Appendix 4.3: Outline Construction and Decommissioning Environmental Management Plan

Introduction

4.3.1 This document sets out the template for the Construction and Decommissioning Environmental Management Plan (CDEMP). The purpose of the CDEMP is to define the detailed construction and environmental management methods that will be employed in the construction and decommissioning of the Development, detailing how relevant legislation and good practice practices will be implemented to minimise the effects of construction and decommissioning on the environment. The CDEMP will be finalised prior to commencement of construction, in consultation with the relevant authorities and taking account of the approved plans and Consent conditions. At that stage, the decommissioning element will remain in draft form given the time to decommissioning, but will commit to a requirement to finalise the decommissioning plan in an agreed timescale prior to decommissioning.

4.3.2 The contractor(s) appointed to construct the project will prepare detailed method statements which will be incorporated into final CDEMP. It is not possible at this stage, in the absence of geotechnical site investigation and a detailed design, to finalise the CDEMP. However, this template sets out the proposed content of this plan. Annex 3 of this document sets out good practice construction measures that will be implemented through the construction of the Development and will be incorporated in the final CDEMP. These have been identified through the Environmental Impact Assessment (EIA) and their implementation has been taken into account in the assessment of effects of the proposed Development.

4.3.3 The requirement to produce a CDEMP will form part of the contract for the construction works for the proposed Development. The management measures, method statements and referenced good practice guidance and legislation will form the basis of the detailed design to be prepared by the Contractor.

4.3.4 As noted above, the decommissioning plan will require to be finalised prior to decommissioning taking place. As the windfarm will have a potential life of 25 years it is not possible to provide a definitive decommissioning strategy at the construction phase. However, in line with the Scottish Government Scoping Opinion, an Outline Decommissioning Strategy is set out in this document.

4.3.5 The CDEMP will provide:

- a schedule of all construction and decommissioning stage mitigation measures required to address likely significant effects identified in the Environmental Statement (ES);
- a schedule of all additional construction and decommissioning stage good practice management measures included as part of the proposed construction work, in line with industry good practice guidance;
- a schedule of roles and responsibilities for delivering the requirements of the CDEMP, including a statement of responsibility to 'stop the job / activity' if in potential breach of a mitigation or legislation occurs;
- a method statement for monitoring, auditing, and templates for reporting and communication of environmental management performance on site and with the client, planning authority and other relevant parties;
- Construction stage environmental management measures, based on good practice including but not limited to:

– Forestry Commission (2011). Forests and Water. UK Forestry Standard Guidelines. Forestry Commission, Edinburgh. i–iv + 1– pp.

– Scottish Natural Heritage (2013) Good Practice During Wind Farm Construction, A joint publication by Scottish Renewables, SNH, SEPA, Forestry Commission Scotland and Historic Scotland, 2nd Edition.

– CIRIA Publications 2006: Control of Water Pollution from Linear Construction Projects. Site Guide (C649);

– Scottish Natural Heritage (2013) Constructed Tracks in the Scottish Uplands, 2nd Edition;

– Forestry Commission Scotland and Scottish Natural Heritage (2010) Floating Roads on Peat;

– Scottish Natural Heritage (2013) Constructed Tracks in the Scottish Uplands, 2nd Edition; and

– Forestry Commission Scotland and Scottish Natural Heritage (2010) Floating Roads on Peat.

- a template for the production of detailed and task/site specific plans for on-site components of the construction work.

4.3.6 It is anticipated that specific mitigation plans and additional management measures will be required to address archaeology, ecology (protected species), surface water management and pollution prevention, watercourse crossings, waste, access arrangements, soil and peat management, construction and decommissioning nuisance (noise, dust), and community liaison. An appropriately qualified Environmental Clerk of Works (ECoW)/ Site Environment Manager will be appointed with the responsibility monitoring compliance the CDEMP.

Schedule of Environmental Commitments

4.3.7 The CDEMP will provide a schedule of mitigation commitments made in the ES.

Table 1: Schedule of Mitigation and Additional Good Practice Measures	
Reference	**Commitment**

4.3.8 The CDEMP will also maintain a schedule of commitments required by specific Consent/planning conditions.

Table 2: Consent/Planning Condition Commitments	
Reference	**Commitment**

Communication Protocol

Roles and Responsibilities

4.3.9 The CDEMP will confirm the roles, responsibilities and communication routes for environmental management during the works. This plan will make reference to or incorporate communication protocols for use during an environmental emergency or incident.

Recording and Reporting

4.3.10 The CDEMP will set out the requirements for recording and reporting all aspects of environmental management, for example:

- minutes and attendance record of start-up meeting (on-site meeting prior to commencement of construction works).
- an environmental risk register
- minutes of weekly meetings covering environmental (ecology, archaeology, hydrology) issues (meetings may be combined with regular construction progress meetings)
- a communication plan;
- records of toolbox talks;
- dust / noise monitoring records;
- site waste and materials management plan and records;
- water quality monitoring records; and
- licensing and consents.

Environmental Audits

4.3.11 The CDEMP will set out the programme of environmental audits, including audits of sub-contractors to be undertaken by the contractor, on a quarterly basis (as a minimum) and provides an audit report within two weeks of the audit being undertaken. The contractor will develop a template for completing and reporting audits for the agreement of the employer prior to the commencement of site works.

General Construction Activity

Construction Programme

4.3.12 The CDEMP will specify the outline construction programme from the date of commencement to operational stage. The Principal Contractor should inform and notify through planning condition the construction start and finish date.

