled, double skinned waste tanks will be utilised for the storage of waste oils onsite.
- The waste storage area will be isolated from surface drains and bunded to contain any spillages.
- A wastewater collection system will be used to prevent contamination of local water courses.

## 3.10. HEALTH AND SAFETY

### Construction Phase

3.10.1. The construction site will be managed and operated in accordance with Health and Safety at Work etc. Act 1974 and comply with relevant Health and Safety Regulations, including:

- The Management of Health and Safety at Work Regulations 1999
- Electricity Safety, Quality and Continuity Regulations 2002
- Construction (Design and Management) Regulations 2015

3.10.2. In awarding any civil, electrical or other contracts for the construction of the proposed wind farm the appointed contractor is obligated by law to follow the CDM Regulations implemented by the Health and Safety Executive (HSE). These are based on standard procedures that are adapted to take account of all site specific requirements. The CDM Regulations require due consideration is given to construction workers and the public, with risk assessments and method statements created to cover all risks identified including access rights across the site.

3.10.3. Sweco UK Limited has been appointed Principal Designer to ensure all the CDM Regulations are correctly implemented, and to compile a health and safety file, which would be used in the operation and maintenance phase of the proposed wind farm. The Developer would be required to provide a timescale and start date for the project, to allow the Principal Designer to review the adequacy of the contractor involved against the description of the required works. Additionally, a representative from the Developer would be on site during the construction period. This person would be empowered to halt any or all construction works if they believe correct health and safety procedures are not being adhered to. Similar procedures for site workers, visitors and civilians must be drawn up for the operational phase of any wind farm. The HSE can investigate safety aspects of the Project and visit site at any time if they have concerns.

### Public Safety

3.10.4. Throughout the construction phase of the development the relevant statutory requirements would be adhered to. All potentially hazardous areas would be fenced off and all unattended machinery would be stored in the secure site compound or immobilised to prevent unauthorised use. In addition, temporary construction safety signs would be placed at each possible entrance to the site and in areas where there may be further danger, e.g. around settling lagoons and borrow pits.

3.10.5. Throughout construction, measures to manage diversion routes would be secured. The diversion routes would be clearly marked and for safety reasons would direct the user away from any areas of construction.

### Operational Phase

3.10.6. Wind farms have a proven track record for safety. A very small number of wind turbines have been known to suffer mechanical damage through lightning strikes or mechanical failure. Experience on existing sites has shown that allowing the public to access an operating wind farm does not lead to a compromise with respect to safety issues.

3.10.7. Companies supplying products and services to the wind energy industry operate to a series of international, European and British standards. A set of product standards for wind energy equipment has been developed by the International Electrotechnical Commission - IEC 16400. There are a number of British Standards that correspond to it, for example; BS EN 61400-1 ed3.0: 2005 “Wind turbines – Part 1: Design requirements”.

3.10.8. The Developer would commit to installing wind turbines and components that meet BS EN 61400-1 ed3.0.

3.10.9. Public access to the Proposed Development Area after construction has been completed would revert to the current situation. Appropriate warning, directional and identification signs would be installed on the turbines, transformers and onsite electrical control building, and access to these would be restricted to wind farm personnel. At all times these facilities would be locked. Additionally, safety and/or directional signs would be placed at strategic points across the site area, particularly on public routes to inform members of the public that they are entering a wind farm area, to make them aware of potential hazards and provide direction for emergency services should the need arise. Any signage would be agreed with the relevant authorities prior to installation.

3.10.10. No resulting safety risks are expected as a result of public access to the Proposed Development. Turbine models being considered for the site would operate automatically and have sensors to detect any instabilities or unsafe operation during high wind speeds. Should sensors placed within the nacelle and tower of the turbine detect any other malfunction in operation or should wind speeds increase over maximum operational thresholds, the brakes would be automatically applied in order to rapidly shut the turbine down.

3.10.11. Icing within Scotland is predicted to be light with the Icing Map of Europe (WECO, 2000) showing an annual average of only 2-7 icing days per year therefore the risk of ice throw from wind turbines is low. Wind turbines are fitted with vibration sensors which shut the wind turbines down should any imbalance that might be caused by icing be detected. Further mitigation measures include compulsory ice throw training for service crews, regular monitoring of ice risk conditions by the wind farm operator and public notices displayed at access points to the Proposed Development alerting the public and staff of ice throw that may occur under certain weather conditions. Further information is detailed in Volume 1 Chapter 13: Aviation and Other Effects.

3.10.12. If the cause of the shutdown was high wind speeds then the turbine would automatically begin operation once the average wind speed reduced to within operational levels. Under other causes of shutdown, e.g. through malfunction, the turbine would remain shut down and in a safe condition (i.e. commonly with the blades orientated 90° to the wind direction) until restarted by a member of the operations and maintenance (O&M) team following satisfactory investigation. This procedure ensures safe operation of turbines to protect members of the public walking, cycling or riding past turbines during the operational phase. In addition, the vibrometers in the nacelles would detect rotor imbalance in blades caused by icing and the wind turbine’s control and monitoring system would shut the turbines down under these conditions. The turbines are also equipped with lightning protection equipment so that strikes will be conducted from the nacelle down the tower into the earth.

3.10.13. The safety features and record of wind turbines are identified above, and it is concluded that the Proposed Development would not present a significant safety risk to the public.

## 3.11. CONCLUSION

3.11.1. This chapter has set out a description of the Proposed Development and provided details of the activities that will be undertaken throughout the construction, operation and decommissioning phases of the Proposed Development.

3.11.2. There is sufficient detail to provide consultees with a reasonable understanding of the Proposed Development and to assess its likely significant environmental effects. Further construction details will be provided in the CMS, which will be submitted by the principal contractor for approval by the planning authority prior to the construction of the Proposed Development.