General Working Practices

4.3.13 In general practice the Project Manager will have the overall responsibility for the environmental management on-site during the construction phase. Specialist advisors will be appointed (where appropriate) to provide support on such matters as hydrology, forestry and ecology etc. and advise on specific issues that may arise during construction and reinstatement phases.

4.3.14 Specify the legislation, regulation and guidance for all construction activities, mitigation and pollution prevention to ensure consistency.

Site Induction, Training and Tool-box Talks

4.3.15 The Principal Contractor (under most circumstances) will ensure that all staff are provided with the following:

- Environmental Awareness Training and Health and Safety Awareness Training.
- The Principal Contractor will issue safety rules to all site operatives and visitors and schedule a series of tool box talks at prior to commencement of works to ensure all staff on site are aware of task specific site sensitivities and procedures.
- The CDEMP will specify frequency of tool-box talks and procedure to be followed in the event of any breach or accidental malpractice on site.

Pre-Construction Habitat and Species Protection Works

4.3.17 Details of pre-commencement protected species surveys should be referred to and any appropriate mitigation measures proposed in relation to the findings. The CDEMP should direct the reader to the findings and proposed mitigation of the Species Protection Plan and commitments made in the Habitat Management Plan.

Habitat and Species Monitoring and Management During Construction

4.3.18 The Principal Contractor will consult Scottish Environment Protection Agency with regard to the regulatory requirements and ensure that on-site practices accord with the relevant advice/guidance.

4.3.19 The CDEMP will detail the ECoW's responsibilities and will carry out an assessment of the environmental performance based upon reports submitted by environmental management representatives and regular site visits during the construction period. The frequency of these visits and reporting will be referred to in the CDEMP.

Infrastructure Protection Works

4.3.20 A full search for all utilities on-site will be undertaken prior to construction to ensure that buried cables and pipes are identified. All utilities which could be potentially be affected by construction will be protected to ensure that the supplies of water, electricity, telephone etc. to properties will be maintained. Further details of this should be specified in the CDEMP.

Site Welfare

4.3.21 Safety and safety management is of paramount importance and is an integral to ensuring the successful construction of the Development. Throughout the construction phase the Principal Contractor and other contractors working on the site will report and monitor on health and safety performance.

4.3.22 Welfare facilities will be in line with current Construction (Design Management) Regulations.

Site Compound Management

4.3.23 Details regarding the temporary construction compound uses, worker and visitor parking, plant, machinery and materials storage will be detailed as necessary.

On-site Concrete Batching

4.3.24 In the event that concrete batching is to be undertaken on site the details will be specified as to its location and pollution prevention measures, which should be developed in conjunction with the ECoW.

Pollution Prevention and Mitigation Plan

4.3.25 The Principal Contractor is responsible for pollution prevention for the duration of the contracted works or until such times as permanent measures are in place. Measures for prevention and monitoring performance will be implemented by the Principal Contractor and monitored independently by the ECoW. The CDEMP should demonstrate the methodology and procedures to be adopted that will avoid construction activities impacting on surface and groundwater and define the actions to be taken in the event of a pollution incident on land or within a watercourse.

4.3.26 Pollution prevention measures such as drainage management, fuel, oil and chemical storage and handling, spill kits and spill kit training etc. will be applied in accordance with best practice and relevant guideline documents.

4.3.27 Pollution prevention measures and good practice measures are outlined in further detail in Annex 3 of this CDEMP.

Site Waste Management

4.3.28 A number of different waste streams are likely to arise during construction of the Development. The Principal Contractor will likely be responsible for the production of a Site Waste Management Plan that will identify all waste streams and provide an estimate of expected waste volumes for each waste type generated within the waste stream.

4.3.29 An objective of the plan will be to detail how much waste is to be recycled, reduced or processed throughout the life of the construction phase. The CDEMP should also note measures to reduce potential environmental impacts associated with the generation, storage and transportation of wastes.

Water Abstraction

4.3.30 The CDEMP will detail water abstraction details should this be required on-site.

Site Excavation

4.3.31 Details regarding open trenches, soil handling and topsoil spreading shall be considered in the CDEMP.

Peat Management

4.3.32 Details pertaining to peat management shall be in line with best-practice principles to be adopted during construction. A Peat Management Plan has been prepared as part of the ES as Appendix 4.4. This is based on extensive peat depth survey undertaken as part of the EIA. This plan will be updated prior to construction following geotechnical site investigation and detailed design of the Development.

Environment Incident and Emergency Response

4.3.33 The Principle Contractor will prepare a detailed Environment Incident and Emergency Response Plan in line with current guidance.

4.3.34 Consistent with the above, the Principle Contractor will ensure systems are in place to record the key information of any incident and on-site testimony of any personnel witnessing an incident. A communication plan (to be followed in the event of an incident) should be provided prior to commencement of site works.

Typical Construction Stage Environmental Management Measures

4.3.35 This section provides sub-headings for typical detail to be provided in the final CDEMP.

Hours of Work

4.3.36 Specify hours of work and an outline of proposed restrictions.

Archaeological Management

4.3.37 Specify requirement for mitigation and/or good practice measures agreed with the planning authority and in line with measures specified in the ES.

Ecological Management Plan

4.3.38 Provide Species Protection Plan, agreed with the council, to include all measures required to protect ecology at the site and ensure compliance with relevant nature conservation and wildlife protection legislation.

4.3.39 Specify requirement for an Ecological Clerk of Works.

Management of Surface and Ground Water and Water Quality Monitoring

4.3.40 Specify and provide design for drainage management measures, to incorporate two tier sustainable drainage systems (SuDS) to attenuate the volume and rate of run off and maintain water quality.

4.3.41 Specify requirement for visual inspection of surface water courses to be undertaken on discharge waters during the construction phase to assess and manage the performance of the drainage system.

Management of Surface Water

4.3.42 Include details of design of swales, check dams and settlement ponds, as required to provide a surface water management and treatment train that will mitigate any adverse impact on the hydrology of the site and surrounding areas during the construction phase of the project.

Dust Management

4.3.43 Detail dust management controls and protocols for implementation (e.g. in the event of dry weather).

Waste Management

4.3.44 Provide details of site waste management, identifying all waste streams and responsibilities of the contractor.

Soil and Peat Management

4.3.45 Provide a Stage 2 peat management plan, to be produced post consent using data acquired through the site investigation campaign. Specify measures to maintain soil structure and function during temporary storage and reinstatement work. A Soil and Peat Management Plan is included as Appendix 4.4 of the ES.

Peat Instability Risk Assessment

4.3.46 Provide a geotechnical risk register and management plan to manage risks associated with construction in close proximity to areas identified as having peat instability risk in Technical Appendix 7.2 of the ES.

Noise Management

4.3.47 Specify community liaison and noise control measures required during construction work

Traffic Management

4.3.48 A separate traffic management plan will be prepared for the Development to manage traffic on the public highway during construction. Whilst this will not from part of the CEMP, there will be a requirement for all contractors to adhere to it. The CDEMP will contain traffic management measures for traffic movements within the site away from the public highway during construction. A Construction Traffic Management Plan is included as Appendix 12.2 of the ES.

Construction Method Statements

4.3.49 This section provides sub-headings for typical detail to be provided in the outline CDEMP.

Temporary Construction Compound and Site Fencing

4.3.50 Specify final details of layout of temporary components.

Public Access Roads

4.3.51 Specify the improvements proposed along the site access route and detail in a Traffic Management Plan (TMP) which will also set out any Agreements or Licences required with the relevant statutory authorities.

Site Entrance

4.3.52 Specify requirement for inspection of site entrance roads and detail requirement/protocol for providing a road sweeper to remove any mud or debris transferred onto the roads from site activities if required.

Site Tracks

4.3.53 Specify construction details for site tracks, including installation of track drainage, and the locations and use of cut and floating track design.

4.3.54 Specify areas requiring sub-grade drainage measures to maintain groundwater connectivity (based on detailed site investigation at pre-construction phase).

Watercourse Crossings

4.3.55 Specify design of watercourse crossings in accordance with the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR) and the guidance set out in Technical Appendix 27.7 of the ES.

4.3.56 Specifications will comply with:

- Flood Estimation Handbook (Statistical Analysis) and Flood Studies Report (FSR) - used where appropriate used to determine the design flow;
- CIRIA Culvert design and operation guide (C689); and
- Scottish Executive (2002) River Crossings and Migratory Fish: Design Guidance (where appropriate).

Construction Methodology

4.3.57 Specify watercourse crossing construction methodology, including detailed measures to prevent pollution.

Crane Hardstandings

4.3.58 Specify construction design details for crane hardstandings and construction methods for their installation.

Turbine Foundations

4.3.59 Specify foundation design and construction methods proposed.

Turbine and Turbine Transformer Erection

4.3.60 Specify construction details for turbine and turbine transformer erection.

Site Electrical Works

4.3.61 Specify construction details for site electrical works.

Cable Trench Design Philosophy

4.3.62 Specify route and design of onsite cables, including methods of installation, watercourse crossing and measures to ensure that cable trenches do not provide a preferential pathway for dewatering peat forming habitats.

Substation and Control Building and Compound

4.3.63 Specify construction details for substation control building and compound.

Grid Connection

4.3.64 Specify interface with transmission or distribution network operator for providing grid connection.

Decommissioning Method (Outline Decommissioning Strategy)

Overview

4.3.65 This section provides details on how decommissioning has been considered as part of the design and construction process and provides an Outline Decommissioning Strategy.

4.3.66 The Decommissioning Strategy will be updated on completion of the construction work for handover to the site owner. It will provide details of all relevant 'as built' plans/drawings and technical details which will inform the decommissioning process.

4.3.67 The Decommissioning Strategy will include a schedule of bill of quantities to summarise the components and constituent materials which form the as built Development, and the likely options or methodology envisaged for the decommissioning process. There will be a requirement for NLEI Ltd to update the Decommissioning Strategy in consultation with relevant consultees, most likely to be the Local Authority, SEPA and SNH, within an agreed period prior to decommissioning taking place. This is to ensure that it reflects the site condition at the time of restoration and complies with the relevant legislative framework at that time.

Purpose

4.3.68 This section provides a framework for environmental management and protection during the decommissioning phase of the project.

4.3.69 The aim of decommissioning will be to return the site to the same or better state than pre-construction, taking account of land-use at the time of the Decommissioning Strategy being finalised. Key topics include:

- The reason for the decommissioning plan

  In the Final Decommissioning Strategy the wording of the planning condition will be stated to make absolutely clear to readers why the decommissioning method exists and whether there are any requirements in the condition which are specific to the site. The primary reason for decommissioning the Development is that there will be a requirement to remove the Development in line with the time-limited consent applied for. In the absence of changes to land-use during operation or any further development, it is expected that the footprint of the Development will revert to the site use at the time of construction.

- The aims of the decommissioning plan

  The final Decommissioning Strategy will specify in detail what decommissioning is trying to achieve (restoration of the site to peatland or original land use etc.). At the time of writing this Outline Decommissioning Strategy it is expected that the aim will be to restore the affected areas back in line with the current mixture of upland habitats present at the site. This this will need to be developed with reference to the OCMP to ensure the restoration activities do not undermine any habitat improvements resulting from the implementation of the OCMP, which will be reported on during the life of the Development.

  In addition to the restoration of the habitats on site, one of the overarching aims of the Decommissioning Strategy is to minimise waste arising as a result of the decommissioning. The final Decommissioning Strategy will include a detailed waste management plan to address. Where

technology and existing facilities practicably allow for the recycling of materials which form part of the Development, materials will be recycled. Table 3 outlines the likely components and how these will be handled. It is important to note that technology may change during the life of the Development and components which are not currently recyclable may be suitable for recycling at that time.

- The way the site will be decommissioned and restored

  The Final Decommissioning Strategy will provide an appropriate level of detail about how the site infrastructure will be removed and restored, in line with the principle decommissioning plan objectives. An indication of how each of the elements of the Development will be dealt with is set out in Table 3.

- Reviewing and reporting

  This Outline Decommissioning Strategy should be treated as a live document and will be updated and finalised within a timeframe to be agreed with the planning authority, SNH and/or other regulatory body during the operational life of the development. It is anticipated that the first update would be following completion of construction of the Development to provide the detail of the 'as built' scheme.

Decommissioning Aims

4.3.70 In summary, the primary aims of the Decommissioning Strategy are:

- Ensure that site is restored to as good a condition as pre-construction, reflecting any changes which have occurred during the operational life of the Development e.g. through the implementation of the OCMP;
- Ensure that appropriate methods are used in the decommissioning process, and that environmental protection measures are secured through the requirement to produce a Decommissioning Environmental Management Plan which will contain detailed method statements and environmental control measures; and
- Reduce waste through a commitment to recycling the components and materials where facilities and technologies allow.

Table 3 – Elements of the Development to be Decommissioned

Key Element	Components	Constituents	Decommissioning and Reinstatement
Turbines	i. Blades	Resin / fibre glass	Oils and lubricants will be drained from the turbines prior to decommissioning and taken to an appropriate handling facility to reduce the potential for pollution during removal of turbines. Turbines will be taken down and likely broken up for ease of transporting and will be completely to be removed from site. Components which can be recycled will be taken to an appropriate facility. The only materials that cannot currently be recycled are the fibre glass and resin within the blades and nose cone.
	ii. Blade hub and nose cone	Cast iron / resin / fibre glass	
	iii. Nacelle / Gear Box	Iron / steel / copper / resin / silica	
	iv. Tower	Steel (sections)	

Table 3 – Elements of the Development to be Decommissioned

Key Element	Components	Constituents	Decommissioning and Reinstatement
Turbine Base	i. Backfill above and around base.	Suitable engineering fill / crushed rock	Foundation to be 'broken out' and removed down to a depth of 1m below the finished ground level in accordance with current guidelines. Will be restored to tie in with the surrounding ground level. There may be a requirement for re-seeding of the reinstated ground to encourage habitat regeneration.
	ii. Concrete Bases	Concrete / steel reinforcement	
	iii. Concrete Piles	Concrete / steel reinforcement and casing	
Transformer	i. Transformer	Electrical components	Removed entirely from site and materials recycled or disposed of in line with legislative requirements at the time.
	ii. Concrete Base	Concrete / steel reinforcement	As per turbine foundation.
Crane Pad	i. Hardstanding	Crushed rock / geogrid reinforcement. Weathered and possibly vegetated	As per turbine foundation. Likely that all of the hardstanding will be removed.
	ii. Soils	In-situ soils	Left in situ.
Tracks	i. Forestry Spec Roads (granular fill) (also floating roads)	Crushed rock / possibly geotextile separators / geogrids on weaker ground	To either be left in situ for use in ongoing land management or as access and recreation opportunities, or removed and seeded to be restored to existing ground level and in keeping with surrounding vegetation.
	ii.Bituminous/ Asphaltic Roads	Bitmac/tarmac/bitumen / Type 1	

Table 3 – Elements of the Development to be Decommissioned			
Key Element	**Components**	**Constituents**	**Decommissioning and Reinstatement**
Buildings	i. Control Building / Staff Building	Timber / brick / prefabricated panels / glass / steel / concrete Buried and O/H Services.	Structure removed entirely from site. Cables/ services to be cut and removed down to a depth of 1m below finished ground level in accordance with current best practice guidance. No unburied or exposed cables or services left on site. Ground to be restored to tie in with existing level and vegetation at the time.
Substation	i. Switchgear/ Cabling	Switchgear / Cabling Other miscellaneous – fencing / lighting etc.	The sub-station will primarily be in the ownership of the grid operator. At the end of the operational life of the Development, agreement with the grid operator will be required regarding the decommissioning of the substation, although it is expected that it will be decommissioned in line with other site buildings with no exposed or unburied cables remaining.
	ii. Hardstanding	Compacted granular material / concrete plinths	
Cables	i. Cables	Copper / Aluminium / Fibre optic / plastic and rubber sheaths	Cables/ services to be cut and removed down to a depth of 1m below finished ground level in accordance with current best practice guidance. No unburied or exposed cables or services left on site.

Annex 1

Figures

4.3.74 Consented planning drawings (to be updated with 'as built' drawings on completion)

Annex 2

Drainage Design

This sets out the headings that will form part of the SUDS and drainage measures that will be implemented as part of the Development.

- General Philosophy
- Hydraulic / Water Quality design criteria
- Working in the vicinity of watercourses
- Working in vicinity of Groundwater Dependant Terrestrial Ecosystems (GWDTEs)
- Management of Silt and Water pollution
- Detailed drainage design:
- Trackside Drainage
- Settlement Ponds / Lagoons
- Watercourses
- Turbine Foundations
- Excavated Soil Management
- Concrete Washout Area
- Maintaining Site Hydrology
- Maintenance / Monitoring of SuDS performance
- Decommissioning of SuDS

Annex 3

Mitigation and Avoidance Measures

Introduction

4.3.90 This section of the CDEMP provides a general overview of the standard good practice measures to be adopted. These are measures primarily applicable to the construction phase, which is the phase of activities with greatest risk of adverse effects in terms of both probability and magnitude. The principles identified for construction would also be anticipated to be applicable for decommissioning.

Mobilisation of Heavy Metals

4.3.92 Good practice measures for this issue are closely aligned to those identified in the Pollution Incident and Erosion and Sedimentation sections. Mobilisation will be managed by minimising excavation or exposure of material with elevated heavy metal content and designing drainage systems to reduce potential for drying-out and oxidation of soils in areas containing elevated levels of heavy metals.

Prior to construction, areas planned for development and excavation will be sampled to establish heavy metal content of soil, with any areas exhibiting values beyond agreed threshold to be avoided or location-specific mitigation identified in order to reduce probability and magnitude of effect within local surface water catchment.

In addition, specific mitigation measures for this matter are provided in the Proposed Mitigation Measures of ES **Chapter 7: Hydrology, Hydrogeology, Geology and Soils** and in **Appendix 7.3: Mining Desk Study**.

Erosion and Sedimentation

4.3.94 Erosion control is recognised as being more effective than sediment control in preventing water pollution, i.e. minimising generation of sediment and control 'at source'. This 'prevention-led' philosophy will be applied to this project. Careful construction project programming will take account of interactions between construction, erosion and sedimentation, thus reducing the potential for adverse effects.

4.3.95 All construction work will be undertaken to meet current good practice standards, including recommendations in CIRIA guidance documents such as Control of Water from Linear Construction Projects[i] and Handbook for Construction of SUDS[ii]. Specific measures that will be employed include:

- Where practicable, vehicles will use existing tracks or prepared surfaces rather than disturbing unprepared ground. Where plant movement is necessary off track, low ground pressure vehicles will be utilised, particularly at locations where ground conditions are considered sensitive.
- Areas recently disturbed and cleared of vegetation are prone to sediment wash-off, even in low intensity rainfall. In consequence, vegetation clearance will be scheduled only as needed ('just in time' principle). Specific erosion control precautions will be taken at watercourse crossing locations and other areas where construction work is required within 50m of watercourses. In areas identified as at increased risk of sediment contamination, a double line of sediment containment measures will be considered.
- Buffer strips will be retained, other than those select areas where infrastructure crosses a watercourse, as vegetated features between development features and watercourses, acting as filters, minimising sediment transport, attenuating flows and maximising infiltration. These will preferentially be placed on flat ground. Location and distance of buffer strips from watercourses will be determined taking into account geology, topography and vegetation characteristics. A vegetated buffer of at least 20m will be retained around all water features in order to protect these features from sediment contamination, with the exception of watercourse crossing locations where specific controls will be put in place.
- Sediment-laden water can reduce the efficiency of SuDS features through clogging and reduction in channel capacity. All discharges with heavy sediment load will be routed through balancing tanks and one or more suitable filters or silt busters, in series as necessary, to reduce the sediment load. The resulting supernatant water will be discharged onto vegetated surfaces and directed away from burns and ditches to avoid direct entry into watercourses. Sediment slurry will be stored appropriately prior to being tankered offsite for appropriate further treatment and disposal.
- Silt traps and sediment settlement tanks will be inspected and cleared regularly to ensure they remain fully operational and effective. Removed sediment will be collected for offsite disposal. All silt traps and settlement tanks will be designed and constructed to accommodate 1-in-200 year rainfall events, to minimise the potential for sediment-laden water overflowing into local watercourses. 'Splashboards' will be fitted on any temporary bridging structures, prior to their use as crossings, in order to reduce the splash/wash of sediment-laden surface water directly into watercourse channels below.
- Site tracks will be designed and constructed to good practice standards. The tracks will be constructed with sufficient camber or crossfall to minimise the ponding of surface water on the track surface, to minimise track erosion and reduce the risk of downstream sediment deposition. There shall be a need for some new sections of track and widening of existing access tracks.
- Temporary interception bunds, sheet piles and/or drainage ditches will be constructed upslope of excavations such as borrow pits to minimise surface runoff ingress and in advance of excavation activities. These cut-off ditches will be of the minimum required length, depth and gradient. The same approach will be applied to interception of surface water around soil stockpiles.
- Soil removed during excavation activities will be stored nearby and battered or otherwise protected such that it will not dry out or be liable to erosion, and can be used subsequently to reinstate the excavated area. Protective coverings (such as jute, coir or geotextiles) will be considered as temporary measures to protect the stockpiles from rainfall and wind erosion. Where bare ground exhibits rough external characteristics these are less prone to erosion than smooth slopes and will re-vegetate faster. This approach is likely to be most applicable to areas adjacent to track construction whereas individual stockpiles adjacent to turbines or borrow pits may be more suitable for covering.
- Excavated material or other forms of loading will not be placed on or close to breaks in slope or other potentially unstable slopes.
- Re-vegetation will be encouraged to minimise sediment loss. Techniques such as replacement of turves, protection of in situ seed bank, reseeding with native vegetation can be used, all with an aim to encourage viable vegetation cover within 12 months (with particular focus on riparian vegetation regeneration at locations adjacent to watercourses where fluvial erosion may be expected).
- Care will be taken to remove turves of vegetation with minimal damage using suitable equipment. In order to retain good quality turves storage time will be minimised, with an aim of no longer than 6 weeks from lift to replacement at track side. Longer timescales are anticipated at turbine and hardstanding areas due to areas involved and construction programme requirements. The aim is a maximum of 12 weeks from lift to replacement at such sites. Watering of stored and recently replaced turves will occur during prolonged weather conditions that could lead to desiccation (dry windy conditions, for example), to encourage successful re-establishment.
- Cable trenches will be laid in the disturbed material adjacent to tracks. Where conditions are suitable, that is on deeper subsoil, cable can be laid using a plough 'lift and turn' process which lifts and turns the required depth of material over, exposing the trench. The cable is immediately laid and the overlying material turned back to its original position, burying the cable. This method is effective and swift and produces very little damage to the surface.
- Where cable watercourse crossing requirements are not adjacent to track crossings suitable conduits will be placed below drain channels to minimise disturbance and erosion potential. The laying of such conduits will be undertaken using construction industry good practice techniques, with reference to SEPA CAR Guidance on engineering activities near watercourses.
- Wheelwash plants will be set up at agreed locations for vehicles coming offsite, consideration will be given to the application of dry wheel cleaning systems. A road sweeping vehicle will be employed on site to maintain the site access area in order to minimise accumulation and transport of dust, mud and other loose debris.
- Borrow pits will have appropriate and specific drainage treatment, likely to involve a series of settlement lagoons during borrow pit operation to remove particulates, with monitoring to ensure that the quality of final output is suitable for discharge to the local environment (with no direct connection to natural watercourses). Specification of treatment will be confirmed at the detailed design stage. These lagoons would be removed on restoration of the borrow pit following confirmation of runoff being of suitable quality for direct discharge.
- All excavation and earthworks will be suspended during and immediately following periods of heavy rainfall in order to minimise sediment generation and soil damage. Rainfall forecasts will be used as an early warning system.

4.3.96 In addition to the good practices measures discussed above, a number of further measures will be employed to adequately manage erosion and sedimentation due to increased sensitivity of these effects in the riparian zone (adjacent to watercourses), these will include:

- gathering detailed characteristics of watercourse crossing locations, to ensure optimum final crossing locations are identified;
- ensuring appropriate site-specific crossing structures will be employed, including use of existing culvert structures to support bridges on existing track;
- ECoW will observe watercourse crossing construction, taking account of flow conditions, erosion and sedimentation processes and use of sediment management measures;
- channel conditions will be restored to former state, with photographic evidence of pre-construction and post-construction condition;
- all excavated areas (including turbine bases and borrow pits) and soil storage zones will be carefully managed, with sediment management techniques monitored for efficacy;
- environmental personnel will monitor watercourses downstream of construction activity and have the authority to postpone or halt activities, as appropriate;

- monitoring surface water quality and provision of mobile potable water, as for pollution incident mitigation.

Modification of Surface Water Drainage Patterns

4.3.97 The principles on which the surface water management strategy will be devised are:

- minimised locations and extents where engineering works are planned in the riparian zone;
- runoff from the developed area will not be significantly different from runoff prior to development;
- runoff from the developed area will not result in any downgrading in the status or quality of downstream watercourses or habitat.

4.3.98 To achieve this, the following measures will be implemented:

- Artificial drainage will be installed only where necessary. The individual lengths, depths and gradients of these drains will be minimised to avoid intercepting large volumes of diffuse overland flow and generating high velocity flows during storm events.
- Drainage features will, wherever practical, be installed in advance of ground being cleared of vegetation, with sustainable drainage techniques specifically targeted at the substation location to mitigate any increases in flows due to the impermeable surface area of the substation.
- Cross-drains will be constructed at appropriate intervals to conduct surface flow across the track to discharge it from the drainage system. Frequent discharge points will limit the concentration of surface runoff and diversion of flows between sub-catchments.
- In-channel works will be minimised and carefully managed where necessary will reduce the potential for impediments to flows.
- SEPA will be fully consulted regarding the requirements for registration or licensing of elements of the drainage system such as discharges and watercourse crossings under the *Water Environment (Controlled Activities) (Scotland) Regulations 2011* (known as CAR).
- All watercourse crossing structures will be designed and constructed using good practice techniques and will be of sufficient capacity to receive 1:200 year storm flows, with an allowance for increased flows due to climate change.
- Watercourse crossings will not restrict water flow, hinder the passage of mammals along the banks, where mammals are present, or form a barrier to suspected fish migration. They will be designed and constructed following guidance published by the Scottish Executive, River Crossings and Migratory Fish: Design Guidance[iii] and will be engineered in accordance with CIRIA[iv] and SEPA[v] river crossing guidance.
- Additional data has been provided for the 12 CAR-applicable watercourse crossings, all which are on the River Nith system, as shown on the OS 1:50,000 mapping. Of these 12 crossings, 8 involve upgrades to existing crossing structures including 2 bridges. There is a requirement for a new bridge crossing of the Crawick Water at Nether Cog. This data includes channel characteristics, watercourse photographs, theoretical flow values, catchment area and suggested crossing types. This is provided at **Appendix 7.2**, Watercourse Crossing Guidance of the Environmental Statement.
- The crossing of all smaller watercourses will follow the SEPA General Binding Rules under CAR. **Appendix 7.2** provides details of typical smaller watercourse crossing locations (not shown on OS 1:50,000 mapping and hence non-CAR) and representative site photographs of hydrological features.
- Particular locations for abstracting surface water for concrete batching have been considered for feasibility, with abstractions planned from the Clackleith Burn and Crawick Water, with low flow conditions involving contingency locations.
- An anticipated surface water abstraction volume of 10-50 m^3/day would require a Registration under CAR. Opportunities to collect water from interception drainage channels located above the borrow pits, use of rainwater collection systems or applying water re-circulation systems to minimise watercourse abstraction will also be considered at detailed design stage.

Modification of Groundwater Levels and Flows

4.3.99 The key concerns for good groundwater management involve careful decisions involving locations of drainage and dewatering activity and ensuring such activities are undertaken sympathetically and minimised in terms of extent and time to avoid excessive influence on groundwater levels and flows. To achieve this, the following measures will be employed:

- where necessary, a permanent drainage system, typically consisting of french drains (using a gravel layer as water conduit, rather than pipework, running downhill to a soakaway zone designed to enable water to percolate back into soil), will be installed at hardstanding locations;
- any necessary dewatering activity will be limited to the minimum necessary duration, with removed water returned locally to minimise hydrological regime alteration, such discharges will be discussed with SEPA to establish appropriate level of licence;
- clay bunds will be installed to divert groundwater flow from cable laying trenches on cross-slope sections, where this is appropriate.

4.3.100 The above measures will also minimise any potential effect upon groundwater dependent terrestrial ecosystems (GWDTE) and groundwater-source private water supplies. GWDTE locations identified within 250m of infrastructure have been identified and sensitivity to the development activities evaluated and presented in Appendix 7.5 of the Environmental Statement. Private water supplies identified within the site area and downstream have been evaluated and sensitivity to the development activities evaluated and presented in Appendix 7.6.

Loss of Soils and Soil Compaction

4.3.101 This issue is closely aligned to erosion and sedimentation mitigation, discussed above.

- Prior to the availability of tracks for heavy vehicles, limiting movements to specific corridors avoiding sensitive receptors such as deep peat will reduce any effect considerably.
- Low pressure vehicles will be employed where vehicles are required to cross sensitive soil/peat locations.
- Where possible topsoil will be stripped in reasonably dry conditions and stored in a mound no more than 2m high.
- Stored topsoil will be kept from the passage of vehicles and will be prevented from intermixing with other materials.
- Where distinct soil layers are identified, excavated sub-soils will be stored separately from topsoil to enable successful restoration of the soil profile.
- Soil reinstatement will be undertaken under reasonably dry conditions to limit compaction. Soil loosening may be required in areas where heavy load traffic has occurred.

Peat Stability

4.3.102 Early identification of areas of deep peat and/or peat stability concern were an integral part of the design stage but were necessarily limited to locations where access was possible. Peat depths were typically very shallow.

4.3.103 The combination of peat and steep slopes on this site led to the instruction to undertake a Peat Stability Assessment as a Technical Appendix (**Appendix 7.2**), this involved a peat depth survey across the general site area, where access was possible through the forestry, followed by assessment of stability.

4.3.104 Where activities are close to areas of concern, a number of good practice measures will be employed, these include:

- avoidance of removal of slope support;
- avoidance of heavy loading on slopes, particularly avoiding breaks of slope;
- good drainage practice to ensure flows not concentrated onto slopes or into excavations;
- earthmoving activities will be restricted during and immediately after intense and prolonged rainfall events;

- re-establishing vegetation cover on exposed ground to anchor soil;
- on-going monitoring of key areas of concern for signs of slope instability;
- review of site conditions post-forestry clearance, to confirm indicative peat depth and for visual evidence of instability;
- creation and management of geotechnical risk register or similar management system throughout the detailed design and construction phases.

4.3.105 Further details are available in **ES Chapter 7: Hydrology, Hydrogeology, Geology and Soils** and **Appendix 7.2**, including specific mitigation measures for peat stability.

Pollution Prevention Planning

4.3.106 Pollution prevention planning prioritises prevention at source, followed by mitigation measures local to source. Pollution incident management will operate on two main principles:

- reducing the likelihood of an incident occurring;
- minimising the magnitude (or severity) of an incident that does occur.

4.3.107 In tandem, these measures will limit the potential for contamination of surface and groundwater, soil and associated habitats. To achieve this, the following measures will be implemented:

- There are 5 construction compounds planned, all construction compound locations are at least 50m from any Ordnance Survey 1:10,000 mapped watercourses on an impermeable surface and outwith SEPA's 1:200 year flood risk zone. This will be the default storage location for all chemical, fuel and oil requirements. The borrow pits are sited at least 50m from all surface watercourses. Construction activities in sensitive locations (including those within 50m of hydrological features) will be carefully considered and also supervised by suitably qualified environmental specialists such as an Environmental Clerk of Works (ECoW).
- Oil and chemical storage will meet the minimum requirements of SEPA's PPG2 and PPG26, i.e. good practice secondary containment (bund) volumes. This will apply to all temporary storage locations. All chemical, fuel and oil stores will be sited on impermeable bases within an appropriately-sized secure bund, suitable to contain at least 110% of the contents (for a single tank) or 110% of the contents of the largest container (for multiple tank storage), with default location within the construction compound. Materials will be stored in accordance with applicable COSHH (Control of Substances Hazardous to Health Regulations) requirements. Empty chemical/fuel containers will be retained within the construction compound (bunded area) until collected from site. No underground storage devices will be employed.
- Site compounds will be secure environments, with locked storage containers to prevent unauthorised releases (including via theft or vandalism).
- Storage of chemicals and/or fuel will be limited to the minimum required to serve immediate need, in order to minimise the volumes of chemicals and fuels stored on site. Biodegradable oils will be used as a substitute for standard oil/grease, wherever practical.
- Delivery and refuelling of vehicles and machinery will be carried out in specific designated impermeable and bunded areas such as construction compounds or other suitably equipped sites and will be carried out under supervision. Associated equipment such as refuelling hoses, vent pipes, delivery pipes and sight gauges will be contained within bunded areas.
- Standing machinery will have drip trays placed underneath to prevent oil and fuel leaks causing pollution. Vehicle maintenance and repairs will be undertaken in the construction compound. Exceptionally, vehicles or other equipment that has broken down will require maintenance at the point of breakdown. Special precautions will be taken in this eventuality, including the use of drip trays and spill kits to prevent pollution.
- No pesticides, detergents or rock salt will be applied to access tracks or any other site infrastructure during any phase of the project. Should exceptional circumstances occur which may necessitate the use of such materials, advice will be sought from SEPA regarding good practice and required volumes.
- Runoff from the construction compound areas carries a higher risk of being contaminated and will be treated appropriately, such as by oil interception and/or neutralisation of high alkalinity.
- Contingency measures will contain items identified in PPG21 and will include emergency plans for different pollution incidents, fire procedures, emergency contact telephone lists, spill kits located at appropriate locations on site and staff trained and equipped to deal with incidents effectively.
- There is the intention to batch concrete on-site, rather than requiring ready-mix cement to be brought to the site. Concrete batching plants will be located at least 100 m from watercourses, positioned in secure contained areas that have a separate drainage system outwith flood risk zones and where groundwater is not expected to be close to the surface. The locations of borrow pits BP02 and BP03 are the planned sites for concrete batching. The washing-out of mixing plant will be carried out in a contained area. Wash water and surface runoff from these areas will be adequately treated to deal with suspended solids and high alkalinity before discharge. Lined settlement ponds will be used to prevent infiltration of alkaline runoff. Consultations will be carried out with SEPA at the detailed design stage regarding the discharge licensing requirements, under CAR, and agreement for precise locations. Good practice measures for abstracting water for concrete batching is considered in the Modification of Surface Water Drainage section below.
- Pre-cast concrete structures will be considered for all appropriate locations. Use of wet concrete in the vicinity of watercourses will be minimised and carefully controlled. Competent personnel will confirm that details such as rainwater removal and good quality shuttering are in situ prior to pour. Particular care will be taken to develop robust procedures where concrete will be used between cables and stream beds (to protect the cable from scour) at excavated cable watercourse crossing locations. Geochemical testing will be undertaken to establish the likelihood of sulphate attack on concrete. If necessary, sulphate resistant concrete will be used.
- The washing out of concrete mixing plant, if deemed necessary to be carried out on site, will be carried out in a contained area and a settlement and re-circulation system for water reuse will be discussed with SEPA. Wash water will be adequately treated to deal with suspended solids and high alkalinity before discharge. Wash out activities for the plant and vehicles will be carried out in accordance with a clear procedure developed in consultation with SEPA, with a key element being clarity of process for operators. A lined settlement pond will be provided to prevent infiltration of alkaline runoff into soils, groundwater and adjacent watercourses. If a discharge licence is required under the CAR Regulations, consultations will be carried out with SEPA at the earliest practical stage in the detailed design process.
- Ground investigations will be undertaken across the Development Area, including any location where directional drilling is deemed necessary, such as, should cables require to be drilled below stream beds, to ensure ground conditions are suitable. If grout or any drilling lubricants are to be used, these will have appropriate protocols developed and communicated for storage, use and collection.
- Should any contaminated groundwater or surface water be identified, work will cease, enabling investigation of the source of contamination and development of measures to contain and/or remove pollutant (this will include any water within cable trench).
- All sewage and waste water will be collected on site in an appropriately designed and located tank and will be tankered from site at an appropriate frequency. Disposal of sewage from the site will be carried out by methods recommended in PPG04. In all cases, final disposal will be into the local sewer system at a location agreed with Scottish Water.

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[i] CIRIA (2006). Control of water pollution from linear construction projects: technical guidance. Publication C648; Construction Industry Research and Information Association, London.

[ii] CIRIA (2007). Site handbook for Construction of SUDS. Publication C698: Construction Industry Research and Information Association, London.

[iii] Scottish Executive (2000). River crossings and migratory fish: design guidance.

[iv] CIRIA (2010). Culvert design and operation guide. Publication C689; Construction Industry Research and Information Association, London.

[v] SEPA (2010). Engineering in the water environment, good practice guide: construction of river crossings, 2nd Edition. Scottish Environment Protection Agency.